IX.

PROCEEDINGS OF THE CONSULTANT'S COMMITTEE ON PATHOLOGY

Translation prepared by:

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Death caused by heat and burning.
(See Section V, Article 5)

Death caused by dust.
(See Section V, Article 6)

Carbon monoxide poisoning and CO test.
(See Section V, Article 8)

Review of the non-organic heart-diseases, vegetative disturbances of regulation (postinfectious and others).
(See Section VIII, Article 7)

Acute tuberculosis of juveniles.
(See Section XIII, Article 8)

1. Fatal early coronary sclerosis.

Stabsarzt (Captain, MC.) Prof. ERICH MUELLER

The present report concerning early coronary sclerosis of juveniles is based upon 127 cases of coronary scleroris with fatal termination in soldiers between 20 and 40 years of age and corresponding control examinations of persons of the same and higher age.

The number of fatal coronary changes in youths appears to be raising in comparison to the period before the war.

The main object of the study was to solve the following problem:

1. Why is sudden death in cases of juvenile coronary sclerosis occurring so frequently without any noteworthy previous clinical phenomena?

2. Does fatal early coronary sclerosis differ morphologically in any demonstrable aspects from the alterations observed in advanced age?

3. To what extent may the fatal termination of early sclerosis be ascribed to influences of the war?

Clinical statements as to the causes of death were as follows: Coronary death after physical strain (drill, sport, marching) 24 cases; after excessive drinking, usually during the preceding night 9 cases; caused by an extraordinary rapid drop of temperature 7 cases; caused by overloaded stomach 5 cases; while bathing 4 cases; during or after a truck ride 3 cases; after acute abuse of nicotine (anamnesis: heavy smokers) 2 cases; fright, or psychic excitement 2 cases; after testing gas masks with bromacetone gas 1 case.

29 of 65 reliable reported cases were, as was expressly emphasized, heavy cigarette smokers with a daily ration of 15 - 50 cigarettes (according to LOESER it was found that 7 - 10 per cent of the examined soldiers smoked more than 12 cigarettes daily).

Previous attacks of heart troubles are mentioned only 19 times; with a surprisingly high percentage death occurred in the first attack and was due in 50 per cent of all cases to a particular cause.

The non-fatal early changes appear under the microscope as simple thickenings of the connective tissue, mostly with lipoids deposited in a strikingly regular way. If there are larger centers we find hyaline structures in addition, and the lipoid deposits are shifted into the deeper structures of the intima. With an increased spread of the disease the nourishment of these zones near the media becomes worse. Consequently in 13 of 40 control cases (in which death was not due to circulatory disorders) the fibres of the connective tissue showed slight evidence of swelling.

The fatal early sclerosis of juveniles, however, shows a marked tendency to considerable swelling and necroses of swollen tissues appearing in the connective tissues of sclerotic focuses. The histological examination of 45 fatal coronary cases in juveniles revealed a fatal focus without marked swelling in only 5 cases. The lipoids located in such focal areas will be cast off by the progressive swelling towards the edge of these areas and will frequently be subject to the formation of crystals following the direction of the swelling pressure.

Fatal coronary cases over the age of 40 show in almost every case symptoms of necrosis in the center of the foci in the intima. Half of these cases show simple necrosis of the fibrous vascular tissues without swelling of the fiber substance. The swelling power and tendency to swelling of coronary foci distinctly decrease as the hyaline fibres are hardening and the protein colloids decaying.

The swelling process itself can only develop in the presence of protein substances. The fact that the swelling process most frequently occurs in juveniles is due to the greater tendency to swelling of freshly hyalinized connective tissue fibres and to the particular tendency of young tissues to swelling.

The swelling is of pathogenetic significance for coronary fatality, as it brings about an acute narrowing of the diameter of the vessel, which leads to fatal insufficiency of the blood circulation or coronary thrombosis.

The senile sclerosis of the coronary system is not equally prone to acute swellings of the intima. It is particularly dangerous, and fatal termination is frequent.

How extensive and how often a coronary spasm may bring about anginal troubles without simultaneously causing anatomical parietal changes is difficult to determine at autopsy. By our postmortem examinations, however, it was ascertained that fatal coronary disease of juveniles is almost always combined with serious parietal changes. We should keep that in mind when evaluating vasoneurotic complaints.

The main factors aggravated by war-conditions which may cause the above mentioned intima swellings chiefly affected already existing coronary foci. Such factors are-above all conditions caused by lack of oxygen (loss of blood, carbon monoxide). According to our investigations heavy smoking too may be counted among the factors that bring about necrotic swellings of coronary centers. It is also possible that climatic influences may produce swelling in connective tissues by modifying the turgor of the tissues. Sporadic cases of death caused by most serious acute swelling of the focus may be interpreted in favor of this possibility, as the patients died during the passage of very bad atmospheric conditions.

2. Early coronary sclerosis.

Stabsarzt (Captain, MC.) MEESSEN

The collective examination of sudden heart diseases with fatal termination in cases of early coronary sclerosis confirms the personal experience of each pathologist that the number of these deaths has doubtlessly increased in comparison to the last war, whereas a corresponding increase of coronary sclerosis has as yet not appeared in so far, as one may judge from the autopsy reports to date. It is pointed out that coronary sclerosis occurs less frequently among Japanese.

As to the origin of early sclerosis local edematous formations and swellings in the intima play a part as initial injuries. There are, moreover, fibrinoid swellings and hemorrhages to be observed in the intima. The finding of partial thrombosis is of some significance for the origin of (circumscribed) stenoses. In the media hypoxemia adiposis of the smooth muscular fibres is brought about. Especially characteristic of the early sclerosis are active secondary, reparative inflammatory modifications. This inflammatory character of early sclerosis is attributed to the fact that the capacity of reaction is better in the juvenile organism. Transitions between early sclerosis and vascular diseases of a more inflammatory character were mentioned.

Hypoxemia is discussed as one of the pathogenic factors. No statistical material is available as to the hypoxemic injuries of motor vehicle drivers caused by carbon monoxide. The possibility of infectious-toxic injuries causing the early sclerosis is emphasized, and at the same time the importance of increased blood pressure and fluctations of the blood pressure should not be overlooked. It is probable that abuse of nicotine too is of significance. In brief it may be said that no single factor may be held responsible as an initial cause of this disease, but it may rather be said that the combination of various factors has to be considered. An increase of sudden cardiac death has, as far as early sclerosis and early thrombosis are concerned, not been recorded since 1939/40.

About 70 per cent of the sudden cardiac deaths due to early sclerosis came to notice by the anatomical findings. In 20 per cent more the anatomical findings in connection with the etiological history justify classifying the cases as sudden cardiac deaths. In about 6 per cent inflammatory modifications are observed, which have to be considered apart from sclerosis. In 4 per cent the anatomical examination was negative. As to the latter groups attention is called to the discrepancy between the insignificance of anatomical findings and acute cardiac failure. The possibility of purely functional trouble causing cardiac failure must be admitted.

3. Coronary diseases in young people.

Oberstarzt (Colonel, MC.) Prof. UHLENBRUCK

The frequency of coronary diseases in juveniles will be confirmed by any clinician. Whether the increase of the number is absolute or relative remains unsettled. Constitutional, physical, psychic strain, nicotine, cold, carbon monoxide and changes of climate may be of influence. In addition to the phenomena pathologically and anatomically demonstrated, of hypoxidotic-acidotic swelling the problem of spasm and atony as a functional regulatory disturbance of the coronary blood circulation must be considered. What makes the whole problem of juvenile coronary disease so difficult is that there are comparatively so few patients organically seriously endangered, and these often have their fatal cardiac attack without any preceding symptoms, and furthermore, that these comparatively few cases have to be picked out of a host of cases showing nervous regulatory disturbances of the coronary circulation or anginal complaints. The surgeons and clinicians follow entirely different methods in picking out these cases. In any cases the experienced army surgeon will soon learn to classify correctly the vaso-labile sympathicotonic, the vagotonic with vagus heart, the man with overtrained athletic heart, the patient with Basedow's disease, the man with a propensity to circulatory collapse (collapse type), the emphysematous, the allergic, the case with a focal toxicosis, the case with a Roemheld complex, all of which have more or less pronounced anginoid cardiac complaints. Generally speaking the army surgeon is able to avoid blunders by taking into consideration the soldiers psychic structure, constitution, history, the statistics of age, the blood pressure readings, the test of circulatory function, the erythrocyte sedimentation rate and the control of temperature.

He must know the differential diagnosis of ulcus ventriculi, bilious colic, appendicitis. If organic coronary disease is suspected the case should be brought before the clinician in the hospital for differential diagnosis, which, as regards cardiac infarct, can attain almost anatomical exactness by means of the electrocardiogram. Infacts of anterior and posterior areas give typical EKG if, on the other hand, the conduction mechanism is affected, the infarct is likely to be concealed by different kinds of blocks. The infarct is traceable after eight hours at the earliest, in three to four days at the latest. "Silent" infarcts not manifesting themselves by EKG changes are very unusual. ST and

T deflections of the EKG together with the anamnesis and clinical findings often permit in addition a specific differentiation between myocarditic processes, organic coronary modifications, and reversible fluctuations of the coronary blood circulation of vasomotor origin. In brief summary:

1. An organic coronary insufficiency may be taken for granted:

a. in cases of attacks of angina pectoris in men who show typical ST depression in the attack (which is generally reproduceable in the functional EKG);

b. in cases of typical attacks of angina pectoris with femur block, arborization block, Wilson block etc. after the attack - unless myocarditis is suspected;

c. in cases of angina pectoris complaints with frequent extrasystoles in various places of origin after the attack and especially after the functional strain of the attacks;

d. in cases of transition from the EKG of coronary insufficiency to the EKG of cardiac infarct in the course of several attacks;

e. in those cases showing a typical EKG after a severe infection combined with stenocardiac complaints, and also in cases of intense exposure to excessive cold, of carbon monoxide toxication and in cases of a trauma of the chest wall.

2. An organic injury is possible:

a. in cases of hypertonias, even of juveniles, which show the typical hypotrophic form of EKG, although it is still debated whether this form of ST depression is not merely due to the changes of the myocardial substance;

b. in asthmatics with a dextrohypertropic form of EKG and typical ST depression in the attack and after working.

3. An organic coronary disease is not likely in the following cases:

a. ST depression and T modifications after infections without anginal complaints. In this case we usually have to deal with myocarditis;

b. in coronary EKG's of pericarditis, where we have an anemia of the external parts of the myocardium caused by pressure. The coronary EKG's of pulmonary infarct are reflexions of vascular spasms;

c. the coronary EKG's of thyreotoxicosis, myxoedema, tetany and of diatebes simulate metabolic disturbances of the myocardium and ordinarily they are not reproductions of coronary changes;

d. the ST depression of nervous tachycardias, of juvenile hypertonias, of vegetatively labile persons, of allergics, of cases with manifest focal toxications are not caused by organic coronary diseases.

Besides the EKG roentgenography may give an indication (enlargement of the heart, chronic pulmonary congestion, kymographic zones of calcification of the coronary vessels, aneurysma of the heart). The basal metabolism test can be of importance, but must be regarded critically.

Discussion of the reports on early coronary sclerosis:

LAUCHE: We have to be particular about the matter as to whether coronary sclerosis has increased only during the war, or whether there has been general increase in recent decades. On the strength of the material published by MEESSEN, I am inclined to deny the first of these possibilities. The latter possibility, however, must be answered in the affirmative according to the material of NUERNBERG.

OSTERTAG: The cases of coronary sclerosis among patients younger than forty or fifty years of age have not increased during the war but according to my own findings since 1936. Among the causative factors recurrent infections are of utmost importance. Reactions in the lymph channels and the lymphatic vessels are frequently observed, especially in the patients suffering from recurring pharyngitis. Chronic relapsing pharyngitis is very important especially in those cases in which general vascular symptoms are observed with juveniles. It must be pointed out, however, that in these cases the cause of death, the so-called "coronary death", may not be ascribed positively to coronary disease in consideration of the co-existing sequels to the vessel disease in the cerebrum or in the pancreas.

It is against my experience to consider the vascular involvement of the coronary system separately without a thorough examination of the other vessels of the body. If the general involvement of the vessels has a special effect upon the coronary system the reason for this is due to local and often to constitutional factors.

SIEGMUND: It is my own opinion that specific proof of an increase of coronary sclerosis in juveniles caused by the war, cannot be established. Coronary sclerosis resulting in sudden death of juveniles has always been found frequently as long as the material which is taken as a basis for our statistics is not taken only from the pathological institutes of the hospitals but also from the so-called police autopsies. The question of utmost importance is found in the relations between the functional disturbances of the blood circulation and the development of changes of the wall of the coronary vessels which can be proved morphologically. It is my opinion that the changes which take place in the walls of the coronary vessels are generally the consequence of local disturbances in the walls of the vessels after alteration of the tonus and the blood circulation caused by the nerves. We must take into consideration not only spasms but also atonies. All varieties of morphological changes, from the hypoendothelial formation of fibrinoid with and without thrombosis to the centers of swelling and necrosis; all of them must be considered under the point of view of an altered per-

meability of the endothelium with a change in the relations of the blood circulation of the blood tissue. In the evaluation of the functional disturbances of the blood circulation we must take into consideration the particular anatomical condition at certain points along the coronary vessels as observed by ZINCK from my institute. Besides this we have to consider the extent of the changing anastomosis between the right and the left coronary artery in connection with the functional circulatory disturbances. The point of attack of the initial stimulus is the vegetative nervous system. The tonicity and the sensitiveness which may change even in the same person is decisive for the effect of the stimulus. In the case of an extra sensitivity of the vegetative nervous system nicotine may be important for initiating changes of tonus and may even be held responsible for fatal changes of the blood circulation. Besides this other factors, such as infectious-toxic and psychic factors, are important also.

GRAEFE: I would like to ask the speakers what significance they attribute to lipoid metabolism in connection with the origin of coronary sclerosis in juveniles. This question has arisen from the observation that we find coronary sclerosis of the same kind and in the same incidence in Russian prisoners of war, as long as they are well fed, as we find in German soldiers.

In case of a longer lasting inanition the frequency of atherosclerotic centers in the vessel system diminishes rapidly and is not observed anymore in case of malnutrition which has existed over years. This observation confirms that the fat metabolism is of utmost importance in the developing of atherosclerotic centers. The importance of nicotine in the case of vessel damage is demonstrated in the following observation: A soldier employed as a cigarette taster and who had tested about 2 - 300 cigarettes daily and who had contracted a nicotine intoxication was found to have a completely normal vessel system when he died years later.

ZINCK: I thank Prof. SIEGMUND for the hint in connection with the throttle mechanism of the heart muscle which I have referred to several times. I would like to ask the two speakers if they have observed an accumulation of these centers in the area of these throttle spots, especially in the small vessels. Here, we may find a link from the functional to the pathological anatomical spheres.

RANDERATH: He asks which anatomical changes are suitable for judging the age of swelling of the intima. It is remarkable that neither of two anatomical-pathological specialists refer to findings in the heart muscles in the case of acute swellings although this would furnish a clue to the age of the changes of the intima.

HUECK: The swelling may develop very quickly. This does not account for the origin of the stenosis because it is a symptom of the disturbed vasomotoric tonus. It may be found also in other arteries. From the etiological point of view first of all fresh catarrhal inflammations of the respiratory passages are important if persistent foci of previous inflammations still exist.

NONNENBRUCH: The difficulty in detecting the susceptibility to coronary thrombosis is illustrrated by the following example: In the morning careful examination including EKG without findings. In the evening myocardial infarct. If infectious foci are thoroughly eliminated the prognosis of coronary thrombosis in juveniles is favorable according to my personal experience.

BUECHNER: 1. Contribution to the problem "functional-organic". Recently it was reported to me that in a case of arteriosclerotic coronary infarct a sound coronary system and a sound heart were diagnosed eight days before fatal termination occurred during a thorough examination of the functions of the heart.

2. In connection with the question of side effects of smoking, especially cigarettes: I would like to point out that contrary to the negative findings of GIESE we have numerous cases of juveniles afflicted with severe coronary sclerosis even with fatal termination directly due to smoking to an excess.

MUELLER, Erich: Final remark: I wish to say that in the case of subsidence of the swelling of centers in the intima the pressure of the circulating blood is not of great importance. The tension in the completely closed swelling center is too great and the liquid causing the swellings has no channels of exit.

In connection with the question how quickly swellings may develop I would like to point out that the movement of lipoids and chromatic substances out of the center of swelling and their deposit in the coronary zones and at the same time symptoms of an unequalized swelling pressure may be the evidence of the suddenness of the swelling. Besides this we rather seldom found distinctly developed and macroscopically perceptible muscle necrosis or advanced heart muscle changes in juveniles which fact also indicates an acute swelling with sudden fatal termination.

As to the vessel-wall-lipoidosis in the case of arteriosclerosis this problem is of minor importance compared to the swelling symptoms which are dependent on protein factors. It seems to be advisable to contrast a late lipoidosis to a premature lipoidosis caused by the infiltration of blood plasma into the vessel wall, spread rather regularly over the intima center. The late lipoidosis develops in the insufficiently nourished medial zones of larger intima centers probably in the way of a fat phanerosis with an anoxia of the tissue and a decay of hyaline fibre structures in these zones.

MEESSEN: A higher incidence of sudden fatal coronary cases in drivers of motor vehicles was not observed. Generally speaking it may be said no particular branch of the service has a marked incidence of this disease. The examination of the heart muscle revealed that fifty per cent of the cases were due to previous injuries.

Statements concerning early coronary sclerosis.

1. The systematic examination of numerous fatal coronary cases in soldiers between the age of twenty and forty five reveals, with an amazing regularity in the arteriosclerotic centers, marked acute swellings in contrast to similar cases among aged persons. The centers of swelling usually associated with marked decrease of efficiency may lead either to an acute irregularity of the blood circulation in the heart muscle or to fatal coronary thrombosis. These findings were made at the same time by the Army and the Airforce. They confirm that in early coronary sclerosis in juveniles sudden death very often occurs during the first attack. Reparative inflammatory changes are more frequent than in older persons.

2. The changes and the resulting acute coronary death of young soldiers may be ascribed to a certain extent to the abuse of tobacco as observed in thorough examinations by the troop surgeons. Infectous toxic influences must also be considered. It cannot be proved, however, that CO is often involved.

3. During this war an increase of the fatal coronary sclerosis cannot be proved statistically.

4. Clinical experience confirms the existence of a large number of fatal cases of juvenile coronary sclerosis which very often appears without any preceding symptoms.

5. The clinician is in a position to control the course to a certain and important extent pathologically as well as anatomically.

6. The diagnosis "Coronary insufficiency" should take the etiological aspect into account.

7. The troop surgeon is in aposition to differentiate which patient is seriously endangered and which one probably not according to the anamnesis and the constitutional conditions of the patient. If a serious prognosis is foreseen the patient should be brought to the hospital as soon as possible for clinical observation.

4. Cases of sudden death in troops.

Stabsarzt (Captain, MC.) BOEMKE

By sudden death is understood a transition from apparent health to death taking place in a few seconds without external injury. Furthermore it will be considered a case of sudden death if the patient dies unexpectedly after a relatively insignificant illness or after a short indisposition. It is still necessary to speak of sudden death in such cases where the autopsy reveals a severe chronic disease as accounting the fatal termination if the particular disease did not appear clinically. Fatalities due to external influence in consequence of a poisoning will not be considered as cases of sudden death as they were caused either intentionally or unintentionally.

In consideration of these points of view about 3000 cases of sudden death were thoroughly reviewed. Of these 1816 cases are described as sudden death cases in the sense of the above definition. The classification of the basic diseases causing sudden death reveals, in accordance with all other known statistical material, that the failure of the heart or of the vessel system accounts for by far the greatest number of these cases (1496). 70 cases of sudden death were caused by some failure of the central nervous system. In 35 cases death was due to an illness of the respiratory passages, in 32 cases - according to the findings of the autopsy surgeon - as a result to a status thymico-lymphaticus. 14 cases of sudden death were due to illness of the other organs of internal secretion, in 8 cases we found an illness of the digestive system. In 6 cases by an allergic reaction and in 8 cases by a cerebral or lung embolism. 46 cases of sudden death are especially remarkable because of the unusual pathologic-anatomic findings. In 95 cases a genuine pathologic-anatomical cause responsible for the sudden death was not observed.

When considering the incidence of sudden death of soldiers with regard to age we find that the peak of mortality lies between the age of forty and fifty. This fact finds its explanation in that soldiers older than fifty years are rarely drafted.

When considering the incidence of sudden death with regard to different countries, respectively the different frontiers, we see that the homeland ranges first with 1199 sudden death cases. Then comes France with 229 and Russia with 160 sudden death cases and then Poland with 107 cases, and with far less cases the rest of the countries. It may be concluded therefrom that the conditions at the different frontiers do not influence the incidence of these sudden death cases.

In 294 cases sudden death occurred while dressing, washing, undressing, after meals, while painting, playing at cards, in conversation and while asleep. In 166 cases it appears from the anamnesis that death occurred after excessive strain either during the service or otherwise.

There is hardly any case of sudden death during or after a combat or after strenuous marching. The greater part of the above mentioned 166 death cases rather occurred while indulging in sport either in the service or voluntarily or after strenuous missions. Several cases of sudden death occurred also during or shortly after guard duty. In 125 cases death occurred during service in the orderly room or in the barracks without previous strain. 109 cases of sudden death occurred in the street or in public restaurants, 79 when traveling.

Among the many external factors causing sudden death we must mention psychological excitement with symptoms similar to angina pectoris. Furthermore it is worth while mentioning that death occurred in a few instances after participation in merry parties the previous night. In 353 cases of sudden death the circumstances which led to the sudden death were not known. As far as information about profession and military rank was available it was found that 1409 soldiers and 324 officers and officials were concerned. An especially high incidence to a particular group or profession was not observed. With regard to the relatively high incidence of sudden death cases in officers and officials it must be born in mind that their average age is much higher than the average age of the enlisted men and that, as was pointed out in another place, coronary insufficiency with fatal termination was relatively high in officers. In several cases the diseases of the organic system were subclassified for the purpose of this lecture, according to the exact seat of the fatal disease and especially important rare findings were given special attention: (In cases of sudden death, caused by diseases of the heart; coronary aneurysm, ruptures of the aorta in consequence of an idiopathic necrosis of the media, rupture of the heart after an old trauma. In sudden diseases of the central nervous system: Several cases of swelling of the cerebrum, one case of multiple sclerosis. In cases of sudden death due to special causes: Three cases of tuberculoma of the heart, one case of cysticercos. In diseases of the endocrine organs: one case of basophilic hypophysis etc.)

In conclusion it must be emphasized that a full report on the cases of sudden death in troops cannot be given because there is almost no disease which after a latent course may not terminate sudden death. In order to determine the degree of disability contracted in the service it is essential to ascertain the anamnesis as correctly as possible by the line surgeon as well as by the pathologist. It is required as a matter of course that the line surgeon be present at the autopsy. At the same time the interest of the soldier and next of kin requires an autopsy in each case of sudden death, which should be performed only by a pathological specialist. A very detailed histological examination of all vital organs will be necessary if the case is uncertain. At the same time a blood test should be made with a view to determine blood alcohol even in those cases when an alcohol abuse is not suspected. At the same time it will be necessary to make a chemical analysis of the contents of the stomach and of the bowels and of the urine if the macroscopic findings and the histology cannot explain the cause of death. Even bacteriological examinations should not be forgotten if the cause of death cannot be varified.

Statements in connection with sudden death cases in troops.

1. The majority of all sudden death cases in troops caused by natural factors are heart and circulatory insufficiencies. In this group the fatal coronary cases are most numerous. Fatal termination of myocarditis, valvular deficiency and hypertonia range next. Small groups of fatal cases caused by diseases of the central nervous system, or, of the respiratory organs, of the endocrine organs, of the kidneys, and of the digestive tracts.

2. In every sudden death case an autopsy should be performed by a pathological specialist as quickly as possible after death.

5. Macroscopic-anatomical findings in hepatitis epidemica.

Oberstarzt (Colonel, MC.) Prof. KALK

255 liver punctures were performed in case of hepatitis epidemica. The puncturing needle was directed with the eye by means of a laparoscope (KALK). During this process the liver could be visualized.

In the first phase of the disease the liver was swollen and of red-brown color in contrast to the green color of the liver in mechanical icterus. The liver was of soft consistency and the serosal surface was diffusely spotted and red colored. During the first phase and when the illness was at its height quite often the gall-bladder was only slightly filled or empty, its tonus was weak. The spleen was often found to be enlarged. In the following phases the liver usually becomes smaller and harder. Sometimes, however, it stays larger than normal and shows a little flat hump on its surface. The diffuse reddish spots of the serosa-cover become scarred and somewhat white. In this phase the gall-bladder is amazingly engorged like a case of congested bladder with vascular dilatation visible on its surface. In most of the cases the liver and gall-bladder showed a normal macroscopic picture after healing. Two cases, however, were different. In one case we found a larger brown and hard liver, eleven months after the onset of a serious icterus which had not come to clinical cure. Its surface showed deep septic connective tissue and radiating scars similar to a hepar lobatum. In the other case we found a surprisingly light, almost reddish white liver three months after the beginning of a serious hepatitis epidemic which could not be healed clinically. On its surface we found numerous dark red-brown islets differing in size from a cherry to a walnut with a raspberry-like surface. They probably were fresh liver tissues.

6. The histological picture of the liver in hepatitis epidemica, obtained from biopsy material.

Stabsarzt (Captain, MC.) KUEHN

By means of the directed liver puncture of KALK we have made 179 liver punctures in the cases of 149 patients with jaundice. Most of the cases have to be considered as hepatitis epidemica according to the anamnesis and the course of the disease. The smaller group of the cases showed symptoms which formerly would have been considered as icterus catarrhalis. The biopsy specimen were obtained in all phases of the disease, from the second day of the jaundice to the convalescence. One group of the patients was punctured several times (up to three times) in order to follow up the histological changes in the liver. Even some cases in which the disease was ½ or 1 year old were examined.

In conclusion the results of these histological examinations are as follows:

The very first phases of the disease predominantly show changes in the periportal areas. Besides a loosening of the connective tissue and a dilatation of the vessels and of the lymphatic spaces we see here an infiltration with cells of connective tissue origin. On the other hand we find smaller quantities of lymphocytes and plasma cells and isolated eosinophilic leucocytes.

In the lobe itself we observe only trivial changes in this early phase of the disease, first of all isolated disseminated liver cell necrosis which leads to the change of the liver cell into hyaline lumps with a pyknotic nucleus or, which may also lead to a complete loss of the nucleus. In the early phases of the disease liver cell necrosis is found mainly in the periphery of the lobe and only very occasionally in the rest of the lobe.

The reticulo-endothelium shows swelling and mobilization of varying extent but we do not yet see any proliferation.

Very soon we see extensive changes inside the lobe, The above described areas of liver cell necrosis are found in greater numbers. They are spread all ober the lobe but generally keep their disseminated structure. The hyaline lumps are cast off the trabecula-unit and absorbed by KUPFFER's stellate cells. These cells proliferate diffusely in the lobe and are very active. In general they are lying free in the lumen of the capillaries as round cells. A part of the KUPFFER's stellate cells show an intense accumulation of fine-grain pigment, which, according to its staining characteristics must be looked upon as cell decomposition pigment after phagocytosis of necrotic liver epithelium (erythrocyte decomposition pigment).

In this stage the bile capillaries effuse homogeneous protein which, in the further course of the disease, imbibe bile pigment and give rise to the well-known biliary thrombosis. These findings are considered to be the expression of a primary "albuminocholia" in the case of hepatitis.

A a symptom of a beginning regeneration of the liver tissue one observes very early a mitotic liver cell division. In this phase of the disease amitosis is seldom observed. In general the liver vessels contain an abundant amount of glycogen while an adiposis was never observed.

The reaction in the periportal areas still increased in this phase of the illness. The small biliary ducts may show an abundant profileration. Inflammatory symptoms are not observed.

Some of the cases reach their peak degree with the above described changes. The changes inside the lobe subside quickly. Amitosis is an important feature of the regeneration during the healing process. The reticulo-endothelial reaction may persist for some time longer than the clinical aspect of the disease. This fact is rather regularly observed with regard to periportal infiltration. Finally such cases heal without any residual symptoms.

In a second group of cases which show a more severe and especially protracted course the center of the lobe shows more loss of parenchyma which is compensated by a typical and amitotic regeneration. The latticelike tissue frame work always remains intact even in case of the most serious destruction of the center of the lobe. During the healing process of such cases there is always an increase of the collagenic fibres about the central vein, sometimes even a connective tissue extension of the periportal areas and the proliferation of collagenic fibres inside the entire lobe.

A third group clinically characterized by its chronic course shows a specific formation of connective tissue during the healing process principally a formation of connective tissue "streaks" between the very broad areas which, for a long time, are infiltrated by fibres and strong sclerotic lobe centers. These pictures resemble a beginning liver cirrhosis, but the development of a true cirrhosis could not be detected.

In their entirety the changes are considered to be the expression of a diffuse inflammatory reaction of the organ due to an injurious agent infiltration from the portal vein or from the greater circulation in which the typically disseminated arrangements of the necrosis speaks for a direct attack of the hypothetical excitant on the cells of the liver and against the effect of additional related disorder of the blood circulation. A "serous inflammation" was found only in seriously destroyed lobe centers, never, however, in early cases. It is refuted that a serous inflammation plays a part in the pathogenicity of hepatitis. No difference in the histological pictures of hepatitis epidemica and of icterus catarrhalis could be ascertained.

Discussion concerning the lectures on the biopsy picture of hepatitis epidemica.

NONNENBRUCH: Hepatitis epidemica and icterus catarrhalis cannot be separated either clinically or pathologic-anatomically. There is always in question a preponderant reticulo-endothelial reaction. In clinical cases of a

pseudo-hepatitis epidemica a true hepatosis was found anatomically. It was a Morbus Weil. The supporting tissue remains intact. According to our own findings no case of final development into liver cirrhosis occurred. There are protracted courses of the disease without any progression in the anatomic findings. Functional disturbances may be completely dissociated. Occurrence of bilirubin, Felix-reaction (para-oxyphenyl-pyro-racemic acid) galactose and santonin test, must often be made at the same time.

LAUCHE: In judging the histological findings in liver puncture biopsies greatest caution must be taken when comparing them with post-mortem findings. Seemingly broadened Disse's spaces may be also caused by physiological contents of glycogen. An observation by BRASS of the clinic of NONNENBRUCH proves that there are also cases of hepatitis epidemica without icterus. In that case the patient was punctured three times. The last puncture was done during a clinical relapse without icterus with the typical histological findings of a typical hepatitis epidemica.

SIEGMUND: A special discrepancy between the findings in the liver at autopsy and puncture biopsy do not exist if the peculiarity of the liver is taken into consideration. Each evaluation of puncture biopsy of diseased cases must start with the normal picture of the biopsy and not with the usual liver findings at autopsy. The normal picture of the biopsy is characterized by an abundant glycogen content of the liver cells and the vegetable like character of the protoplasma. Artefacts due to fixation methods must be taken into consideration. The condition of the circulatory vessels must not be judged by the puncture biopsy. The significance of the periportal infiltrates as an incipient change requires further examination. In those early cases that I observed the periportal changes did not occur regularly and extensively enough so that special significance could be attached to them. They are also found in livers without icterus epidemica. All the other changes are found in livers at autopsy as well as in my puncture biopsies. (See: "Kriegstagung der Gesellschaft fuer Innere Medizin", Wien, 1943.)

WURM: The appearance of liver cell necrosis seems not to be an indication of the seriousness of the disease. I remember very well one case of a sporadic icterus which led to the death of the patient after a lapse of three days and which did not show any liver cell necrosis.

MUELLER, Erich: Survey on preliminary examinations of 125 liver puncture biopsies in cases of hepatitis epidemica in the Mediterranean Area in collaboration with Oberarzt (1st Lt., MC.) Prof. Dr. BOCK (clinical picture). In judging histological changes it is important to be acquainted with the characteristics of non-diseased liver puncture biopsy. At the same time we must take into consideration changes occurring in the quick fixation of fresh tissue. Here the evaluation of a cloudy swelling of liver cells may lead to a faulty diagnosis. To its greater part the findings of the histological picture of hepatitis epidemica of the Mediterranean Area is similar to the above

described findings. In the earlier phases of the clinical picture we find periportal cell infiltrates, street-like proliferation of the capillary endothelium, symptoms of swelling and decay of liver cells, usually without any recognizable preference of certain areas of the lobe. Very often it is restricted to a few liver cells only. We did not see any symptoms of a previous or still existing serous inflammation. At the same time it is amazing to note that adiposis of the vessels in the liver parenchyma does not exist which, however, was sometimes present in KUPFFER's stellate cells. The iron-test, with the Berlin blue reaction, is usually negative. Bile deposits were found intra-cellularly and in the biliary capillaries in varying quantities. Early, or sometimes in a later phase, there comes into existence a localized little knot-like accumulation of KUPFFER stellate cells. Mostly they are found in the vicinity of decayed liver cells. It is not yet certain whether this is the symptom of a true or a pseudo proliferation the latter being caused by shrinking of the capillaries in the way of a circumscribed parenchymal atrophy. No increase of fibres in an advanced stage of the disease, i.e. no symptoms of sclerosis became apparent in the preliminary results of fibre observation by silver staining which, regarding the previous conditions of a serous inflammation would be expected in at least some cases. Patients who were punctured repeatedly because of relapses occurring during the period of their hospitalization showed a return of the acute early picture of periportal infiltrates, capillary endothelium proliferations and injury of the liver cells. Examinations of these cases made up to 220 days later did not show any symptoms characteristic of cirrhotic processes.

MEESSEN: Only in a single case of a serum disease did the liver puncture biopsy reveal pathological findings.

Statements concerning: "The biopsy picture of hepatitis epidemica.

1. In early cases the laparoscopic picture of the liver in the case of hepatitis epidemica reveals an enlargement and a redness spread either diffusely or in spots with a thick edge and a soft consistency, in contrast to the green color of the liver in the case of mechanical icterus. The gall-bladder is often empty and loose. Some time later the liver is smaller and harder and frequently has small flat humps on its surface, the gall-bladder being filled. After the healing most of the cases show a normal liver and gall-bladder. In very few cases we found pictures resembling cirrhosis after the clinical healing of particularly serious and long lasting hepatitis epidemica.

2. The macroscopic picture of hepatitis epidemica shows in its early phase strong mesenchymal lymphocytic plasma cell infiltrates in the periportal areas and in the liver parenchyma, disseminated single cell necrosis. In the further course of the disease we see proliferation of the lobe endothelium, in serious cases central parenchymal decay. The decayed liver epithelium is completely regenerated, in general

by mitosis and amitosis. Periportal infiltrates and small endothelium knots frequently outlast the clinical disease. In very serious and chronic cases we sometimes observe streaked developments of collagenous connective tissue. According to the material at hand it was not possible to prove that these cases resulted for certain in liver cirrhosis.

3. The clinical diagnosis of icterus catarrhalis shows the same histological picture so that an identity of these diseases must be considered probable.

4. The alterations are considered to be the result of a hypothetical excitant in the parenchyma and mesenchyma of the liver. The serous inflammation is of no importance as to its pathogenesis.

7. Pathological anatomy of closed and open wounds of the brain.

Oberfeldarzt (Lt. Col., MC.) Prof. SPATZ

We must distinguish between blunt and sharp cerebral injuries, according to the method by which the injury is inflicted, according to the reaction of the dura and the brain we speak of closed and open wounds of the brain (cerebral contusions - cerebral wounds).

In the case of an injury inflicted by a blunt instrument upon the skull (moderate speed, broad area of impact) the impulse is transmitted from the unperforated skull to parts of the brain which are distant from the side of the impact. Such remote effects are manifested on the one hand by the symptom complex of commotio without leaving any evidence. On the other hand we observe contusions (primarily contusion center of the cortex) usually at the spots of contre-coup at the brain base and at the transition from the base to the convexity. The topographical distribution depends largely on the direction of the force and accordingly we have to adopt the following classification:

from the rear, type I	from the right side, type IV
from the front, type II	from above, type V
from the left side, type III	from below, type VI.

In peace-time head-injuries of type I prevail. Type II is predominant in air accidents (75 per cent). Several types show center of contre-coup in the area of the olfactory center. A smelling test is indispensable in the examination of all head injuries. The preference of the basal cortex explains the occurrence of changes of personality. In type IV aphasic symptoms may appear. The petechiae in contused areas of the cortex come into existence the very moment, of the impact and will be circumscribed three days later by a wedge-shaped necrosis. At the edges of the wedge-shaped necrosis-center, which is due to the direct

mechanical impact, we see an area of proliferation in the sound tissue, caused by an active proliferation of the small cerebral vessels, from which area the resorption by mesodermal granular cells begins. In the final stage the center is traversed by a net of connective tissue which is often rather loose. Usually replacement by a solid scar of connective tissue does not occur. There was no evidence of a progression of the damage (ESSER). The contused areas have no importance for the progressive clinical symptoms. At the same time they cannot explain essential symptoms of the "contusio-cerebri" in the clinical sense. The peripheral cortical contusion centers are not pathognomonic for the trauma and even in the final analysis they only prove that an injury must have taken place. An infection of the meninges and the contusion centers is extremely rare. The rather frequent occurrence of subdural hemorrhage does not develop progressively and must be differentiated from pachymeningitis hemorrhagica and dura hematoma. Other changes of the brain occurring in the course of the injuries are areas of softening caused by vasomotor disturbances (RICKER), and large hemorrhage in the first place, the fat embolism (especially in the case of an airplane accident). A comparative study of commotio and contusion is of historical significance only. Commotio is a clinical complex of symptoms, contusio is very often exaggerated whereas the processes which leave no trace are underestimated.

In case of an injury inflicted by a sharp instrument, especially in the case of gunshot injuries, (high speed small areas of impact with a very strong cross section load), part of the energy may be absorbed by the perforating of the cranium and the penetration of the tissue so that remote effects and the process causing commotio, may be prevented. Besides the alterations at the point of impact we often find isolated rebound fractures in the thin bones of the front brain cavity (hydrodynamic effect)/ We do not find, however, the well-known compound fractures of the basal skull fracture as in the case of a blunt impact. The essential difference between an open and a closed brain injury lies in the fact that the first one is always infected. Next to the site of the open wound and the paths of the projectile produced by the penetration of the tissue a bruised zone develops possibly followed by a zone of necrosis often tending in the direction of the ventricle. The proliferation zone that is also developing here in the stage of resorption at the edges of the sound tissue is permeated by free infiltration of vessels and has the character of a true inflammatory granulation tissue which is covered by suppuration remnants of necrosis. At the bottom of the granulated wall solid scars of connective tissue are observed. If the infection does not come to a stand still, a series of progressive inflammatory complications are added which are not found in closed brain injuries. This is, first of all, the meningitis that can be proved in 75 per cent of all autopsied cases. On the one hand it may start directly from the wound wherewith subdural empyemata may originate which were not recognized during the first World War. On the other hand the meningitis may be caused indirectly by primary or secondary ventricle infection. Frequently the ventricle infection is associated with a depression of the functions of the vegetative center which lies near the ventricle of the brain stem and results in symptoms which till then were

erroneously associated with the meningitis. Further inflammatory complications are: the abscess, the phlegmonous marrow encephalitis, the inflammatory prolapse and finally hydrocephalus occlusus caused by inflammation. One of the most important problems in the treatment of gunshot wounds of the brain is to combat the spreading of infection in the brain wounds and meninges because a primary wound closing and a closed treatment are usually necessary. Mydriasis which frequently occurs in the phase of the edema of the center (TOENNIS) must be explained by the pressure of the swelling uncus upon the root of the oculomotor nerve.

Discussion:

OSTERTAG: The significance of the fluid cushion was correctly evaluated by SPATZ. His theory as to the route of the escape of cerebro spinal fluid in cases of cerebral contusion, in the direction of the subarachnoid area of the spinal cord, were confirmed by own observations in cases of high vertebral gunshot wounds. A characteristic contre-coup originates in the oval cerebral parts in the case of a non-penetrating gunshot wound of the cervical spine.

Apart from the meningitis caused by ventricle infection, there is an early meningitis which infects the plexus plate via the cisterna ambiens. This is the cause for hydrocephalus of the third ventricle which until now could not be accounted for.

In brain injuries the collateral subcortical centers depending on the vessels in which the infection spreads are of special clinical significance. The dura is not opened unnecessarily and so these centers cannot be taken care of during the wound revision. On the other hand they do not show any particular symptoms in the beginning but they present a danger in the later course of the case which may even frustrate the success at an unexpected moment.

Statements concerning pathological anatomy of closed and open wounds of the brain.

1. We must differentiate between closed brain injuries, contusions especially in case of a blunt impact and open brain wounds especially in case of a sharp impact. The blunt impact may lead, besides other effects, to remote effects in the brain stem and this generally implies commotio, which does not necessarily ensue in the case of a sharp impact.

2. The most important contusions, namely the contusion of the cortex, prove to be of pathological importance for the trauma as revealed by certain characteristic symptoms even in the final stage. There are no actual evidences for a progressive damage. Contrary to the pachymengitis hemorrhagica, subdural bleeding does not develop progressively.

3. The cortical contusion centers, owing to the concentration of contre-coup effects, are more frequently located in areas near the bone and in those areas having a low content of cerebro-spinal fluid, the so-called silent areas of the cerebral cortex, the base

and the transition area from the base to the convexity. The convexity itself, however, is rather seldom involved. The frontal impact predominates in cases of air-accidents (to 75 per cent), the impact from behind predominantly in injuries occurring in peace-time.

4. The frequent implication of the silent areas of the basal cortex, especially of the frontal brain in case of an impact from in front, behind and above, explains the scarcity of neurological signs in those types. The most important symptom of the center is an olfactory disorder. Extended bilateral centers of the basal cortex may result in late changes of personality. In the case of an impact from the right side aphasic symptoms may occur.

5. The significance of contusion with regard to a serious general disorder of the body which may lead to a decrease of the earning capacity is clinically overestimated. The contusion centers are not responsible for the main symptoms of the clinical picture of contusio cerebri. They must, however, be explained by processes which leave no anatomic trace in the brain stem, which are also a basis of the clinical syndrome of the commotio cerebri.

6. In contrast to the closed brain injury, the open injury must always be considered as infected, which fact appears anatomically in the occurrence of bacteriologically stimulated inflammatory processes which may develop progressively (abscess, phlegmonous encephalitis, inflammatory edema, infection of the ventricle, hydrocephalus occlusus). During the healing process we frequently see solid scars of connective tissue in the final phase.

7. Meningitis was found in 75 per cent of all fatal gunshot injuries of the brain. If the infection starts directly from the wound a subdural empyema will be the result in 50 per cent of the cases. If a basal meningitis occurs via an infection of the ventricle, vegetative symptoms arise by the depressant effect on the vegetative centers of the brain stem adjacent to the ventricle.

8. The combating of persistent infectious agents in brain wounds and in meningitis is an important problem in the treatment of brain gunshot wounds.

X.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON PHARMACOLOGY AND TOXICOLOGY

Translation prepared by:

U. S. Naval Technical Unit, Europe, (Medical Section)
Office of the Naval Advisor
Office of the Military Government (U. S.)

Carbon monoxide poisoning and detection of CO.
(See Section V, Article 7 - 9)

Specific and general forensix-toxicologic questions.
(See Section V, Article 14)

Toxicology of insecticides.
(See Section VII, Article 11)

1. Problems of organizing decontamination.

Oberstarzt (Colonel M.C.) Prof. WIRTH

The use of poison gas of the "Lost"-group (mustard) will probably be of great importance in case the enemy has recourse to chemical warfare. Protection by the use of anti-gas clothing and impregnated clothing etc., seems to be possible but it will not afford sufficient protection in most of the cases. Therefore preparations have been made to decontaminate the skin, the clothing and equipment. The mobile installations of the troops and medical services of the field army and the fixed installations behind the lines were reviewed.

The organization must be decentralized to a great extent. It is very important that the activity in the first place be deployed near the front lines so that the poisoned soldier can be given help as quickly as possible.

In the replacement units we have a similar organization. In the field army the physical decontamination is taken care of by the medical services. They are, however, not concerned with the decontamination of equipment. The pharmacologists of the army who serve in the home territory are the consultants of the responsible surgeon of the military district with regard to all questions pertaining to the medical anti-gas defense measures.

Discussion:

LOESER, HEIDENREICH, HEITE, KONZETT, PENDL: These gentlemen reported about the peculiarities of anti-gas defense in the West, East, North, South-East, and South. (Editors Note: The report does not include their remarks.)

2. Acute arsenic hydride poisoning.

(According to findings of the Institute for Pharmacology and Military Toxicology of the Military Medical Academy)

Oberstabsarzt (Major M.C.) Prof. LENDLE

The captured documents of the French Central Office of

Chemical Warfare Research at Le Bouchet established the special interest our enemies had attached to AsH_3. The persual of the captured documents did not bring about any new facts for the evaluation of this poison or for its treatment.

The French reports confirm the general opinion expressed in previous experimental research work and in new experiences in cases of an acute poisoning, that AsH_3 in moderate concentration will lead after a latent period of a few hours to hemolysis with a secondary anoxemia and obstruction of the uriniferous tubules. The human body may resist the above mentioned poison as long as the kidneys do not fail. (Death caused by uremia occurs in 4 - 8 days.) A stronger concentration, however, may lead to a serious poisoning and death may occur during the first hour. The reason for this is a cardio-vascular collapse and the central nervous intoxicating effect of the gas in addition to the previous onset of hemolysis with a possible anoxemia. A damaging effect upon the liver was not found primarily but only in consequence of the decomposition of the blood corpuscles. Icterus symptoms were found only after two or three days. The bronze-red color of the skin, which is observed early in cases of a serious poisoning is due to the imbibition of hemoglobin by the skin.

We have included in our discussion some theoretical considerations in acute poisonings for which a definite explanation cannot yet be given but which will be presented here in their practical results.

On inhalation of moderate AsH_3 - concentrations (0,5 - 1.0 milligram/liter/ 30 - 60 sec.) hemolysis with subsequent anoxemia, anemia and anuria will occur after a few hours time. The chemical processes leading to hemolysis, which take place only in the presence of oxygen, are known by the publications of LABES, HEUBNER and their collaborators.

The course of such poisoning in cats is characterized by the following peculiarities. During the inhalation of the gas an irritant effect is not observed. As a first sure symptom of poisoning vomiting will occur after 15 - 60 minutes which some time later is accompanied by a violent choking or even vomiting of bile or blood. 1 - 2 hours later tenesmus and diarrhea with an excretion of mucus begins. Still later we observe a serous, even bloody-mucous liquid. These experimental findings correspond to clinical experience as to the early symptoms in occupational poisoning (pains in the upper abdomen, vomiting and frequently colic and diarrhea.)

In about the second or third hour after the inhalation, when a hematuria cannot yet be observed, the animals become restless and they show an increased frequency of breathing. The color of their mucous membranes varies between faint livid and cyanotic. After that we see a growing weakness and a distinct dyspnoea. The animals lie down on their side, often we see cramp-like twitchings and some hours later the animals die of a paralysis of the respiratory organs. The heart activity ceases later. Obviously there is in question

a suffocation without any recognisable direct paralysis of the respiratory center under still favorable conditions of metabolism. This means that there is in question an anoxemia with increased respiration while the metabolism is still in relatively good condition. It must be concluded therefrom the exchange of oxygen in the lungs is not sufficient or that the oxygenation of the blood is insufficient. The pathological and histological examinations showed no evidence of capillary damages or the development of pneumonia in the lungs where ste strongest concentration takes place. (Oberfeldarzt (Lieut. Col. M.C.) Prof. LAUCHE). Therefore we must take into consideration an insufficient oxygenation of the hemolysed blood because no considerable loss of blood pigment, i.e. an anemia, is observed during the first hours.

Preponderantly we attributed special care to this question, which was given little attention in the past, by determining the amount of oxygen and carbonic acid in the blood of poisoned animals and measured its oxygen carrying capacity (van SLYKE). In all cases it was possible to prove a lack of oxygen proportional to the suffocation. The oxygen carrying capacity, however, was not so much influenced. At the same time we were in a position to demonstrate a content of methemoglobin of about 20 - 40 per cent which, however, must not be considered to be responsible alone for the inusfficient saturation with oxygen. In order to produce a suffocation methemoglobin values of 50 - 60 % would have been necessary. So the question has arisen whether the insufficient saturation with oxygen can be explained by other products of an advanced decomposition of the hemoglobin (verdo-hemochromogen (HEUBNER) or perhaps hematin). This question is under study. First experiments by Dr. KIESE show positive findings of verdoglobin. The oxygen-carrying-capacity-tests make it clear, however, that its share cannot be very great because the combining power of oxygen is still sufficiently high in vitro.

So we must come to the conclusion that hemoglobin extravasating from the erythrocytes cannot be sufficiently oxygenated in the blood stream even if it is still in perfect condition as to its chemical composition. This supposition is underlined by BARCROFT's physiological experiences concerning the properties of hemoglobin solutions in comparison with the blood itself. Control tests with hemolysed blood in vitro showed a decrease of saturation of 12 - 30%. Some disturbance of the circulation is a possible additional contributing factor to this anoxemia in vivo.

The findings as to the formation of methemoglobin by inhalation of arseniuretted sulfate have so far been given very little consideration because of special significance in connection with the explanation of most acute poisoning after the inhalation of strongest possible concentrations (4 - 8 milligram/liter). In this case death occurred within 20 - 50 minutes. Preliminary symptoms were: unrest, ataxia, symptoms of paralysis and wild excitement, cramps predominantly of the tonic kind, finally labored respiration was observed. 10 - 20 minutes later the animals showed a distinct dyspnea and a dark-blue coloring of tongue and lips. Blood tests showed high quantities of methemoglo-

bin, from 40 up to 60 per cent. A hemolysis was hardly present at that time. These findings explain the picture of this kind of poisoning as an acute suffocation characterized by the formation of methemoglobin and additional disturbances of the oxygenation (also deficient circulation). Therefore a direct nerve paralysis or stimulation by arseniuretted hydrogen must not be assumed any longer.

During those tests some histological examinations of the organs were also made by Prof. LAUCHE which only confirmed the well-known kidney-findings. Pathological findings could not be demonstrated in the lungs and the brain. The findings in the intestinal canal were of special interest. During the acute hemolysis a surprising red coloring of the mucous membranes and musculature was observed and frequently bloody serous or mucous substances were found in the duodenum, especially in the area at the end of the intestine. Here, a hyperemia or hemorrhage could not be observed. Presumably there is in question a coloring by imbibition with hemoglobin as was previously assumed by THAUER. The passage of the blood pigment into the intestinal contents must occur through the intact capillary vessels (normally intestinal capillary vessels are somewhat pervious to albuminoid) but also the epithelium must be penetrated. There are many reasons why a damage of the capillary vessels by arseniuretted hydrogen occurs very early (perhaps by the quick supply of arsenic oxide) so that we see here an explainable acceleration of the poisoning, which might also explain the above mentioned symptoms of vomiting and diarrhea.

I am not in a position to go into further details as to the problem of the poisoning by arseniuretted hydrogen. I only want to point to some negative experiences we made. We have tried for various reasons to influence the poisoning indirectly by administering oxidizing or reducing elements (catalysin, glutathione) and by active sulphur compounds (detoxine, calcium thiosulfate, tetrathionate). We did not succeed in confirming in practice these somewhat theoretical possibilities.

The results of our findings with regard to symptomatology and therapy were published in their essential parts in Army Manual 396 of January 1, 1943.

3. The Toxicology of AsH_3 poisoning.

Oberstabsarzt (Major M.C.) SEXTL

In connection with the examinations of the correlation of ct-products (product of concentration in milligram per cubicmeter multiplied by the time in minutes) to the concentration of the inhaled gases we have also examined arseniuretted hydrogen.

First of all we have used in dogs ct-values of 3000, 5500 and 30 000 in such a way that during one series of test low concentrations and in the other high concentrations of

arseniuretted hydrogen came into effect. The extent of the damage was determined besides the general clinical examination - by the result of the urine findings, the red and white blood-cell count, the resistance of the erythrocytes, frequency of the pulse and respiration and a graph of the weight. In all three ct-values it was clearly proved that in each case the influence of the stronger concentrations during a shorter time of action caused greater damage than the lower concentration during a correspondingly longer period of action.

In order to be able to study thoroughly and quantitatively the findings in dogs we made a greater number of tests with white mice. In the analytically determined concentrations of inhaled air and arseniuretted hydrogen of 9,500, 4,500, 2,500, 1,200, 650 and 100 milligram per cubic meter we exposed each time seven groups of animals (each having 20 mice) for different periods of time. In each case we ascertained the concentration and period of time in question and with it the corresponding ct which had caused the death of all animals. At the same time we determined the exact length of time which all animals could barely survive. It was observed that the upper and the lower level of the time of exposure, independent of the concentration, is in a proportion from about 3 - 4 : 1 so that the upper limit is 3 - 4 times higher than the lower.

The product of ct under the influence of which half of the test-animals died is the average fatal dose for the corresponding concentration. The period of observation after the exposure to the gas was extended over a maximum of 10 days.

It was observed that the average fatal dose of the examined concentrations has a direct proportion to the concentrations. In the case of a lower concentration we find much more ct than in the case of a stronger concentration. As for example:

concentrations	average lethal ct
100 mg/cbm	about 6000
650 "	" 4000
1200 "	" 3000
2500 "	" 1800
4500 "	" 1300
9500 "	" 1000

Discussion on the reports concerning AsH_3 poisoning.

FLURY: According to the personal statements of Prof. René FABRE in Paris who was himself seriously poisoned by arseniuretted hydrogen " the whole Faculty of Medicine" in Paris was not in a position to find a specific remedy. Therefore, the therapy mentioned in Army Manual 396 (publ. January 1, 1943) seems to be absolutely suitable.

HEUBNER: In a man who had died during the first day and was thus a subject of a severe poisoning, I did not observe coloring which would indicate the presence of methemoglobin. In another case I observed the return of the hemoglobinuria after an interval of a couple of days during which it had completely disappeared.

(To SEXTL): It was observed by KIESE that in the case of a lower concentration a considerable part of the arseniuretted hydrogen was eliminated by exhalation. Therefore, the inconsistency of the ct-product is understandable.

EICHLER: Hemoglobin precipitates and obstructs the uriniferous tubules. All this may be prevented by increasing the diuresis. It is suggested to alkalise the urine because the iso-electric point of Hb is near 6.8.

4. The effect of hydrocyanic acid.

Oberarzt (First Lt. M.C.) SCHOLZ

(According to findings of the Institute for Pharmacology and Military Toxicology of the Military Medical Academy.)

Volume and frequency of the respiration in rabbits and cats were recorded. The apparatus used made it possible to expose the animals either to fresh air or to a mixture of air and gas. The volume of respiration did not change under the influence of different concentrations of hydrocyanic acid. The frequency did not change, as is observed when hydrocyanic acid is administered intravenously thereby stimulating the carotic sinus reflex and causing an abrupt increase of the ventilation. Blood-gas-analysis in animals poisoned with hydrocyanic aicd reveals a marked difference as to the anoxemia which depends on the mode of administration. In case of inhalation of hydrocyanic acid, especially in the case of a stronger concentration, only low-grade anoxemia is observed, i.e. not the blocking of the respiratory exchange but the paralysis of the centers in the medulla oblongata prevails. This differs from what is observed if the poison is administered in a different way involving a stoppage of the vascular respiration owing to the slower loading of the blood with hydrocyanic acid.

The practical consequences are as follows: An increased intake of hydrocyanic acid by inhalation owing to accelerated respiration must not be expected. The finding that the central effect prevails and that anoxemia is not so important when hydrocyanic acid is administered by inhalation in contrast to other ways of administration, justifies the opinion that a general damage of the cells due to anoxia need not be feared. The tests proved that the treatment with oxygen which was recommended in Army Manual 396 is suitable especially when stronger concentrations of hydrocyanic acid have been inhaled.

Discussion:

HEUBNER: Contrary to the findings of the last speaker I was in a position to prove - in collaboration with FLURY - a lasting arterial coloring of the venous blood after continous inhalation of sublethal but toxic concentrations of hydrocyanic acid. The animals died of the after-effects in spite of a temporary recovery of the respiration.

WIRTH: In previous personal experience with rabbits we observed a stronger shifting of the hydrogen -ionconcentration of the blood to the acid side after a preliminary shifting to the alkaline side after inhaling toxic concentrations of hydrocyanic acid. This leads to the conclusion that even in case of a non-fatal outcome a general impairment of the oxygenation occurs. According to these tests the impaired oxygenation may considerably outlast the time of actual influence of hydrocyanic acid.

5. Phosgene oxide.

Stabsarzt (Captain M.C.) KROEBER

The author reports about the results of the examinations and decontamination obtained by the Institute for Pharmacology and Military Toxicology of the Military Medical Academy.

The examinations of W. WIRTH, KOETZING, POSTEL, NIEMANN and the captured findings of the Russians were referred to. The most important subject of his report concerns the extraordinarily quick reaction of phosgene oxime on the skin and furthermore the effect upon the respiratory organs. A skin-damaging effect occurs within a few seconds to one minute. This fact illustrates how quickly decontamination of the skin must be carried through. Numerous alakline and acid chemicals (salts, protein compounds and mixtures with skin decontamination-paste) were examined with regard to their decontaminating effect. In part, these examinations turned out highly satisfactory. Their application, however, is rather limited owing to the quick reaction of phosgene oxime upon the skin. "Losantin", decontamination-paste for skin and weapons is not suitable for decontamination of the skin in case of contamination by phosgene oxime. The MS-soap, however, is suitable to a certain degree if it is applied quickly enough. As an improvised means of decontamination of the skin a solution of 5 % ammonia may be used. Even an immediate washing with plenty of water affords a certain decontamination - effect. The so-called inhalant-tubules of ammonia are not suitable for decontamination of the skin because the contents are too small. If a 5% solution of ammonia is at hand the decontamination mst be done immediately. Uniforms may be decontaminated by boiling them in water for an hour. The terrain must be decontaminated by spraying it with the decontamination-material which we have introduced. Vehicles, weapons and equipment may be decontamined by wash-

ing them with plenty of water.

Furthermore a number of homologues of phosgene oxime were examined but in their toxicologic effect they were less effective than phosgene oxime.

Discussion:

GILLERT: According to own capillary-miscroscopic observations we may presume there are changes in the capillary as a result of phosgene oxime, perstoff and phosgene which may be important for the evaluation of after-effects of these substances.

KROEBER: According to the Russian findings, the question (LENDLE) whether or not the resorptive effects of exposure to phosgene oxime can be diminished by urotropin must be answered in the negative.

6. Blood-substitutes in toxic pulmonary edema.

Stabsarzt (Captain M.C.) PENDL

The question of the compatibility of blood-substitutes in the field of crystalloid solutions, in case of an inflammatory edema of the lungs was thoroughly studied by LAQUEUR and MAGNUS during the first World War. The finding was that isotonic solutions of common salt produced a temporary dilution of the blood whereas hypertonic solutions of common salt after a slight dilution increased the edema in the lungs in most cases.

The question was whether the new colloidal blood-substitutes (dried human serum and periston) would maintain a longer lasting dilution of the blood, even in case of a toxic edema of the lungs, and eventually have an effect of diminishing the edema. In a number of tests cats were poisoned by nitrose gas or "perstoff". Continuous examinations of the haemoglobin and erythrocyte-values and the weight of the lungs 24 hours after the poisoning permitted one to examine the course of the poisoning. Venesection proved best for the treatment of the progressive toxic lung edema. In order to increase the effect of venesection dried human serum or "Periston" was administered. This, however, leads only to a shorter period of dilution of the blood and causes higher lung weights. A decrease of the lung edema could not be obtained even by administering the concentrated solutions of Periston K or the four-fold concentration of dried human serum. The same result was obtained when the colloidal blood-substitutes were administered as a substitute for the loss of blood-plasma caused by thickening of the blood. In case of a subsiding toxic lung edema (i.e. 15 or more hours after the poisoning) a blood dilution, which lasted longer than 24 hours, was obtained by administering the above mentioned colloidal blood-substitutes.

In a growing toxic lung edema the administration of colloidal blood substitutes (dried human serum, solutions of "Periston") is injurious and therefore not indicated.

(Detailed publications in preparation).

Discussion:

HEUBNER: The published tests underline the experiences of the gas-hospitals in the last World War: Each infusion of a liquid is disadvantageous for a spreading lung edema. It is highly regrettable that again and again in the literature and even in manuals the injection of isotonic and hypertonic solutions is recommended. By doing so the life of many humans may be endangered.

7. Plasma-therapy in mustard gas injuries.

Stabsarzt (Captain M. C.) SOEHRING

1. The local treatment of persons injured by mustard gas requires - according to general experience - large quantities of dressings and ointments, In order to make the mustard gas therapy independent from supplies, tests were made in the cases of eleven workmen who were seriously injured by mustard gas. Human plasma and horse plasma were applied locally. After a wet treatment for the removal of the necrotic tissue - a physiological solution of common salt is sufficient - plasma crusts were put on the cleaned wound surfaces under which a good and painless healing was achieved.

2. The right moment of application must be determined correctly. If the application is done too early the crust will not adhere and may even lead to an undesirable accumulation of the secretion. The therapy has to start at the same moment when granulations have replaced the loss of substance and the suppuration has come to an end. Till then the wet dressings with common salt solutions are sufficient.

3. Comparison with the treatment using a 5% anaesthesin-paste showed that the application of plasma is advantageous. It is difficult, however, to coordinate this procedure with the usual therapeutic methods.

4. Plasma therapy should be reserved for all cases in which supplies are either difficult or impossible to obtain. As soon as its application is sufficiently tested under field-conditions the final decision may be made.

5. The application of horse plasma is equivalent to the therapy of pooled human plasma and thus a mass-treatment will easily be possible.

8. Plasma therapy in mustard-gas injuries.

Oberarzt (First Lt. M.C.) POSTEL

SOEHRING's successes in treatments with plasma gave rise to systematic examinations of the described method under most strict observation.

In animal tests a closing of the wounds of all animals treated by an artifical formation of a crust was obtained. In 50% of the cases, however, the crust formations was cast off by pus after a couple of days. In the other cases the healing process was sometimes favored but in general was not influenced. A difference in the effect of horse plasma and other preparations such as gelatinous mucus collodium elasticum and glycerin paste could not be observed. None of the methods tested has shown an exclusively favorable re-sult in animal-tests. Owing to the particular susceptibility to secondary infections the danger of a delayed healing is by far greater than the chance of a prompt healing.

Even on human skin the closing of the wounds was successful by the formation of crust in all cases, but two in which after a lapse of a longer or shorter time, violent, pulsating pains reappeared until finally after the lapse of two to nine days the crust was cast off by pus with considerable destruction of the granulations.

In 20 attempts to close a mustard gas ulcer by artifical formation of a crust in order to protect it against infection and to accelerate the healing process, 18 failures occurred and led to secondary infections and delayed healing. Even in an eventless course a favorable effect upon the healing could not be observed. In none of the cases has plasma proved to be an "especially suitable medium for germinating epithelium" and therefore did not come up to the expectations.

Discussions about the reports concerning plasma-therapy in mustard-gas injuries.

EICHLER: The differences in the results of the treatment tests by SOEHRING and respectively POSTEL may possibly be due to the fact that SOEHRING compares his plasma-treatment with anesthesin-paste. Thus the plasma treatment might have appeared in a more favorable light.

SOEHRING: The fundamental difference in the findings of POSTEL in comparison to our own experiences lies in the fact that the secondary suppuration prevails in the cases described by POSTEL, which cannot be explained yet. Possibly the different reactions may be due to different mixtures of mustard gas.

9. The poisoning of large supplies of drinking water by chemical warfare agents and the possibility of their removal.

Oberstapotheker (Colonel, Pharmacy Corps.) GEMEINHARDT

We must distinguish between subsoil and surface water supply. In case of genuine subsoil supply possibilities of contamination may be excluded. In case of an artifical subsoil water collection, however, contamination seems to be possible. In processing the water at the water works contamination can easily be eliminated. Large accumulations of water (lakes, water reservoirs) can be efficiently contaminated temporarily. The methods of decontamination depend largely on the kind of chemical weapons used. All chemical weapons inclusive mustard gas which can be neutralized by hydrolysis, do not present an important danger. In order to facilitate and shorten the time required for decontamination we must use a chlorine-carbon suspension or carbon filtration in case of mustard gas. Chemicals which cannot be decomposed easily (chlorpicrin, N-mustard gas) are also easily absorbed by carbon. Greatest difficulties, however, are encountered with arsines which, so far, can be removed below the toxic limit only by a very slow filtration through active carbon. In case of large accumulations of water, (water reservoirs) chemical weapons which were used in large quantities will dissolve only to a very small part whereas the main quantity will settle down at the deepest spot (base of the reservoir wall) and slowly become ineffective there. The water usually not being drawn from the deepest place , only little quantities of the chemical will be contained therein. It is considered unnecessary to decontaminate the entire body of water but only as much as is necessary for consumption. For this purpose portable decontamination equipment is recommended. The question of an improvised decontamination by carbon suspension and other means is under study.

In the decontamination of drinking water it seems to be more practical to separate the poison rather than to eliminate it by chemical combinations.

10. Decontamination of drinking water from supplies contaminated with chemical warfare agents.

Stabsarzt (Captain M.C.) KROEBER

In tests made to neutralize chemical weapons by way of oxidation (HCIO) we found that only S-mustard gas and sulfone can be neutralized efficiently. Arsenic containing materials can only be oxidized into arsenic acids. N-mustard gas and chlopicrin, however, defy this treatment, (chemical part in collaboration with Dr. NIEMANN).

The products of oxidation in the arsenic containing material were examined toxicologically in the Institute for Pharmacology and Military Toxicology of the Military Medical Academy. The examinations revealed that in aromatic as well as in arsenic acids the examined quantities of 20-200 gamma for two cubic centimeters, which were used in animal tests, did not show any important irritation of the mucous membrane of the stomach and the intestines.

Furthermore tests were made to establish the irritation level of diphenyl-arsenic-acid and chlorine-vinyl-arine-acid (compounds containing 5% arsenic) in the mouth. The now available but not yet definitive results show that the irritation level of these chemicals in humans is much higher than 50 gamma S/liter of water.

Discussion concerning contamination of drinking water systems.

FLURY: The speaker reminds of the experiences gathered during the examinations of sweet cider and wine with regard to arsenic content. A damaging effect caused by short periods, but not chronic use of cider containing some milligrams of inorganic lead-arsenate (3 - 4 milligram per liter As) was not observed.

11. Possibility of substitutes in the use of drugs.

Generalarzt (Brig. General M.C.) Prof. FLURY

The possibilities of substitutes for important drugs which for the time being are scarce are reviewed from the pharmacologic point of view. It is a well-known fact that as is the case with all substitutes, the "ersatz" drug has often proved unsatisfactory. Under the conditions of war, however, even the medical doctor has to make allowances. In the following we are going to give you some hints in catch-words.

With regard to means of narcosis the question arises again: Ether or chloroform? Instead of ether which is scarce now we recommend "Evipanatrium" and "Eunarkon" for longer narcosis.

With regard to hypnotics "Adalin" and"Luminal" may be replaced by "Bromural" and "Phanodorm". "Bromural" seems to be suitable as a substitute for "Adalin". "Luminal" however, can hardly be replaced by any other drug with regard to its exceptional importance and its great efficiency. Unjustified use of hypnotics should be avoided.

Among the opiates "Morphine" may be replaced more or less satisfactorily by the stronger and more effective "Dilaudid", also by "Eukodal" as in the S.E.E.-combination (Scopalamine HCL - Eukodal - Ephetonin). "Dolantin" combines the effects of "Morphine" and "Atropin". All these drugs may lead to mania. "Paracodin" has proved to be a good substitute for "Codein". Instead of "Papaverin" we may use "Octin D" and "Dolantin".

In case of a shortage of "Atropin" it may be replaced by similar natural alkaloids and synthetic tropeines. The different indications must be separated and studied separately as is the case will all drugs which have multiple effects. Antispasmodics have to meet various requirements such as the absence of secondary effects and suitability for injection. First of all "Octin" and "Dolantin" are to be considered. Against asthma "Ephedrin" and related products are available. A substitute for "Atropin" for ophthalmological use is not necessary.

Cardiac drugs: "Strophanthin" may be replaced by injectable "Digitalis" preparations. Even the time honored "Blaetterpulver" (leaf-powder) has not yet lost its importance. It is supposed, however, that the surgeons are familiar with the proper determination and regulation of doses of "Digitalis". "Digitalis" must not be considered a universal drug against any kind of heart disease but only against insufficiency of the heart.

Analeptics are available in sufficient quantities. Instead of "Cormed" (coramin) "Cardiazol" may be used. Furthermore we have camphor-oil and "Hexeton" at our disposal as well as "Lobelin".

"Quinine". For the greater part of the indications we have satisfactory substitutes available. Against malaria we have "Atebrin". In cases of pneumonia we use sulfonamides; against febrile diseases, neuralgias, headaches the "Antipyretika" and "Analgetica" of the "Pyrazolon"-series and at the same time salicylate preparations. Quinine as well as "Quinidin" are considered non-replaceable in certain cases of arrhythmias.

Heavy metals must be conserved, for instance mercury, silver, gold, and rare metals. A very serious bottleneck, however, is encountered in the case of bismuth. Sulphate of barium is a good substitute for X-ray diagnostic purposes. The situation is rather difficult with r gard to chemo-therapeutic purposes. For the treatment of lues we have only mercury besides "Salvarsan" which has the quickest and strongest effect. If bismuth is not at hand we have to put up with the well-known disadvantageous effects of mercury in case of a combined treatment. The possibilities to replace bismuth for internal medical purposes, for the treatment of wounds especially burns are much more satisfactory. Here we have at hand quite a number of absorbing or astringent materials and disinfecting agents.

In the series of antiseptics some difficulties must be overcome. The replacement of boric acid should be realized as quickly as possible. The question arises, whether or not boric acid may be spared completely or partly. Its advantages are the absence of some undesirable characteristics. Substitutes are the so-called "tissue-friendly" antiseptics, indifferent salts and anti-inflammatory vegetable agents. Borate ointment can well be replaced by other wound-and healing ointments, even perhaps by a durable sterile ointment base.

All animal products are scarce. A substitution may take place only when synthetic material is at hand. We know very well the difficulties in supplying "Insulin", liver preparations and others.

So we can see that only a limited number of remedies of vital importance cannot be substituted at all. For most of the important drugs we have substitutions. In order to eliminate the difficulties we have to find out the real reasons for the shortage, largely caused not only by the general lack of raw material but also by inappropriate distribution, storage, prescription and usage. Sharp measures must be taken against any waste and hoarding of medicines and wound dressings.

12. Possibility of substitutes in the use of drugs.

Oberstapotheker (Colonel, pharm. Corps) WORTMANN

In the supply of sanitary material we have observed a perceptible shortage of many important items during this war.

There are many reasons for the shortage of the different drugs. The general situation with regard to raw materials is in the foreground. Barium for instance, which is the main product for the manufacturing of contrast mediums on the basis of barium sulfate was delivered by England. That is the reason why we have now a shortage of X-ray material such as "Roentium", "Roebaryt" etc. Iodine was made out of Chilean saltpeter which fact may explain the lack of all preparations containing iodine. Bismuth and bismuth salts in their greater part had come from America. Therefore we must economize all bismuth preparations for the lues-treatment. Furthermore we must economize all products containing bismuth subnitrate and bismuth subgallate. The nearly indispensable "Atropin sulfate" is made of the root of Belladonna" and the Seed of stramonium. Both drugs are found in Southern Europe, in Asia and South America and were imported from there. Furthermore all drugs containing alkaloids made out of opium, especially "Codein phosphate" are scarce now for similar reasons.

Domestic raw materials yielding the necessary product for many very important medicines are now being used as food stuffs and they must in the first place be reserved for this purpose. Among these are all preparations made of liver, pancreas, hypophysis and bile. This explains the evident shortage of liver preparations such as "Insulin" and the different preparations of bile and posterior lobe preparations.

Other medicines which were produced in this country too, cannot be produced because of lack of manpower. This is particularly true for camomile, linden tree-blossoms and the different ingredients of pectoral tea etc.

A further reason for the critical situation in the supply of drugs, the same as for other goods, is the damage to the factories caused by the enemy airforces. Thus a delay was caused with regard to the supply of disinfectants especially "Liquor Cresoli" because the firm which produces the "Emulgant", necessary for the manufacture of disinfectants was completely destroyed by air-attack. This even caused other firms using the same "Emulgant" to stop their production. By the fact that very valuable fats are necessary for the production of these agents, many of them being supplied from foreign countries all these articles must be considered as critical items. Conclusion: All disinfectants are critical items.

Special reasons are sometimes responsible for the shortage of such items which can be produced in sufficient quantity such as the lack of ampules and binding material for certain tablets which cannot be secured by the firms producing medicines which require these binding materials. Reasons for the shortage of "Sulfonamid"-ampules are: Lack of machines, supply of spare parts, lack of skilled personnel, etc. For this reason we cannot push forward the manufacture of synthetic caffein the formula of which is knwon. All caffein-preparations are critical items. Lack of tools, equipment apparatus etc., explain the lack of supply of "Detoxin", "Pandigal", "Trypaflavin", "Tumanol", etc.

The requirement of the whole German Army regarding "Prontosil", "Eleudron", and "Istizin"-tablets, "Yatren Dragees" and about 70% of "Atabrin"-tablets were manufactured in factories owned by the Army. The production there is on a considerable scale. For example about 500,000,000 "Atabrin"-tablets were produced in one year.

The first condition to avoid friction and to secure a well organized supply of sanitary material - as long as it is available - is that the requests be in accord with the actual requirements. The requests submitted to the supply units must be made up by competent personnel and with observation of the utmost care.

Only in this way will it be possible to prevent a stock-piling of medicines in one place while the same material is keenly wanted in another place.

Discussion concerning possibilities of substitutes in the use of drugs.

DRUCKREY, EICHHOLTZ, FISCHER, HEITE, HEUBNER, KONZETT, KROEBER, SCHLUETER, SCHROEDER, SOEHRING, WIRTH: The hints given by the above mentioned gentlemen during the discussion were taken into consideration in compiling the direction.

13. Liver damaging poisons.

Professor HEUBNER

The toxicological aspects of liver pathology offers special difficulties which do not exist in other organs to the same extent. In comparing a disease in humans as well as in animal tests a considerable discrepancy was very frequently found between the findings in the living organism and at autopsy in the liver tissue. The examinations of the functions of the liver do not clarify these discrepancies although the advantage derived from the tests for clinical diagnosis is evident. These examinations proved unsuitable with respect to the most important problem of recognizing an imminent danger of the liver in time. This is true at least with regard to our examinations in rats and dogs in which, according to FELIX, the excretion of p-oxypyro racemic acid, which was fed to the animals, served as an indicator. We must take into consideration that other well proved liver function examinations in humans have failed in animals. On the other hand other investigators who have used the FELIX-tests obtained the expected results in animals but we succeeded, even in the case of phosphorus poisoning with most obvious histological changes, only in extremis.

A further great difficulty for the evaluation of poisonings of the liver is the particular discrepancy between the amazing regeneration ability of the liver in case of relatively small injuries - and it may be said that the liver may be reduced to 1/5 of the normal size (MANN and MAGATH) - and the long and chronic course of recovery, characterized by a very slow restoration of integrity and by specific sensitivity against greasy meals or alcohol for a very long time. In case of a poisoning this becomes obvious in that acute moderate poisoning may lead in one day to a central lobule necrosis of considerable extent, and a couple of days later, a complete restitution and regeneration of the liver tissue will be observed. Chronic poisonings of the same kind result, however, not only in a cirrhosis-like increase of connective tissue but also in an intense loss of the regenerative ability of the parenchymal vessels which distinctly manifest a changed allobiosis. This reaction was proved by numerous animal tests with tetrachlormethane, in dogs by BOLLMANN and MANN, in rats by CAMERON and KARUNARATNE. Also during these animal tests a complete regeneration of the liver parenchyma was possible after a chronic damage, but only after the lapse of an unusually long period of time. The difference in the nature of an acute and a chronic poisoning was especially clearly demonstrated by these tests. The special reaction of the liver can only be explained in cases of a serious involvement as a damage of these parts of the cells participating in hereditary transmission. For a series of generations of liver vessels we cannot but presume a "hereditary transmission of lost capacities".

Tetrachlormethane is the prototype of quite a number of liver poisons acting in the same way as its chemically related compounds chloroform, tetrachlorethane; furthermore, some etheric oils, the most important mushroom poisons, atophane, arsenic, phosphorus, as well as others. Apparently the absorption of phosphorus through the skin is negligible.

The poisoning manifested in the form of a primary central lobule necrosis is not the only one in existance. Primary points of attack were also observed in KUPFER's stellate cells (for colloidal copper by JANCSO) in blood capillary vessels (for allylformial, haemogyrrol derivative and others, EPPINGER), in the cystic ducts (for manganese FINDLAY and others). Furthermore for toluylendiamin there is a disturbance which differs from all other poisonings (MELCHIOR, ROSENTHAL and LICHT; WOLFF, McBOLLMANN and MANN). No apparent difference between the clinical course and the final outcome has been observed in practical cases of poisoning. It is remarkable, however, that it has been observed in tests on dogs made in connection with Salvarsan poisoning that is, in contrast to the above mentioned more frequent variations of poisoning, unfavorably influenced by a carbo-hydrate diet whereas a protein diet reacts favorably (CRAVEN, SCHIFRIN),

In war time poisoning by explosives must be considered. Trinitrotoluene is especially hazardous to munition workers having a long exposure because it may unexpectedly cause acute liver atrophy. During the last years extensive experiments with rats and dogs were made in our own institute and changes in the liver were intentionally produced by long lasting treatments with trinitrotoluene with the view of facilitating early diagnosis. In fact we observed distinct histological changes which, however, did not reach a life endagering extent. A recognition by the FELIX test in living animals was possible only exceptionally. After the administration of dinitroanisol, HINDEMITH (Breslau) observed histological liver changes occasionally.

The effect of alcohol is of special significance in munition workers. It was presumed from the very beginning that abnormalities in this respect might be caused by disturbances of the liver functions. A number of findings already published were reviewed according to which the functions of the liver could be stimulated by simultaneous or previous ingestion of alcohol. On the other hand the effect of alcohol and other narcotics was decidedly influenced by the condition of the liver. In tests made by HINDEMITH rats proved to be much more sensitive to dinitroanisole after a long administration of alcohol. On the other hand, cats were much more sensitive to alcohol after a previous long treatment with dinitroanisole, even after a long interval between the last treatment with dinitroanisole and the administration of alcohol. In the tests made in our institute we observed, in one case of a dog and almost regularly in rats, an intensified effect of alcohol accompanied by cramps and paralysis after administration of dinitrobenzol. For theoretical reasons we also tried acetaldehyde after a corresponding previous treatment

and it proved to be much more dangerous.

These and other findins are further examples to demonstrate the great significance of a combination of two or more injuries caused by intoxication which necessarily will have a multiple effect on the complex function of the liver. In case of disease, a toxic etiology will always have its special although not exclusive medical significance - which has been well known for a very long time with regard to alcohol.

Discussion

KROEBER: Regeneration of a liver which is degenerated in the connective tissue, seems to be impossible, for serial sections of such a liver show all phases of the disease beginning with completely normal liver tissue and terminating with the most extreme phase of cirrhotic degeneration.

DRUCKREY: According to statements made by Japanese authors it is possible to prevent or to heal existing liver damages by feeding liver substances after the effect of liver poisons.

SCHOLZ: Examinations made by HECHT Elberfeld showed that in rats liver damage in the sense of a distinct fatty degeneration of liver cells occurs even after a single short period of influence of chloroform.

EICHLER: After a poisoning by chloroform the administration of "Eunarkon" showed a disturbance even after a couple of weeks which was not observed with "Avertin". "Lost" (mustard gas) causes liver-damages which can be demonstrated months later.

HEUBNER: The clinical picture of chronic dinitrobenzol poisoning could not be changed by feeding liver. Histological examinations of livers in the case of liver damage from the influence of explosives is under study. Chronic dinitrobenzol administration clearly increased the sensitivity for a large single dose, which may be considered as analogous to the mustard gas examinations, mentioned above, by EICHLER.

14. Toxic effects of "Periston".

Stabsarzt (Captain M.C.) Prof. EICHLER

"Periston"-tests made with rats, guinea-pigs, rabbits and cats did not show any disturbances of the liver functions. "Periston" was in some cases given chronically up to three months, in single cases daily. In function tests FELIX' and TESKE's methods were adopted (Phenyl-pyro-racemic acid). In tests of the plasma content of bilirubin the methods of JENDRASSIK and GROF were used. The bilirubin - content was rather diminished which may be explained by in-

hibition of the reticuloendothelial system. This effect is proved by the disappearance of congo-red from the plasma, and by the histological examination of the accumulation of trypan-blue and the Turnbull-blue reaction upon iron after a saponin hemolysis. The inhibition is short in the case of a single dose (1 gram per kilogram of body weight), after repeated dose, however, it is relatively long lasting. The inhibition does not occur as regards phagocytosis. There is no reason to presume a diminished resistance against infections.

If administered over a long period of time we observe changes in the supra-renal cortex which point to an increased activity. This change must be attributed to the function of the supra-renal cortex in regulating the blood-volume, which, therefore must be expected in the case of a regular clinical application, i.e. not directly toxic.

The kidney did not show histological changes even in the case of prolonged administration.

15. The action of Periston (Kollidon).

Oberstabsarzt (Major M.C.) Prof. ZIPF

In continuation of previous tests regarding blood substitutes we examined:

1. the general effect of "Kollidon" in different animals,
2. the time during which "Kollidon" may be traced in the blood,
3. the secretion of "Kollidon" with the urine,
4. the histological changes after "Kollidon" administration,
5. the effect of "Kollidon" upon the regeneration of the blood protein bodies,
6. the influence of "Kollidon" upon the resorptive effect of "Novocain".

In the acute test, mice, rats, and guinea-pigs can tolerate 10 grams of "Kollidon" per kilogram body-weight if "Kollidon" is administered subcutaneously and intraperitoneally. Dogs did not show any abnormal attitude after subcutaneous and intraperitoneal doses of 8 grams of "Kollidon" (as a 10% solution). In mice , rats and dogs a slow intravenous injection of 7,5 grams per kilogram "Kollidon" did not lead to any toxic symptoms. The results prove that "Kollidon" does not cause any immediate reaction if it is administered more concentrated than considered possible therapeutically.

In case of an injection of a 7% solution of "Kollidon" which was given three times weekly, more than 10 grams of "Kollidon" were given to white rats in a five weeks time without any toxic symptoms. Growing animals increased their body-weight normally. Full-grown rats kept their body-weight. Three intraperitoneal injections of 2,8 grams each of "Kollidon" administered at intervals of two days did not harm guinea-pigs in any way that could be proved.

In cats and dogs which had a hemorrhagic collapse the "Kollidon"-content of the serum falls 20-30% within 5 - 6 hours after an infusion of Periston and amounts to 40-50% 24 hours later. "Kollidon"-determinations were made by means of the Methanole-method of HECHT.

The secretion of "Kollidon" in the urine of normal dogs was determined after an intravenous and intraperitoneal infusion of a 3,5% solution of Periston. The method developed for this purpose is based on the precipitation of "Kollidon" in the urine, which is sulphuric acid and protein free by a concentrated trichlotic-acetic acid with a following determination. This method which will be published in detail in another place allows the exact determination of 1-2 milligrams of "Kollidon". In a modified form this method allows the quantitative determination of the "Kollidon" in the blood and tissue. In case of an injection of Periston which corresponds to 1/3 of the normal quantity of blood there are secreted in the urine first day 26.3 - 37%; second day 4.6 -16.7%; and third day 1.7 - 6%. During the following days the secretion of "Kollidon" diminishes so that it amounts to 0.6 -1.4% on the sixth day. Within 5 - 6 days 47.2 - 59.1% of the injected "Kollidon" is eliminated by the kidneys.

In collaboration with Prof. BERGMANN, first assistant professor of anatomy of the Anatomy Institute at Koenigsberg in Preussen, we studied pathological changes. White rats which were given intravenous injection of 700 milligrams per kilogram body-weight as a 7% solution for a period of five days did not show any organic changes in the liver, kidneys, lungs and thyroid gland. The spleen showed only, varying in the different animals, stronger vacuolization of histiocyte elements. Guinea-pigs which were given 700 milligrams per kilogram of "Kollidon" subcutaneously daily for five days did not show any changes in the structural appearance of the organs. Even after three intraperitoneal injections of 2800 milligrams per kilogram "Kollidon", each at intervals of two days, guinea-pigs did not show any histological changes of the organs. In the chronic tests white rats were injected with 350 milligrams and 700 milligrams per kilogram bodyweight intravenously three times weekly for the period of five weeks. The liver of such animals occasionally shows swollen stellate cells. A distinct increase in comparison to those treated with "Normosal" could not be observed. The kidneys and lungs of the animals treated with "Kollidon" and those of the control animals showed the same finding. The R.E.S. (reticulo-endothelial-system) of the thyroid gland does not show any peculiarities. The

spleen of all test animals treated with "Kollidon" shows a vacuolization of the entire area of the red pulp clearly visible under low power magnification. The little knots of the spleen are free from vacuoles. The vacuolization is especially clear in the peripheral areas of the organs. It is more distinct in animals treated with 700 milligrams per kilogram than in those treated with 350 milligrams per kilogram. If studied in immersion (under oil immersion) the vacuoles appear as enlarged pustular elevated histiocytic elements which according to BARGMANN must be considered as cast-off reticulum cells. The cyto-plasma of the cell is limited to a narrow area enclosing the cavity. All varieties between small vacuolated and larger vacuolated cells are seen. A sudanophilic content which might have been considered as a fatty deposit was not observed. The iron reaction in prepared sections revealed a fine and coarse granulated blue-tint in the cyto-plasma of the cells. It corresponds to the visible deposit of brown pigment seen in some preparations with preference for the fringe of the cells. The cell-inclusions with a positive iron reaction in the vacuolized cells could possibly consist of hemosiderin. In comparison to the normal condition the substance containing iron seems to be increased. Besides this the spleen in animals treated with "Kollidon" did not show any changes.

We studied the influence of the "Kollidon" upon the regeneration of the blood protein bodies in cats and dogs. Besides the total protein, fibrinogen, albumin and globulin, we determined the "Kollidon"-N with the methanol method of HECHT and took it into consideration in our calculations. The decrease of the blood protein bodies after the infusion of Periston corresponds on the whole to the degree of dilution of the plasma. The regeneration of the blood protein bodies after the administration of "Periston" is not delayed, at least not during the first hours. A change of the albumin-globulin-relation was not observed during the short tests. Longer tests with a more exact determination of "Kollidon" in the blood (after the trichloride-acetic acid - method) are under way.

The resorptive effect of "Novocain" is not influenced by "Periston". In white mice and guinea-pigs the effects of fatal dose, the average fatal dose and the average convulsion dose of "Novocain" is not traceably diminished by an admixture with "Periston".

Discussion concerning the action of Periston

SOEHRING: Besides occasionally occurring chills no disadvantageous effects were observed when "Periston" was administed on a large scale in an army in 18 months.. About 8% of these reactions are attributable to the use of preserved serum (SCHWIEGK). I suggest the use of preserved serum chiefly in those patients who are already deficient in albumin, i.e. in the war hospitals. "Periston", however, should be used by the front medical units.

LOESER: It is suggested that the examinations made on normal animals should be repeated on animals deficient in blood. The morpholgic changes of the spleen observed in rats which were treated with "Periston" (ZIPF) should be studied more thoroughly.

ASCHENBRENNER: The problem of the kidney injuries due to "Periston" is, in practice, of importance only in connection with the treatment of field nephritis where occasionally " Periston" was used in a concentrated solution for the stimulation of diuresis.

LANGE: Summary of the experiences made with "Periston". It has no disadvantageous effect at all when used as an infusion for deficiency of liquid, as with bleeding ulcer etc.

XI.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON PHARMACY AND FOOD CHEMISTRY

Translation prepared by :

U. S. Naval Technical Unit, Europe, (Medical Section)
Office of the Naval Advisor
Office of the Military Government (U. S.)

Possibilities of substitutes in the supply of drugs.
(See Section X, Article 11)

CONTROL OF PREPARED FOOD FOR TROOPS

1. General introduction, reasons for control.

Oberstabsapotheker (Major, Pharm.Corps) LEHMANN

It is believed that the nutritive value of food served to troops in this war is no longer in accord with the desirable quantities of protein, fat, carbo-hydrates etc., due to a general decrease of the quality of food. The Medical Department of the Army, by agreement with the Army Administrative Branch, therefore decided to introduce routine examinations of the nutritive value of the rations served to troops especially at home and in occupied countries.

By this measure reliable information suitable for correction and amendment of the appendix of Service Manual 43 a, will be gathered. The tables contained therein proved to be incomplete and often erroneous, the percentage of wastage provided for potatoes for instance amounts to 25 to 13 %; the 1943 crop, however, makes a modification of this percentage to 40 to 50% necessary. In the Generalgouvernement (German Administration of Polish Territory) the quality of beef of category B and C cattle reached only 79 - 87 % of the standard. A part of the ready made dishes, as for instance meat balls, hamburgers, stew of minced meat, fried meat balls etc., are not listed in the appendix.

As a matter of fact the supervision of the quality of the food will give rise to recommendations relative to the quantity and variety of the food prepared, the operation of kitchen and messes and the methods of cooking which are of special interest to the higher command.

The Chemical Examination Centers are charged with the responsibility of investigating the food. Their reports will be checked by the Institute for Army Pharmacy and Applied Chemistry who will make recommendations for the correction of all deficiencies.

In order to obtain a good average result it will be necessary to include as many army mess installations as possible. The Chemical Examination Centers were therefore directed to carry through regular examinations at least every second month in all kitchens and messes under their jurisdiction, It must, however, be born in mind that the number of kitchens and messes differs widely from one district to another and is subject to continuous fluctation. The number of obligatory examinations to be carried through by each Examination Center was later reduced to 30 per month. The food examinations being relatively tedious, this still presents an extraordinary amount of additional work for the Examination Centers. The chief object of the examination is to ascertain the following questions:

1. Is the soldier's food in perfect condition or not?

2. Does the nutritive value of the served food (especially hot meals) come up the desired standard?

3. Was the nutritive value diminshed by poor preparation of the food?

4. What is the proportion between the nutritive value of the prepared food in comparison to the raw material used?

In the following we will hear some reports about the experiences made up to now in the chemical examination of the food served to troops. We are in a position to state that with regard to the fact that we are in the fifth year of war these chemical tests are made in the interest of the German soldier. Therefore, even in the future it will be worth the effort to continue these examinations. Besides the sanitary control the chemical examinations will give rise to valuable recommendations in the general management of kitchens and messes.

2. Present results of the control of prepared food.

Oberstapotheker (Colonel, Pharm.Corps)
GEMEINHARDT

More than 2000 analyses from the testing stations have come in up to 10 May 1944. About 1750, which had come in prior to the end of March 1944 could be checked. They were partially reported upon or submitted to further investigations. All examinations revealed that the difference between the actual nutritive values contained in the food served to the soldier did not differ as widely from the calculated table values (protein, fat, carbo-hydrates) as we were originally inclined to believe. There is no excess in the nutritive value of the food, but the quantities were found adequate within tolerable limits. The differences between theory and practice are, for the most part, within the 10% limit. In some cases, notably regarding fat, they sometimes received more than called for. According to these findings the total value of calories varies between 2700 and 3500 calories in the soldiers daily diet. The results studied so far by no means reflect the general situation. But the reports at hand and those to be expected in the future are very suitable for drawing conclusions on the general food situation of the army. The study will be pushed forward as much as possible and, first of all, this material will be secured. With regard to the direction to be worked out for the future control of the ready prepared food we shall give some hints.

3. Review of the present method of drawing food supplies for troops.

Stabsapotheker (Captain , Pharm.Corps) FREY

The speaker deals with the requirements with regard to qualified personnel and equipment for the inspection of messes.

The inspection, storage, and handling of food stuffs, the adequacy and suitability of the diets will include an analytical examination of the caloric value of the prepared food. Only by close study of these single factors will we arrive at a final judgement concerning the absolute value of the respective kitchen.

The tables setting forth the results of the food inspections made up to now prove that inferior caloric values rarely occurred and that in most of the cases the prescribed calories were actually served or even more. So, the food situation of the field army must be considered to be satisfactory and well balanced.

4. Review of the present method of control of prepared food for troops.

Stabsapotheker (Captain, Pharm.Corps) FRANK

The average results of about 54 controls are compared with the calculated nutritive values of the rations distributed by the FVM kbg. (Quartermaster Koenigsberg). The theoretical amount of calories according to the bill of fare is almost in accordance with the actual values found in the chemical tests.

In one case it is demonstrated how, by means of the chemical food control, it is possible to prove clearly whether or not at a given troop kitchen the soldiers receive the food they are supposed to get. A comparison of two controls of two meals of the same unit proved that despite the same consumption of raw materials one of the kitchens revealed a deficiency of 148 calories, the other, however, a deficiency of 684 calories. One of the daily rations contained 72 grams of fat, the other 52 grams.

A further example demonstrated that it is not enough to compare the contents of protein, fat, and carbo-hydrate and the total amount of calories of all the meals for one day in order to get a true picture of the controls. We rather must compare the values of the different meals and dishes. Therefore it is recommended to make arrangements that these values be set forth in the fragebogen, the completion of which was ordered to facilitate the interpretation by the respective commanding officers. The difference in the percentage of the nutritive values is subject to modifications by the fact that the high amount of 1596 calories for the bread must be added to both the practical as well as the theoretical side.

On the occasion of instruction given to the commanders of the training units regarding food supply, the officer in charge of one of the testing stations reported his experiences made with these controls and finally pointed to the necessity of considering all the details. The man who has no chemical background will not be able to understand the different findings of the tests. Therefore it is recommended that the chiefs of the test stations report to the commanders about the summary of the findings as at present and in addition to comment on them at the same time. In this way the interest for these tests was very much increased in Military District I. It was seen and it will always be so that the troop food is especially good where the commanding officer as well as the troop surgeon and the manager of the troop kitchen are interested in these controls and at the same time are interested in their troop kitchens.

In this connection it is pointed out that it is not practical to always send another man of the test station to the units to carry out the control. This seems to be important regarding recent objections concerning the variations of the nutritive value. In the following a few examples are given.

5. Observations on food control.

Oberfeldapotheker (Lt. Col., Pharm. Corps) DILLER

1. The bills of fare of a Giessen General Hospital were used to demonstrate which mistakes are likely to be made in the calculation of the daily food-ration.

2. The daily contents of the different meals in protein, fat and carbo-hydrate and the total amount of calories are shown in a chart and the considerable daily fluctuation is pointed out. In other charts the contents of the daily supper is demonstrated.

3. Another chart shows the share of meat and vegetables in the daily diet. First of all the considerable share of bread and potatoes in the total diet is indicated.

4. In the following picture we see the contents of vitamin A, Carotin, B and C of the daily food and the daily human requirements. In the calculation we see how important it is to find out and to take into consideration the exact value of the potato, which is the main vitamin-carrier. With the analysis made by two hospitals it is shown how great the influence of the time of distribution of the food can be.

5. Then it is calculated to what extent whole grain-bread can absorb raw fiber in comparison to the pre-war soldier's bread, and finally we see variations in the bills of fare (soup-days, fresh vegetables and stew-days, desserts, meals made of flour etc.)

Directions for the chemical inspection of the prepared soldiers food

With regard to the experiences gathered in previous controls of the Chemical Test Stations of the army it seems to be necessary either to change in part the directions given to the chemical service (Anordnung zum chemischen Dienst Nr. 5 v. 6.10.1943) or to complete and enlarge them. For this purpose the following suggestions are offered.

1. The number of tests to be made by each chemical test station during a month be reduced to 20. Reason: The personnel, the material and the time required for each control of the prepared soldier's meal does not permit making more than 20 tests monthly with the necessary care.

2. Distribute this work among the chemical test stations of medical depots of the military districts and the military districts themselves and at the same time the stationary chemical test stations according to KStN 1385 in the occupied countries. Special directions will be given to the chief representative of Army Medical Services regarding the participation of the army groups and armies in the chemical tests. Reason: The above mentioned chemical test stations have available the qualified personnel and suitable equipment. The chemical test stations of the field army may only occasionally participate in these tests.

3. In those cases in which the samples cannot be taken by the chief of the chemical test station himself or by a member of his staff the garrison pharmaceutical chemists must be charged with the responsibility of handling this control according to detailed instructions regarding purpose, technique and handling of the examinations. It is intended to use a pamphlet of which a draft is already available. Reason: The chiefs and scientists of the chemical test stations will have to devote most of their time to their principal assignments. Furthermore duty travels should be limited to a minimum.

4. The forms used for these examinations should be amended. Reason: It has proved necessary to consider further facts for the evaluation of the findings.

5. The meal served at noon should be weighed at the spot if possible. It must be mixed carefully by passing it through a meat grinder several times and only a quantity sufficient for the test should be drawn. The remainder can be used for soups, sauces and so on by the troop kitchens. Therefore, it is not necessary to take along and to test the evening meals if they consist of food stuffs, the nutritive values of which can be found merely by weighing them. Their nutritive values are well-known by constant controls, (butter, cheese, bread, artifical honey etc.). Reason: Saving of food and guarantee of an efficient procedure.

6. It was learned by experience that it is advisable to inspect also the kitchens and storage rooms during the drawing of the samples. Reason: Recommendation may be given in this connection regarding storage and careful handling of the food (Fight waste).

7. The drawing of sampels in later examinations should if possible be done by the same chemist. Reason: Knowledge of the local conditions has proved to be of practical importance.

8. Without infringing on the rule that chemical tests are to be made unexpectedly it is still advisable to inform the troop medical officer in time so that he may take part in the drawing of the food samples. Reason: The collaboration with the troop medical officers has proved to be a great advantage for the success of these tests.

The directions in accordance with the above proposals are in preparations.

The consultations within the special groups have proved that the success of the food-chemical tests of the prepared soldier's meals must be considered as adequate and efficient. The further evaluation of the material gathered by those tests, which amounts to more than 2000, lets us expect valuable final results.

6. Packaging requirements for food especially bread, on board war ships.

Marineoberfeldapotheker (Commander, German Navy, Pharm. Corps) KLEINKNECHT

As an introduction the speaker discussed casings made of cellulose and at the same time he referred to the requirements regarding permeability of that casing to steam and air, fat and arome density. After that the requirements of the Navy regarding that subject were demonstrated. These special requirements are caused by the relatively great humidity aboard ships, especially on board submarines, and at the same time the rough treatment of the crates when taken aboard and difficult storage conditions. The reasons why

the humidity of the air is particularly high in submarines was illustrated. Further factors affecting the consistency of noncanned food aboard submarines are: high temperatures when cruising in the tropics and bad effects due to poor ventilation.

The supply of submarines with fresh fruit and vegetable is possible only for the first portion of the cruise. After this the food supply depends on canned food. Then followed a discussion regarding the use of non-tinned cans. Tin plated cans must be reserved for fruit and vegetables with strong vegetable acid. After a discussion about the influence of the food to be canned upon the can-material a report was made about the experiments to supply a butter preserve of unlimited keeping quality, by means of the "Alfa"butter procedure. At the same time a report was made about attempts to preserve sausage, ham and bacon by covering it with a protective coat of material which is based upon polyvenyl alcohol and polyvenyl chloride. This procedure has already been used in practice. It is intended to adopt the same procedure for preserving fresh bread.

The supply of big ships with bread is no problem at all because they have the necessary installation to bake bread on a large scale. Submarines, however, must be supplied with canned bread. Then followed a discussion about preservable fresh bread and canned bread. Finally reference was made to the directions regarding the outer wrapping of food, the so-called sea-proof casing.

7. The preservation of eggs.

Marineoberstabsapotheker (Lt.Comdr., German Navy, Pharm. Corps) WENDLAND

The speaker dealt exclusively with the preservation of eggs by drying them because this procedure is becoming more and more important for the food-supply of the Armed Forces. Reference was made to the advantages of egg-powder in connection with the food supply of the army and methods of production were reviewed. The best-known and generally applied method is the jet-method. Egg-powder for the army is not to be considered as a bakery or a technical product anymore but it is supposed to be an equivalent for fresh eggs. This must be taken into consideration by food-chemical test methods regarding the appraisal of quality. An important test is the sense-test if it is intended to make an exact and reproduceable method. The following point system is recommended which agrees with the rules for the consideration of frozen products.

5 (very good)	completely fresh, without strange flavor
4 (good)	tasting somewhat old
3 (medium)	obviously tasting old but not yet disagreeable, slight smell like ammonia

2 (useable)	strongly tasting old but still edible, strong taste of ammonia
1 (bad)	unedible
	Consistency:
5 (very good)	loose, homogenous, not differing from fresh egg, no separation of water
4 (good)	more solid than fresh egg but homogenous, no water
3 (medium)	not entirely homogenous, slight separation of water, not conglobated
2 (useable)	strong separation of water, colored, strong granular consistency
1 (bad)	strong discoloring, poorly soluble.

This allows the appraisal of the taste as well as the important characteristics such as consistency, color, looseness, appearance etc. The solubility can be found out by means of the soluble nitrogen and by whipping. For the diminution of quality by chemical means we must take into consideration the water content, the acid and ammonia which is bound loosely. Volatile sulphur, oxidation value, change of lecithin and absorption of iodine by oil (Lea-number) do not give any clue. It is remarkable that tests regarding rancidness do not give any clue either, though the "old" taste of the food is certainly accompanied by a decomposition of fat.

Finally the importance of egg-powder as a carrier of vitamin A was referred to and it was shown that the loss is very little during the drying process.

8. Influence of relative humidity on the growth of micro-organisms in packed food.

Regierungsrat (Government Counsellor) STILLE

During the storage of dried food under varying conditions of humidity "Aspergillus glaucus" proved to be an organism which is extremely xerophilic. It is the last of a series of hyphomycetes to die in case of low humidity.

It was observed that the extreme limit of germination of Aspergillus glaucus is near 70% relative humidity and the upper limit for the formation of spores is near 74% relative humidity. These values are valid only if in addition the hyphomycete grows at an optimal temperature of 31° C. Below and above the optimum temperature the development of the hyphomycete is inhibited by a higher humidity.

In some practical storage tests for the demonstration of the extreme limit of a visible invasion of hyphomycetes we observed that in case of dried vegetables the maximum value is near 77% relative humidity if the storage temperature is 31° Celsius. This represents the maximum density at which decay may still be expected. With higher or lower storage temperature a higher maximum value was observed in all cases. On the other hand all the other dried products which were examined generally showed that they were less liable to an invasion of hyphomycetes than dried vegetables.

9. Analytical problems of chemical warfare.

Oberstabsapotheker (Major, Pharm.Corps) BRODMANN

It is demonstrated that the previous regulations regarding the chemical detection of war gas are insufficient. The new edition of D 1118 (an army regulation) was then commented upon and its advantages and most essential changes were reviewed and compared with the previous editions. The speaker described the new quantitative methods of detection which are to be used from now on. Finally a quantitative analysis of mustard-gas and nitrogen which were compiled by the Institute for Army Pharmacology and Applied Chemistry of the Military Medical Academy was reported. These were in practical application in connection with food.

Discussion:

Then followed discussions about all topics which resulted in a complete agreement on all points. The most important results of the discussions are contained in the directions concerning the methods for the food-chemical tests of the prepared soldier's food.

XII.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON PSYCHIATRY AND NEUROLOGY

Translation prepared by:

U. S. Naval Technical Unit, Europe, (Medical Section)
Office of the Naval Advisor
Office of the Military Government (U. S.)

Self-mutilation and simulation of sickness
(See Section V, Articles 10 - 12)

Psychiatric evaluation in case of self-mutilation and negligence while on guard duty
(See Section V, Article 13)

Fronto-basal brain-gunshot wounds
(See Section VI, Articles 7 - 10)

The pathological anatomy of open and closed brain injuries
(See Section IX, Article 7)

1. Neurosis from the point of view of clinical psychiatry.

Oberfeldarzt (Lt. Col., MC.) Prof. Kurt SCHNEIDER

It is our task to define the concept of neurosis for the purpose of the Army. Personally I never use this term. The significance of the new psychopathology and psychotherapy lies in the fact that they have helped to prove that a neurosis is of psychic origin and is not a disturbance of the nervous system. Paradoxically enough a definition which means the contrary has been retained. Even psycho-therapeutic considerations oppose the definition of neurosis; it may lead the patient to a lack of responsibility. Therefore the patient must realize that he has not been invaded by a neurosis but that he himself is the cause and the seat of the neurosis.

Functional disturbances of the organs without psychic genesis are no longer defined as neuroses by internists. (Close correlations must be recognized.) Furthermore the opimion held by some neurosis therapists that almost the whole field of clinical psychiatry belongs to the study of neurosis must be rejected.

It seems to be acceptable to define a neurosis as consisting of all those clinical symptoms which incontestably are due to environmental factors. We have to differentiate between psychic factors and physical factors. Among the psychic factors I differentiate the abnormal reactions to environmental occurrences (abnormal reactions to personal experience in a narrower sense) and the abnormal inward conflict-reactions which are often stimulated by external experience. Neurosis of the organs and animal neurosis belong to the body reactions which are especially observed in war-neurotics. I define this entire group of psychic factors as psychogenic disturbances of the body. Everywhere, however, we observe transitions and intersections.

The question arises whether or not it is suitable to define any of these symptoms as neurosis. - The expression "abnormal reaction to events" cannot lead to any misunderstanding. The inward conflict-rections normally occur in certain psychopathic patients and are due to a lack of self-confidence - contrary to the abnormal reactions to environmental factors. It is recommended, however, to never use

the term "neurosis" for those cases in which the cause of ill-health is inherent in the personality of the patient. The psychogenic disturbances of the body, however, have an exceptional position with regard to their origin; they differ from the abnormal reactions to environmental factors by physiological factors and from the inward conflict-reactions by the fact that a specific type of psychopathic personality is less relevant to their origin. The definition "neurosis" may be used for this picture.

Therefore the following suggestion is made: The best thing to do is to drop the expression neurosis completely. Presumably it is ineradicable, because not only the physicians and psycho-therapists need it, but also the neurotics themselves. (It is much more honorable and much more elegant to have a neurosis instead of being called a "psychopath".) If one cannot decide to drop the expression completely it should be used only for psychological functional disturbances which are caused by a psychic disorder.

2. Neurosis from the point of view of psycho-therapy.

Oberfeldarzt (Lt. Col., MC.) Prof. J. H. SCHULTZ

1. The term "neurosis" means faulty reactions and faulty attitudes (faulty structures) toward the internal and external world due to psychological injuries without bionomically conditioned reflexes (grief etc.). These faulty reactions and attitudes are understood to be of medico-psychological, abionomic or antibionomic, psycho-physical quantitative origin. Congenital and, very rarely, acquired sensitivity postulates the existence of neurosis, the degree of which may be determinated by the reactions to environmental influences ("sensitivity", "depth") which have not only a "pathoplastic" but also a "pathogenic" valence.

2. The earlier such an injury becomes effective, the more serious the consequences will be. An injury during infancy may change the entire structure of personality beyond recognition (characterogenic nuclear neurosis). Injury occurring later, in most cases, leads to a perceptible disturbance ("psychogenic stratum-neurosis"). Mnemic defects are responsible for habitual anomalies (psychogenic nuclear neurosis) and an acute feeling of being defenselessly exposed to "super-powerful antagonists and conditions". This hypersensitivity results in faulty reactions and faulty attitudes (exogenic remote neurosis).

3. According to the principal psychological source of origin, this classification has a clear relation to the psychiatric-clinical systematology:

Medical-psychological | Psychiatric

Therapy	Diagnosis	Diagnosis
0	Psychopathy	Serious psychopathy
Aggravation	Nuclear neurosis. Serious stratum neurosis.	Abnormal "psycho-reactive" changes of personality; and slight psychopathies.
Partial aggravation with active psychotherapy	Light stratum neurosis.	Psychogenic reactions.
Preventive interference.	Remote neurosis.	Reactions of the environment (BRAUN), "Miliosis" (HAMBURGER)
Change, weaning away	Peripheral neurosis or distaste	

4. The characteristic features of neurotic structures, attitudes and courses may contribute in an important way to other diseases, (structural diseases of the organs (V. v. WEIZAECKER, J. H. SCHULTZ, and others), psychoses (KRETSCHMER, SCHULTZ-HENKEL); peripheral neurosis in case of psychopaths and others).

5. The clinical pictures of neurosis are largely independent of the structure: Same symptoms of different structure, different symptoms of same structure.

6. In comparison to the often intersecting psychiatric classification such as "psychopathy", "abnormal reactive (psycho-reactive) change of personality", "psychogenic reaction", the genetic-structural classification of neurosis in relation to the main psychological sources of origin gives a clear survey and indication for treatment.

7. In the still prevalent (incorrect) static-descriptive definition of "the psychopathy" as an exclusively hereditary, abstract, providential, irrevocable fate, the nomenclatural classification of light and often not as yet psychopathically tainted cases of psychopathy (nuclear and serious layer neurotic) as neurotic seems to be advisable from a theoretical and practical point of view. In the psychiatric classification the peripheral neurotics are missing.

8. "Psychogenic reactions" on the one hand and light layer neurosis and remote neurosis on the other hand may be equivalent nomenclaturally because even in the case of "psychogenic reactions" - at least in principle - psychotherapy must be taken into consideration. The differentiation between stratum neurosis and remote neurosis is based on more positive indications regarding structure and indications for treatment.

9. The uniformity of the psycho-physical reactions from the clinical point of view often causes a complete resemblance of the predominantly hereditary external world reactions and pre-destined false reactions and faulty attitudes (structure) in varying shapes and grades. A purely clinical descriptive differentiation often may not be achieved. In that case it may be obtained only by hereditary-biological research and by diagnostic depth-tests.

10. The neurosis as an abionomic reaction to external influence (SPEER) of different types may in principle be a sequel to the vicissitudes of life, (sickness etc.). That is the reason for its frequency, its practical and social significance. According to its nature, it can be healed only by psychological - in serious cases by "depth-psychological" - research and treatment.

11. The dynamic-genetic contemplation of medical psychology and psycho-therapy is not exhaustively dealt with in present German biology. It needs a thorough and active penetration, in serious cases with "microscopic" minuteness and a permanent aggressive attitude with the keen intent of securing critical findings. Otherwise neurosis will invade precious lives which will be lost for the community.

3. Neurosis from the point of view of internal medicine.

Oberfeldarzt (Lt. Col., MC.) Prof. STEBECK

The term neurosis is very vague, nevertheless it should not be completely dropped in spite of the well justified objections. Only those functional disturbances should be defined as neurosis, or better, as neurotic reactions which occur during a certain period of time or periodically as a characteristic trait of personality and which basically are caused by abnormal psychic dynamics, by abnormal psychic reactions or faulty attitudes. Vegetative disturbances of the functions (metabolism, respiration, stomach, sexual etc.) originate, in a similar manner in the physical as well as psychic sphere of the dynamics of life, due to disposition and are stimulated by particular events or experience. All transitions and relations are found in this connection. But only when the abnormality in the psychic sphere stands in the foreground of medical approach is the diagnosis "neurotic reaction" justified. Even in case the findings of organic impairments are prevalent the psychic influences should never be underestimated. Diagnosis and therapy should always consider both spheres, the physical and the psychic.

4. The legal responsibility of the neurotics.

Oberstabsarzt (Major, MC.) Prof. Carl SCHNEIDER

The neurotic patient may be held legally responsible for any offense committed either beyond his neurosis or under the influence or contribution of it. In this case the general principles of forensic psychiatry are sufficient. Paragraph 51.1 is applicable only in cases of psychosimilar conditions, 51.2 only under special circumstances.

The responsibility of the neurotic patient for his neurosis must be answered in the affirmative in spite of certain contrary considerations. It is based on the experience that the neurotic patient is in a position to influence his neurosis by personal attitude to a very great extent. Furthermore neurotics in their varying phases adapt to the varying environmental conditions. Therefore they must respond to particular situations and they also must be subject to influence by legal measures. In considering the crimical responsibility of the neurotic it is necessary to make a clear diagnostic differentiation from 1. other psychic (psychotic) reactions, 2. undetected endogenous diseases, 3. acute somatic diseases covered by a neurotic superstructure, 4. endocrine disturbances, 5. allergic disturbances and simple constitutional insufficiencies. Only some of the neurotic diseases are of real war significance. First of all we have to struggle against the psychogenic reactions, against the psychogenic superimposition of organic symptoms and the so-called neurosis of the organs. In all these cases the frame of mind and the will of the individual, i.e., factors which are subject to personal influence, have to be fully considered in the evaluation of a neurosis even in cases of a primitive psychic mechanism. In general escape into neurosis should not be criminally prosecuted because it is difficult to prove it is only an escape and a distinction from malingering is extremely difficult and if such cases are to be prosecuted even those subjects whose neurosis was primarily caused either by a serious shock, exhaustion or disease would be liable to punishment. It seems reasonable to subject to punishment only those who resist medical therapy and show insufficient will to convalescence during the therapy. These are the facts well experienced surgeons are confronted with. These facts are connected with undermining the moral of the Armed Forces, because they may give rise to imitation. Imprisonment and transfer to an asylum without treatment and healing are not sufficient in the struggle against neurosis. Means and ways must be found to submit a neurotic to a legal procedure if he does not want to be healed. After the elimination of his symptoms and a thorough reeducation he should be excluded from the community for some time. Two practical procedures are: immediate transfer by the strength of the verdict of the court to a special field unit for hazardous duty. It seems to be better, however, to send the neurotic to a concentration camp for an indefinite period of time until the aim of reeducation or a healing is achieved. The necessary protection of the inoffensive neurotic must be guaranteed in that only medical experts and sufficiently qualified surgeons will be authorized to ask disciplinary action. On

the other hand a sufficiently great number of surgeons should participate in that procedure, and, if necessary the court should be composed of physicians besides the juridical chairman and one of those at least should be a qualified psychiatrist who must possess sufficient experience.

Discussion of the lectures concerning neurosis.

DE CRINIS: I remember two cases which were diagnosed as "neurosis" and "psychopathy" one of which later revealed to be "cranio-pharyngeoma" and the other a "Wilson's disease". I have observed that those aspects of neurosis are becoming popular to which special importance is attached in the geeral medical research such as the focal toxicosis. In one case which I know personally, an officer intended to justify his inefficiency by a focal toxicosis and had obtained several certificates to this effect.

With regard to "neurosis" in general and especially with regard to the evaluation of the psychic effects, I would like to underline that we have not made any proper progress regarding the definition of the concept, since World War I. This is due to the fact that by emphasizing the psychic influence and the contrast of psychic and physical spheres the strict scientific consequences imposing themselves were not given the necessary consideration. Even the "body-anima-problem" which is of fundamental significance in the science of neurosis can be considered successfully if the body and the anima are considered to be one unity in the sense of Goethe's monism. This important question has begged anxiously for solution in the past. On the one hand nobody wanted to adhere to gross materialism, at the sametime the general trend is to abandon relations and dualism. With a view to avoid fruitless discussion I would like to propose that we treat the exterior consequences of an event in the outside world separately from the interior reactions and consequences, the latter referring to the psychic qualities.

CHRISTUKAT: We should always keep in mind that the pathological conditions known as "psychopathy", "neurosis" including "hysteria" must not be interpreted in a moral sense. Their confusion with considerations of evaluation will make it impossible to eliminate the symptoms in single cases and the sociological danger will by no means be diminished. It seems to be unjustified and even dangerous to use the term "neurosis" with too much indiscretion. In dealing with suicide-cases I have observed that monosymptomatic endogenous depressions were covered by some "heart-neurosis" or "stomach-neurosis" which were diagnosed retrogradely. This was the reason why we decided in former meetings to refrain from using the term "neurosis". If, however, it is not possible to avoid the term "neurosis" completely we must give clear definitions in the directions intended for the Armed Forces so that even medical officers who are not experts in this special field can use them advantageously.

PETTE: Whilst the definition of the term "neurosis" is very much disputed our knowledge of the conditions of "neurotic" or "psychogenic" reactions has nevertheless increased in comparison to what was known in the first World War. In the same way the definition of the symptoms has undergone a change and our medical attitude towards those disturbances has changed too and all this seems to be rather important when referring to pathogenic questions. Everything is based on a dynamic mode of consideration which refers to the vegetative functions and regulations. All this makes it clear that it may be rather difficult to distinguish a purely psychogenic case from reactions caused by a pathological process. Besides the many facts already mentioned this is also true for the specific behavior of the attacks in the broadest sense and for all phenomena of the hormones especially in the hypophyseal system.

VILLINGER: Even when adopting the monistic system for the appraisal of humans there still remains a certain liberty allowing for an appropriate evaluation of behavior contiguous to an attempt of malingering.

I absolutely agree with the concept of Kurt SCHNEIDER. We can eliminate the term "neurosis" because it may lead to misunderstanding.

DELIUS: Internists rather often have to deal with people complaining about troubles of the heart and other organs. In many cases it will not be possible to find any objective functional disorder of the subjectively affected organs even by means of minute examinations of the functions. This may be caused to a large degree by the inaccuracy of the diagnosis. On the other hand presumably there are also some cases of neurosis or similar symptoms of disease of psychogenic nature which do not show any objective disorder of the functions. For these patients the term "psychogenic reaction of the body" does not properly describe the situation at least as far as the terminology is concerned because reactions or a disorder of the organs is absent. Perhaps it will be useful to differentiate between "neurosis" i.e. psychogenic symptoms of disease which show only subjective disorders, and those showing objective disorders too.

From the point of view of the internist it seems to be undesirable to accentuate too much the word "reactions" because of the close relationship between constitutional nervousness, light psychopathies and neurosis. In some psychogenic symptoms we do not find any transitory reactive disease but a lasting condition with certain fluctuations of intensity.

Directions concerning neurosis.

In practice and literature the term "neurosis" is used in varying meanings. This renders discussions very difficult and gives rise to erroneous interpretations.

For official use in the Armed Forces it seems to be indicated to give the following directions:

1. Abnormal psychic reactions which are strictly limited to the psychic field and which are not accompanied by physical disorder of the functions are termed "abnormal reaction" psychological factors, for instance "depression" caused by plausible reasons such as a reaction to fear and fright.

These abnormal "reactions to psychological factors" are observed in normal persons as well as in those of an extraordinary character and in psychopathic personalities.

The surgeon must not forget that even many abnormal persons may be cured by psycho-therapeutic means, especially in case of disturbances of the development of personality.

2. The physical symptoms occurring in abnormal psychic reactions are termed "psychogenic (caused by environmental factors) disturbance of the functions". Here first of all, we have the well-known so-called "war-neurosis", appearing as jittering, stuttering, shocks, paralysis, contractures, bladder and gastro-intestinal troubles, i.e. in part, symptoms, which formerly were termed "hysterical". Terms such as "war-neurotic", "war-jittering", "war-hysteria" etc., must absolutely be avoided.

Therefore the diagnosis must be: "psychogenic vomiting", "psychogenic disturbance of the gait", "psychogenic impairment of speech", "psychogenicially fixed radial paralysis".

The necessitiy of giving a description of the person and of the course of the disturbance is emphasized. Even in case of a disease of the organs the same attention must be paid in due time to the psychic as well as to the physical finding.

5. Occupational therapy for brain injury patients.

Stabsarzt (Captain, MC.) RUESKEN

The choice of the suitable occupational therapy methods for soldiers with brain injury should be guided by the aim of that particular treatment. Simple occupations as well as true handicraft in workshops cannot meet the requirement of a systematic treatment of the consequences of brain injuries. Occupational therapy of brain injury patients must be adapted as much as possible to the special conditions of each case. It is of utmost importance to know thoroughly all details of the injury and its after-effects which must be duly considered in the assignment of an appropriate occupation for the patient. Besides the local center symptoms such as motor, sensation, optic, agnostic and aphasic disturbances etc., the so-called general cerebral injuries with the vegetative symptom complex as well as damage of the psychic-mental functions, (meaning a lack of cerebral functional power) must be taken into consideration. The cerebral functional power of persons

with brain injury is especially influenced by the vegetative syndrome. Often it will not be possible to find the lack of cerebral functional power without careful neurological-psychiatric examinations and observations. But this point requires a thorough treatment and promises, when applied in due time, a good result. The work to be performed should be adapted to the cerebral functional power of the brain-injured patient. Recently injured persons must be given quite a different kind of assignment from what is given to patients with old injuries, whose spontaneous recovery have come to a standstill. It is exactly the stimulation of the spontaneous recovery which is aimed at by occupational therapy. For the treatment of cerebral-injured persons handicraft alone will not suffice. They require supplementary mental excersises just as in elementary schools including lessons in arithmetic, reading, history, geography, natural sciences etc. Their purpose is to condition the power of memory as well as the capacity to impress things on memory, the power of concentration etc.

Regarding handicraft, only such tasks should be performed which do not require any professional skill. Under consideration of the peculiarity of the brain-injured person only such work should be performed as wood carving, clay-modelling, sheet-metal-work, card-board work etc. The first condition is that the spontaneous interest "to be doing things" of the brain-injured person must be taken into consideration. The natural impulse for movement and creational activity of each person should be taken advantage of usefully. Aimless and inanimated tinkering must not be allowed. The physician and the instructor of the workshop must cooperate fully and in doing so apply true handicraft under consideration of the psychic capacity of the patient. Pedagogical considerations should govern him with a view to exercising the desired influence. Labor should be performed in a professional and industrial way only by older brain-injured persons whose working power has been reestablished to such an extent that they may be employed again by their previous firms, but who for medical reasons cannot yet be discharged. For this purpose hospital owned work-shops are very suitable in which war-important articles are produced such as household articles and agricultural machines, pig-skin shoes with wooden soles, metal buttons and others. Before being discharged as "unfit" from the hospital the soldier should be employed expediently for some time on probation in consideration of his previous or new occupation.

Discussion:

CHRISTUKAT: The complexity of a cerebral injury cannot be fully diagnosed with the reflex-chamber alone. There is no doubt that in such a case the specialist should proceed to a thorough cerebral pathological examination.

The optimism which was caused by the excellent results of occupational therapy were not fully confirmed, especially regarding the practical value in future employment.

A discrepancy is often observed between the cerebral-pathological finding and the result of a labor test (in continuation of practical occupational therapy methods) on the one hand and the result of the final reinstatement into the civilian life without the control of the hospital on the other hand. It is important to realize that the brain-injured person although fit for labor cannot stand competition. This is explained in detail in a publication by STADLER which will appear in the near future.

Carl SCHNEIDER: Occupational therapy in case of brain-injuries must be adapted to the different important phases of the healing process. Shortly after the operation and during the time required to overcome the edema and the acute danger of infection (three weeks) the therapy must be designed to calm and relieve the patient. In the second phase which sometimes lasts several months, the therapy must be extended in three directions: a. Compensation of remaining defects, b. Exercise of quiescent functions which are not damaged, c. Restoration of damaged functions. In doing so the biological order of the function must be taken into consideration. During the last phase the therapy should aim at achieving the social reinstatement of the brain-injured person. Failures are often caused by not considering the above described principles.

TOENNIS: The reinstatement of the brain-injured patients into civilian life under medical supervision represents an especially important factor to prevent the injured patient from losing his social level.

6. Alterations in the cerebral ventricles following gunshot wounds of brain.

Oberstarzt (Colonel, MC.) Prof. W. TOENNIS

The changes we found in brain ventricles after gunshot injuries are divided into local dilatations and general symmetrical or asymmetrical dilatations.

The following collection of evidence is the result of examining 375 cases of uncomplicated intradural gunshots affecting the vault of the cranium.

1. Local dilatation of the lateral ventricles was observed in 61.2 per cent of the cases. The location of the injury had no influence in this respect. First condition for the formation of a local dilatation of a brain ventricle is a defect of the brain substance. The buldging of the vault of the cranium is caused by the pressure of the fluid. The shape of that buldging is decisively influenced by the shrinkage and the brain injury which later undergoes atrophy.

2. Diffuse dilatation: Regular dilatations of the lateral ventricles were observed in 90.6 per cent of the cases, 46.4 per cent slight, 36.8 per cent moderate, and 7.4 per cent serious.

It was not determined to what extent the duration of the unconsciousness is of importance in spite of the fact that 80 per cent of the cases showed unconsciousness immeditately after the injury.

Among the asymmetric dilatations we find also marked dilatation of the contra-lateral ventricle. In 0.2 per cent a progressive dilatation of the ventricle was observed. In one case we observed a diffuse ventricle dilatation of moderate degree returning to a nearly normal ventricle picture.

Even a prolonged increase of the fluid pressure does not necessarily lead to a chronic dilatation of the ventricle. The chronic and progressing ventricle dilatations are caused by an atrophy of substance. which is due to cerebral edema. It has not been possible so far to ascertain whether or not further stimulating factors exist.

Discussion:

PETTER: We must conclude from experience gained in peace-time that a ventricle dilatation does not by itself permit one to give a final judgement regarding efficiency as long as no function centers are lost. It seems to be important only as regards the ability of the brain to adapt to an acute overload-regardless of the cause. This ability may be influenced and may show disturbances (epileptic attacks).

PANSE: If, as observed by Dr. TOENNIS, the fluctuations of the ventricle size occur quite frequently at short intervals and if they are really caused by fluid-disturbances, this would be of greatest importance for all of neurology. The findings gained from single encephalograms should in that case be considered as being much less static and constant.

XIII.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON TUBERCULOSIS

Translation prepared by:

U. S. Naval Technical Unit, Europe, (Medical Section)
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1. Pleurisy with effusion.

Stabsarzt (Capt. MC.) Prof. SCHEDTLER

(principal report)

The necessity for a precise etiological definition of the different forms of exudative pleuritis is emphasized. The pleural effusions which appear as independent disease pictures are often tuberculous in nature. Apart from this, we find effusions of the same sort during or after diseases of other organs as for instance pneumonia and infectious diseases. Rheumatic exudative pleuritis occurs rather seldom. It is unjustified and unsuitable to consider allergic exudative pleuritis as a special form. After that the symptomatology of the different types of pleuritis were reviewed. Cases of doubtful pathogenesis should for practical considerations be treated as if they were tuberculous in nature. It is doubtful whether or not there exists a true increase of the number of cases of pleuritis during the war.

The therapy to be applied should in general be based on the well-proved principles according to a uniform plan. The particulars, however, may show great differences, particularly regarding the methods. In the case of a non-tuberculous pleuritis the treatment of the primary disease should be born uppermost in ones mind. Patients with this disease are fit for active service after their discharge from the hospital. The tuberculous effusions, however, require a long-lasting follow-up and a careful treatment. Then the question was discussed regarding the deflation of the lung by the effusion as well as the use of pneumothorax. This question must be examined once more in connection with comparative examinations of test-series which could most practically be carried through by special wards for pleuritic patients which should be set up everywhere. The skin-emphysema treatment is rejected. The patients who suffer from a tuberculous exudative pleuritis must be followed up after the treatment (X-ray control) because in the years to come, new tuberculous invasions may occur in case of negligence. Pleuritis patients should be classified "fit for civilian labor", (a.v.) or "fit for conditional service at home under the most favorable conditions possible", after ½ - 1 year at the earliest. Supposing that those patients are taken care of, they may be employed in the homeland or by the supply services taking into consideration their general education and knowledge. Only 2 - 3 years later may a (k.v.) classification (fit for active service) be allowed if new symptoms are absent.

2. Pleurisy with effusion (exudative pleuritis).

Oberstabsarzt (Major, MC.) Prof. HANGARTER
(co-report of the internist)

In exudative pleuritis, other than tuberculosis, acute rheumatic fever is rather important from the etiological point of view. The classical form of rheumatic fever (acute polyarthritis) is often overlooked because of an incomplete symptom picture. Observations made under quite different climates at the different sectors of the eastern front showed that some cases of exudative pleuritis are of rheumatic origin. It is typical for the rheumatic origin of exudative pleuritis, that it sets in suddenly out of good health with accompanying high temperatures, sometimes following angina and infection. Rheumatic reactions may be observed in the joints, in the endomyopericardium, furthermore in the disorder of the cardiac conduction system, musculature, vessels, skin and nerves. All these factors must be taken into consideration. Excessive variations of temperature and excessive exposure to the sun appear to favor the stimulation of allergic-rheumatic exudative pleuritis. In case of a pleuritis caused by rheumatism, the exudate is cloudy-serous, mixed lymphocytic-leucocytic and it has a specific gravity of 1.018 to 1.022. The speed with which the red blood corpuscles settle is much accelerated. The presence of infiltrates could not be observed by X-ray. The rheumatic effusion is very quickly resorbed, without pleural thickening and without any impairment of the mobility of the diaphragm during the salicylate therapy and "Pyramidon" therapy. The speed with which the red corpuscles settle is a reliable indication of the healing of rheumatic symptoms arising during the pleuritis.

3. Pleurisy with effusion.

Stabsarzt (Captain, MC.) Prof. GIESE
(co-report of the pathologist)

Exudative pleuritis is always a manifestation of disease which is not limited only to the pleura. An exception of this rule is the primary endothelial cancer of the pleura, which, together with the metastatic pleural-carcinosis in the group of the non-infectious exudations in the post-mortem findings (besides trauma and lung infarct), are most frequently the reason for a serous exudate. In most of the cases a serofibrinous pleuritis on an infectious-toxic basis is caused by tuberculosis. The cases of serous exudates accompanied by pus-forming germs as the causative agent are very rare. In the observed cases the possibility of tuberculosis could easily be eliminated, even clinically, because of the observed formation of foci in the lungs or in the wall of the pleural cavity. In pleuritis which is sometimes found as an accompanying symptom of the "rheumatismus infectious specificus" no accumulation of a significant exudate is observed. A specific-rheuma-pleuritis with significant exudation apparently does not occur.

The sero-fibrinous form is more common than the caseous form, as was observed in 137 cases of tuberculosous exudative pleuritis which were examined anatomically. After the exudate subsides, little knots are observed in the adhesion in the case of the sero-fibrinous form and large caseous remnants are still found anatomically many months after clinical healing.

In those 137 cases the tuberculous exudative pleuritis had followed infantile primary infection 14 times and the late infection of the adult 80 times. It is found 33 times as an accompanying symptom of pulmonary tuberculosis and 12 times as an accompanying symptom of a flare up of lymph node tuberculosis.

In all cases examined it was proved by the presence of tubercles and caseations on the pleural membranes that an infection of the pleura space with tubercle bacilli has taken place. The existence of very large effusions has not been observed on a purely toxic or allergic basis.

Pleuritis which follows the primary infection of the adult is frequently found between the ages of 18 and 30 years. Later on the number of cases decreases rapidly. Pleuritis with a flare up of lymph node tuberculosis is exclusively found in higher ages most frequently in persons older than 50 years. Since the beginning of the war, a steady increase of tuberculous pleuritis has been observed, first in soldiers of the Armed Forces but now also in the civilian population. In a series of cases in which the onset of the primary infection was approximately determined, it was observed that in the course of the first year, pleuritis appeared in a remarkable number of cases from three to seven months as the first symptom of tuberculosis. Late primary infections as well as infantile primary infections were accompanied by hematogenous spreading in about 2/3 of the cases. In 63 per cent of the cases of the primary infection followed by an exudative pleuritis, localized lung effusions without association with a general miliary tuberculosis were found. It amounted to 24 per cent when an exudative pleuritis was not demonstrated.

The opinion was expressed, that each infectious exudative pleuritis which is accompanied by an excessive long lasting serous effusion must be considered a symptom of tuberculosis, as long as it is not possible to find another non-tuberculous stimulating focus. It has been impossible so far to prove the occurrence of a rheumatic pleuritis which is accompanied by a very large effusion.

The fact that in a considerable number of cases the tuberculous pleuritis develops after a fresh primary infection of the adult leads to the conclusion that it is necessary to regocnize the source of infection beyond the finding of a primary infection. In the case of tuberculous pleuritis, the effusion subsides before the tuberculous process in the pleura or the neighboring organs has come to a standstill. Therefore its subsidence cannot be considered as an indication of the healing of the tuberculous process.

Discussion concerning exudative pleuritis.

Comments upon the report of SCHEDTLER by

Oberstabsarzt (Major, MC.) DEIST

The view has been expressed by some internists that the simultaneous hospitalization of patients afflicted with exudative pleuritis and those suffering from open "cases" of pulmonary tuberculosis may be hazardous to the patients of the first group. It may, however, be taken for granted that:

1. the majority of cases of exudative pleuritis are a manifestation of tuberculosis,

2. exudative pleuritis cases of other etiology are greatly outnumbered,

3. each exudative pleuritis must be considered as a tuberculous disease in an active sense when the non-tuberculous etiology has not been proven,

4. only patients with an exudative tuberculous pleuritis equivalent to active tuberculosis are hospitalized in hospitals for pulmonary diseases, or in special convalescence detachments under supervision of tuberculosis experts. In addition we may also have patients placed under observation for tuberculosis after having been afflicted by an exudative pleuritis.

Two factors are important in connection with the question whether or not patients with closed cases of active tuberculosis may be endangered by open tuberculosis cases. It must be distinguished between endogenous and exogenous reinfection.

In animals the classical experiment by KOCH stands in the foreground of all considerations: A tuberculous guinea-pig cannot be infected again by tubercle bacilli, a local disease of the skin, however, is the consequence but general reinfection is not observed. According to the experiments by the former leader in this field Bruno LANGE a maximum immunity is observed when tuberculosis is at its peak. The immunity decreases, however, with the healing process and subsides as soon as the healing is complete. In that connection with humans, Bruno LANGE points to the great difference between the attitude of the patient who has been healed a long time ago and the attitude of the actively sick person with regard to superinfection. He directs the clinicians attention to the tuberculin-negative individuals. In his findings in animals, Bruno LANGE does not see the necessity for the separation of open and closed cases of tuberculosis.

For all further considerations it is important to point to the fundamental difference of the reaction in juveniles and adults with regard to superinfection. For Armed Forces purposes we may refrain from dealing with the first category.

Against the clear result of the animal tests of Bruno LANGE stands the superinfection with its two faced "Janus-head".

The reaction of the individuals in relation to superinfection may be different in the various phases of the disease (NEUFELD). Superinfection may lead to an acceleration on the one hand, on the other it may lead to a decrease of the defense forces of the body against tuberculosis (KAYSER-PETERSEN). The controversies about "endogenous" and "exogenous" infection have not yet been settled. So far nobody can deny that there is a possibility of an exogenous superinfection. The majority of physicians, however, assume a domination of the endogenous reinfection especially with regard to our concept of the hematogenous course of tuberculosis as has become generally known in the last years. Many speak of a combination of the two possibilities: exogenically stimulated endogenous reinfection (GRAEFF). At the same time the question arises why a tuberculous person should be more sensitive to his own bacilli than to those from others.

For the clinical evaluation the following facts are relevant:

1. Occupational diseases of specialists for tuberculosis.

This kind of disease actually occurs. Although after one hour of consultation in cervical diseases virulent tubercle bacilli could be proved on the cheek and in the nasal mucus of the examining physician, cases of infection are extremely rare.

2. Occupational diseases of nurses.

On the one hand we have the theory of BRAUNING who has observed relatively many cases of infection of nurses who attend tuberculous patients. On the other hand, however, the great majority of sanatorium physicians consider the hazard of infection of nurses as relatively rare. It is a matter of fact that a superinfection of nurses has been observed rather often if regular X-ray control is instituted. But it is quite sure, that many of those cases are benign and that they are not found at all if X-ray control is not instituted and applied regularly and carefully.

3. Tuberculosis in teachers.

There is no question that school children have been infected by tuberculous teachers. Because of our dealing with adults only this question is of no importance here.

4. Matrimonial tuberculosis.

The hazard of infection is especially high in this case, although only 10 per cent of reciprocal infection has been reported. In this instance the exogenous superinfectious moment cannot be the only and decisive reason. It is the opinion of KAYSER-PETERSEN that the superinfection may even lead to an increase of the defense forces in the case of married people.

5. Observations gained in public welfare.

Patients suffering from active tuberculosis who are discharged from hospitals exhibit a more marked relapse rate when returning to tuberculous surroundings. Here, however, there must be taken into consideration not only infectious but also absolute hygienic influences. Healthy dependents of tuberculous persons fall sick 5 - 7 times more frequently than dependents of healthy families. Also in this case in spite of most serious exposure there is no 100 per cent hazard. Babies which are extremely weak regarding their defense forces died in 4.5 per cent of the cases at Halle and in 6 per cent of the cases at Stettin, although all of them were heavily exposed to infection.

6. Epidemiology of tuberculosis.

At Davos as well as at Schoemberg the mortality rate due to tuberculosis of the population decreases with the development of the health resort and the growing wealth i.e. with the increase of the number of patients the greater portion of which is seriously suffering from tuberculosis. According to our own experience these facts are especially striking at Schoemberg, where many patients suffering from serious open tuberculosis are living in private homes.

7. Earlier special examinations at Ueberruh.

The final recovery of all patients has been followed up who during a period of six years had been discharged because of a minor or dubious case of tuberculosis. All those patients had shared their rooms with open tuberculous persons for four years. Within two years a separation had taken place. The result was as follows: 2.6 per cent of the patients had died from tuberculosis, 0.9 percent had sufferent from open tuberculosis, 0.6 per cent of the cases were still closed but their condition of health was aggravated. This makes 4.1 per cent changes for the worse. 1724 cases suitable for evaluation were taken as a basis for these figures. Under consideration of the fact, that extremely severe cases of tuberculosis change significantly for the worse in 7 per cent of the cases, the above result of only 4.1 per cent of changes to the worse is surprising. Without doubt this means that these patients suffering from closed tuberculosis had not been infected or damaged for the future, by those with an open tuberculosis and with whom they had lived together in the sanatorium. The low percentage is especially striking, because among those 1724 patients a rather great number of practically healed tuberculous persons was certainly included, who according to the theory of Bruno LANGE were especially endangered by a new infection because of their loss of immunity. In contrast to the theory of Bruno LANGE some of the specialists for tuberculosis believe that even inactive tuberculosis cannot be endangered by an open tuberculosis under the hygienic conditions in a sanatorium.

Without dealing further with the problem of open and closed tuberculosis, I would like to point only to the fact that in the same patient the result of examining the sputum may vary from "negative" to enormous quantities of tubercle bacilli.

With regard to the clinical animal tests the majority of the specialists are of the opinion - the only opponent so far was BRAEUNING - that the separation of the certain and uncertain cases or cases not to be attended (observation cases) is sufficient. This separation has been practiced everywhere.

There is no doubt at all that there actually exists a damaging exogenous superinfection. For its coming into effect, however, some other damaging components must be present. The possibility of a damaging effect concerns only either healthy individuals or those whose healing process has come to an end a long time ago.

In the hospitalization of tuberculosis cases only two categories of patients will be distinguished: On the one hand healed persons i.e. observation cases, and on the other hand we have the sick person i.e. even the exudative pleuritis cases as active tuberculosis. Furthermore we must differentiate between the clear hygienic conditions prevailing in a special hospital for pulmonary diseases and the insufficient hygienic conditions outside the sanatorium.

Therefore we should insist on a separation of cases of exudative pleuritis from open tuberculous cases or their hospitalization in other medical institutions. It must be repeated that only those persons who really require medical treatment should be sent to the special hospitals for pulmonary cases. As we have always done the observation cases must be hospitalized separately. The separation is greatly desirable because of psychological reasons when the patient after his discharge from the hospital has to return to less hygienic surroundings. This education, however, must not lead to a fear for bacilli. To speak of a cross infection of bacilli, in sanatoriums for pulmonary diseases, is unfounded from the scientific point of view and it is even dangerous, because of its effect upon non-professionals and physicians who are not specialists.

The systematic treatment, even of closed tuberculosis and of the cases of exudative pleuritis and the treatment of the observation cases, by specialists, requires that those patients must not be sent to general hospitals or to a sanatorium for internal diseases or to general health resort. They should be sent only to special hospitals or health resorts for pulmonary diseases corresponding to the hygienic standards where patients are best protected against any new infection.

Further comments:

BOHNENKAMP: In cases of pleuritis, the number of which is increasing, a strict differentiation must take place between the tuberculous pleuritis, the pleuritis after pneumonia and pleuritis after visceral rheumatism, which by the way occurs more frequently than is generally estimated. With rheumatic pleuritis, myocarditis was more frequently observed than endocarditis. After a tuberculous exudative pleuritis an early discharge from the hospital may result in a set-back.

STEINMEYER: In much the same way that the tonsils present a focal exudative pleuritis rheumatica, tubercle bacilli may enter the organism through the lymph passage and may give rise to tuberculosis or aggravate an existing tuberculosis.

LYDTIN: In case of pleuritis lasting over a long period of time and therefore requiring special thorough judgement and care, it is revealed by the onset of a bronchial glandular tuberculosis or of an extra-pulmonary tuberculosis that a tuberculous manifestation of the first infection prevails. The sudden onset of tuberculous manifestations exhibited as exudative pleuritis, requires special precautions more than normal conditions.

ULRICI: The prognostic significance of an exudative tuberculous pleuritis varies in accordance with its appearance, either as an accompanying symptom of a first or second infection, or as a manifestation of hematogenous tuberculosis, or, during the course of tuberculosis. It is always synonymous with a sudden onset of tuberculosis and therefore it must be treated and judged accordingly. The term idiopathic pleuritis should be avoided.

Directions concerning exudative pleuritis.

1. Each infectious exudative pleuritis accompanied by serous effusion must be considered as a symptom of tuberculosis unless another etiology is not provable by the history or clinical examination.

2. Pleuritis occuring in connection with non-tuberculous diseases must be designated correspondingly after a sufficient clarification of the diagnosis (f.i.metapneumonic pleuritis). The supposition of a rheumatic pleuritis must be founded on other findings of rheumatic organic diseases.

3. The results of the pathological-anatomical examinations which were sent to us, prove, that the exudative pleuritis is often an accompanying symptom of late tuberculous primary infection of the adult which is rather often observed nowadays. In those cases, it must be considered, as a first symptom of such a late infection.

4. Each exudative pleuritis should be brought to clinical treatment. The tuberculous pleuritis should be adequately treated in a special section of the hospital after the acute symptoms have subsided. The arrangement of those hospitals must be adapted to the local conditions.

5. After the diagnostic test-puncture, further aspirations should be done only if symptoms of displacement are observed. Neither frequent aspiration, nor pneumothorax prevents pleural thickening, because the pleural tuberculosis determines the degree of the formation of scar tissue.

6. After the subsiding of the acute manifestations of disease, the treatment in the special section of the

hospital must be continued according to the principles of treatment of pulmonary tuberculosis and it should be discontinued after the disappearance of all clinical symptoms. In general, it will require at least three months.

7. When judging the fitness for active service, we must take into consideration, the duration and seriousness of the disease.

4. Tuberculin treatment of tuberculous pleurisy.

Professor W. NEUMANN

The speaker deals with the tuberculin treatment of serous pleuritis and demonstrates, that this kind (tuberculin) of treatment is the method of choice for this disease. The efficiency for the cure is clearly seen in the fact, that after each injection of tuberculin (either subcutaneously, intracutaneously or percutaneously) the existing high temperatures decline, and at the same time the daily quantity of urine increases proportionally. The effusion is decreased by this polyuria. If a ployuria does not appear, we are dealing with either a tuberculosis accompanied by serious damage of the heart muscle (a bad prognosis), or a second possibility is that the basis of the exudate is not tuberculosis but another disease. Therefore, the tuberculin treatment is important from the differential diagnostic point of view.

5. Types of tuberculosis.

Flottenarzt (Fleet Surgeon) Prof. BACMEISTER.

A suitable scheme of classification for the practical work must fulfill the follwoing demands:

1. It must be suitable for research work as well as for the clinic, public welfare and statistics.

2. It must take into consideration the results of the X-ray examination which are indispensable, not only for the recognition, but also for the evaluation of tuberculosis.

3. It must be as simple as possible so as to allow the classification of all the variations and pictures of the disease.

4. It must lend itself to modification according to the neccessities which may arise.

5. It must be easily understandable even for those physicians who are less experienced in the field of tuberculosis.

A good preliminary work was already achieved by the "Reichstuberkuloseausschuss" (National Tuberculosis Committee) which

has prescribed a very simple classification of the different kinds of tuberculosis for the purely practical purposes of fighting epedemics by the State Health Departments and the public institutions for the care of tuberculous patients. This classification was used for the annual report and it included only two main groups of tuberculous diseases, namely the cases to be taken care of and those to be observed. It has relatively few and easily understandable subdivisions.

The arrangement and contents of this classification is not perfect, but it has proved to be practical and is accepted everywhere. This is an example of how a uniform working scheme can be laid out if the personal point of view is put aside and subordinated to the general interest.

This simple classification which is very suitable for the purposes of public welfare (tuberculosis campaigns) is not adequate for scientific work, clinical needs and statistics. Therefore, a supplement is required which takes into consideration the precise diagnosis of the different types of the disease including the findings of roentgenology. This supplement should be included in the system of the public welfare organization in order to guarantee a uniform treatment of all cases. Most of the classification attempts made up to now do not meet these requirements and therefore cannot be taken into consideration. Two proposals have however been received which seem well suited for the public welfare system and therefore should be generally accepted. This refers to the proposal of SCHROEDER, which has been introduced in Berlin and the proposal of ULRICI which was given its trial in Corps Area VIII.

By order of the Chief Surgeon of the Navy a meeting of medical officers took place at St. Blasien from March 23 to April 3 1944. On this occasion the meeting dealt with the details of the future systematic combat of tuberculosis in the German Navy. Both proposals mentioned above were discussed and ULRICI's proposal was given preference. It corresponds more to the clinical requirements and stresses more particularly the precise diagnosis and is built up more accurately on the results of the X-ray examination.

Some changes are proposed but they are not of fundamental significance. These changes will be dealt with in detail in this report.

ULRICI's system in its present form seems to meet all requirements. It adapts itself to the welfare organizations, it has an uniform structure, it is very suitable for practical and scientific work and can be supplemented and therefore it may be accepted by the military and civilian groups equally well.

The meeting concurred, that the above proposal constitutes a suitable bases for a classification. Nevertheless the question arises whether this classification meets modern requirements of statistics because this point was not borne in mind when compiling the classification. Modern statistics regarding scientific questions have found new means and have made great progress. New key numbers were established and

all letter symbols avoided. In this way a direct entry into the punch-card system is possible. The punch-card system (HOLLERIT procedure) is most generally adapted by the government authorities. As to the Navy a new classification of diseases is being worked out which will make it possible to recognize the history of the disease of the patient seen from different angles so as to permit scientific evaluation by means of the punch-card system. This method allows a better control of certain groups of disease. There is no doubt, that this new technic to classify the different diseases will be generally approved. Even for the classification of the different types of tuberculosis such a scheme may easily be laid down on the existing basis. During the Tuberculosis Conference at St. Blasien, Naval Oberstabsarzt Prof. Dr. MAYER was delegated to project such a scheme with consideration of the previous schemes of the public institutions for the care of patients suffering from tuberculosis and at the same time the scheme of ULRICI.

I am presenting this proposal to you.

This proposal may be new and surprising to you but it is not really new. Without specifying more types of diseases it represents a simplification of ULRICI's scheme which constitutes its basis. A classification is applied by simple use of the statistic numbers connoting respective diseases in the punch-card system which may be extended according to personal requirements. It fulfills the clinical-roentgenological demands and requirements and it is very suitable for an immediate statistical evaluation.

Varieties of tuberculosis.

I. Infectious tuberculosis of the respiratory organs with proof of bacilli. (reportable).

A. Acute tuberculosis.

101 Primary tuberculosis, primary complex and its immediate subsequent clinical problems.

102 Acute softening infiltrate with or without dissemination.

103 Hematogenous tuberculosis with disintegration (incl.miliary tuberculosis with bacilli).

104 Lobar and lobar caseous pneumonia.

B. Chronic tuberculosis.

111 Productive tuberculosis

112 Productive cirrhotic tuberculosis

113 Chronic tuberculosis with acute reactivation

114 Tuberculosis in the final phase.

II. Infectious tuberculosis of the respiratory organs without proof of bacilli (reportable).

A. Acute tuberculosis.

201 Primary tuberculosis, primary complex and its immediate subsequent clinical conditions.

202 Acute and softening infiltrate with or without dissemination.

203 Hematogenous tuberculosis (incl.miliary tuberculosis with disintegration and without bacilli).

204 Lobar and lobar caseous pneumonia.

B. Chronic tuberculosis.

211 Productive tuberculosis

212 Productive cirrhotic tuberculosis

213 Chronic tuberculosis with acute reactivation

III. Non-infectious but active tuberculosis of the respiratory organs (not reportable).

A. Acute tuberculosis.

321 Babies with positive tuberculous reactions

322 Primary infiltration

323 Acute and sub-acute miliary dissemination

324 Bronchial glandular tuberculosis with or without secondary infiltration

325 Isolated exudative pleuritis

326 Acute hematogenous tuberculosis (incl.miliary tuberculosis without bacilli).

327 Acute infiltration without softening

B. Chronic tuberculosis.

311 Productive tuberculosis

312 Productive cirrhotic tuberculosis

313 Chronic tuberculosis with acute reactivation

314 Older infiltrates without softening

IV. Active tuberculosis of other organs (reportable).

431 Tuberculosis of the glands

432 Tuberculosis peritonitis and mesentary glandular tuberculosis

433 Genital tuberculosis

434 Tuberculosis of the kidneys

435 Tuberculosis of the bones and joints

436 Tuberculosis of the skin and mucous membrane (Lupus)

437 Tuberculosis of the eyes

438 Tuberculosis of the ears

439 Tuberculosis of the central nervous system and of the meninges

440 Tuberculosis of the soft parts (excl. skin and mucous menbrane)

441 More rare localizations.

V. A. Clinically healed tuberculosis of the respiratory organs.

551 Healed primary complex

552 Old hematogenous and clacified spreading centers

553 Old cirrhosis of the apex

554 Remnants of infiltrates and induration fields

555 Cirrhotic tuberculosis

556 Isolated pleural indurations of all kinds

B. 661 Clinically healed or inactive tuberculosis of all the other organs

C. 771 Persons exposed or having been exposed.

Discussion:

F. MEYER: A classification scheme should be of understandable and simple statistical structure for its purpose is to register tuberculosis. It should be arranged in such a way, that it is possible to apply it to a punch card system.

STEINMEYER: The examination of ULRICI's classification scheme has proved its usability in practice so that it is desirable to apply it in general.

BOHNENKAMP: It must be warned against applying a classification scheme of diseases to the HOLLERITH-procedure because medically qualified personnel would be required for that purpose. ULRICI's scheme lacks any indication concerning the extension of the tuberculous processes and observations concerning the therapeutic treatment.

GRASS: A classification scheme must be compiled in such a way that everybody who has to use it can distinguish the different types of tuberculosis without ambiguity. The symbolism of the scheme of ULRICI and BACMEISTER is much more practical than the figures of a HOLLERITH-system. Both systems must be combined in such a way that the symbols of the scheme can be transferred to the figures of the HOLLERITH-system later. In doing so some difficulties must be taken into consideration because the complete diagnosis must correspond to the sum of the different symptoms.

6. Classification of findings made by the X-ray projection method.

Oberstabsarzt (Major, MC) HEIN.

The scheme for the evaluation of the X-ray projection findings developed by the Army Medical Inspection does not permit an exact diagnosis of the lung processes. First of all it is not possible to arrive at an exact diagnosis concerning the specific changes of the lungs. On the other hand the non-specific changes of the lungs or the changes which cannot be explained with certainty cannot be classified, so that we are not in a position to work precisely enough to use these findings for statistics.

The X-ray projection method should serve to secure a true diagnosis and classification of fitness besides the picking out of tuberculous persons and the elimination of infectious tuberculous patients. Therefore an X-ray projection method should be compiled accordingly. The diagnosis must be so precise and clear, that it is possible to compare findings and alterations without difficulty. All these demands can be fulfilled by means of the minature X-ray projection. As to the demands regarding the diagnosis we must not ask too much. This seems to be necessary because of lack of especially skilled medical officers and the quick procedure with regard to the evaluation of the different screen pictures. We must try to prevent a diagnosis which lies beyond the possibilities of an X-ray projection. On the other hand a control and comparison of the results of other examiners must be possible. Therefore it is requested that the following scheme be adopted:

1. A simple and clear description and localization of the finding

2. Marking those findings which were based only on an X-ray projection.

3. Classification of the findings according to military fitness.

4. A space must be reserved for the entry of the final diagnosis.

5. The course and the prognosis of the tuberculosis should be set forth.

The symbols of the proposed scheme are as follows:
r,l refer to the side of the picture, I, II, III, IV, and V stand for apex, infraclavicular zone, middle zone, base zone and hilus. With these symbols it will be possible to determine the extent of the process as to the space, subsidence and activity. Further symbols are:

L 1 no pathologic changes of the lungs

L 2 changes which cannot be evaluated by X-ray projection alone

L 3 non-tuberculous changes of the lungs

L 4 refers to positively old tuberculous changes which do not affect military fitness (healed pulmonary tuberculosis)

L 5 are changes which affect military fitness

L 6 are changes which exclude fitness for the time being (as f.i. formation of cavities)

P means pleura. To this group belong all kinds of thickened pleura, the seropneumothorax under P 7, pneumothorax under P 8 separately.

G means external influence and effect of operative measures i.e. gunshots, dislocation of diaphragm, pneumolysis, plastic operation, thoracotomy

H is the symbol for the hea. . Changes which can be diagnosed with certainty are set in columns here.

S is the symbol for skeleton. Here we have to designate the curvature of the spine, costo-anomalies and fractures

The actual conditions are characterized by the fact that a special importance is given to the diagnosis. The judgement of military fitenss is also indicated. So, under L 4 we have defects belonging to group A 47, under L 5 defects of groups B 47, and L 47, under L 6 Z 47 and vU 47 deficiencies.

The attempt to bring this scheme into relation to the general scheme for the varieties of tuberculosis failed. The attempt to incorporate X-ray projection findings in a general scheme of diagnosis for pulmonary tuberculosis with a view to secure a possibility of a uniform registration and statistical evaluation, and, at the same time in order to make a count by the HOLLERITH-

system possible, aggregate parts of the X-ray projection have been adopted as f.i. numbers L-1, - L-3, P,G,H,S. Pathologic-anatomic and clinical points of view are the basis of this scheme. The descriptive representation already used in the X-ray projection scheme assures a close relation to the clinical classification. The clinical diagnosis as well as the localization, activation, possibility of transmission, progress, and regress etc. are connoted by a figure. If the HOLLERITH-system is going to be adopted, the symbol used in the general scheme will serve as a basis for the counting system. Particularities of the finding, of course, of the constitution etc., are presented by adding further figures. Necessary supplements are easily incorporated. Practical experiences were not yet gained in the use of this new scheme.

Discussion:

PICKHAN: The classification scheme provided for the X-ray projection findings of the navy takes into consideration the X-ray anatomical finding of the tuberculous pulmonary changes.

JANKER: A frame scheme as simple as possible is desired, which may be extended to special requirements.

GRASS: HEIN's scheme underlines the diagnosis of the X-ray projection i.e. it brings medical experience in reach of scientific evaluation. If the number of X-ray projections is high, this means much additional work to the surgeon who does not concentrate his attention on the X-ray projection findings in the classification of military fitness, appraisal of necessary treatment and control and, in case of prisoners of war, their suitability for labor.

ULRICI: The X-ray projection system used by HEIN as a basis of the diagnosis should be used only as a method of indication and not as a method of diagnosis as we have in the past. HEIN's scheme is rather complicated. It is impressive because of its versatility.

7. Fitness for active service in case of tuberculosis according to the new definitions of fitness.

Oberstarzt (Colonel MC) DEIST.

The observations made in the classification of registrants afflicted with tuberculosis reveal that, in spite of the exceptional severity of the war and in spite of repeated appeals to keep the scarcity of personnel in mind, many a surgeon does not realize the seriousness of the situation and does not proceed with the necessary rigour in the evaluation of the minimum requirements for military service. Some of the surgeons are of the opinion that it must be prevented that a doubtfully active tuberculosis or a tuberculosis which has been inactive for a very long time becomes active again under the influence of active service. This point of view

is contrary to the orders given. If we take into consideration that several hundred young and sound soldiers pay their tribute by dying for their fatherland during the cruel fighting on the eastern front each day, we must accept the possibility that the situation of a soldier afflicted with tuberculosis may be aggravated.

This hesitant attitude cannot be sustained from the scientific point of view as it is not possible to prove if and which form of tuberculosis is aggravated in case of a change of surroundings and if the patient is exposed to different conditions.

When classifying fitness for active service it is not important to disqualify because of the possibility of an activation or reactivation of tuberculosis. We rather must try to find the actual condition by means of well established procedures. Therefore it is useless to evaluate the case on the basis of a future possibility but rather it must be on the basis of the actual condition.

For that purpose we have available quite a number of reliable criteria:

1. The anamnesis (f.i. consecutive relapses)

2. The age of the patient. According to the observation in the X-ray findings, small centers in adolescents under 22 years of age, which are of no importance in adults may easily lead to large infiltrative outbursts.

3. The X-ray picture. Comparative evaluation of roentgenograms at different times.

4. Number and type of the formation centers in the lungs and other parts of the body.

The directive is still valid according to which a registrant may be deferred as temporarily unfit if during the preceding period of five years an infectious pulmonary tuberculosis was objectively proved or if, either in a hospital or sanatorium, operative interventions have been carried through.

No further comment is required with regard to para.47 of the ("Index of Constitutional Ailments for Classification of Fitness" para. 2 of the XXVII of Army Manual 209/1 Navy Manual No. 284, Air Force Manual 800) except on the following points: Under B and L 47 we find the description "Healed with or without defect". In this connection a few questions have arisen. By "Healed with or without defect" the clinical functional reaction is understood. If the tuberculosis was healed with an impairing effect upon the functions of the lung i.e. the ability of respiration, the pulmonary tuberculosis mentioned under L 47 must be defined as follows: Chronic, clinically healed with defect, compensated, predominantly one-sided productive pulmonary tuberculosis of moderate extent. Here, it would have been better to insert the word "inactive". The expert, however, will find that understandable regarding the details of the diagnostic notes.

The description: "Healed with defect for a long time" should not depend on the anamnesis alone, but also on the finding (X-ray) at the time in question.

The classification of fitness for active service according to the new classification of fitness reads as follows: According to the new classification schedule A- and B-defects are classified "fit for active service" and may be used in the field unconditionally. U-defects are classified as "fit for labor duty or use in home defense". vU-defects are classified "unfit for military service" and Z-defects "temporarily fit" as in the past. So far, changes have not taken place in comparison to the previous procedure.

A modification has been introduced in that L-defects are henceforth subdivided and those defects which permit the classification "fit for active service" are especially marked. This, however, does not concern tuberculosis since defect L 47 does not provide for any differentiation in this case. Therefore each L-47 must be classified "fit for garrison service in the field". The classification "fit for labor duty, but not fit for military service" as in the past is no longer possible.

Soldiers classified as "fit for garrison service in the field" may be used either in the field army or in the training army according to their age and their physical condition. In the field army soldiers classified as "fit for garrison service in the field" should not be used in combat. He should rather be used by the supply centers (as f.i. as a cook, as a tailor, etc.) in supply institutions or defense units in the homeland.

Therefore the classification "fit for garrison service in the field" should be subdivided into field army and supply army.

It is not possible to give any general directions for the single case as to usability of those soldiers mentioned in annex XXVII under L 47 either in supply centers of the field army or in the training army in the homeland. Each single case must be considered separately. Under consideration of the present situation the responsibility of the medical officer requires him to be strict, which still must be based upon objective findings. Of utmost importance will be the regulation that all soldiers classified "fit for garrison duty in the field" have to stay with the training army if he is no asset to the field units.

In all cases of pulmonary disease which were healed "with defect" it will be necessary to classify those soldiers as "fit for garrison duty in the homeland". According to the orders given a medical re-examination must take place three months later and if changes have not taken place those soldiers may be classified as "fit for garrison duty in the field".

From a general point of view it should be possible to classify registrants falling under L 47, especially the old pleuritis cases as "fit for garrison duty in the field" in

in the first examination. In this connection I refer to typical old pleural thickenings without simultaneous pulmonary tuberculosis which have been in existance for many years and which do not show a tendency to relapse.

As far as tuberculosis is concerned it may be said in brief, that the new scheme is facilitating the classification process in that the classification "fit for labor duty but not fit for military service" will no longer be possible for deficiencies of that category. The classification "fit for garrison duty field"and "fit for garrison duty at home" which were not clearly enough defined have now been modified into "conditionally fit for active duty" or "conditionally fit for active duty in the homeland". The regulations provide that a soldier so classified will not be used in combat. He will be used by the supply units etc. These changes will facilitate the decisions of the medical officer.

Discussion:

GRASS: Registrants afflicted with tuberculosis of pleuritis will be deferred for a period sufficient to ensure inactivity of the pathologic process, observation of which can be obtained by means of the roentgenogram. Deferment is justified in adolescents with slight formation of foci, in older registrants in case of fresh foci or extensive foci which may include centers of active tuberculosis. That deferment is unobjectionable because the person in question remains in the general labor pool. Within the Armed Forces the tuberculous and pleuritic soldiers as well should be used according to their fitness and be kept under observation if an active process cannot be clearly proved.

Directions regarding fitness for active service in cases of tuberculosis according to the new classification system.

When judging registrants afflicted with tuberculosis it should be born in mind that it is rather the object of the examination to determine the actual present state of the disease, i.e. to diagnose objectively existing symptoms of active tuberculosis, than to make sure that the process has come to a standstill or to exclude the possibility of a relapse. The anamnesis, the age of the soldier and his clinical and his roentgenologic symptomatic picture will help the medical officer in the evaluation of cases of tuberculosis.

Details concerning number 47 of the list of defects are given in annex XXVII of Army Manual 209/1, Navy Manual Nr.284 and Air Force Manual 800.

According to the new classification, A-and B-defects justify a classification as "fit for unlimited active service". vU-defects must be judged as "unfit for active duty", Z-defects

as "temporarily unfit for military service". Defect L 47 will be judged exclusively as "fit for garrison duty in the field."

8. Acute tuberculosis in youth.

Stabsarzt (Captain MC) SIXT.

In juvenile tuberculosis the chronic varieties need not be considered at all.

Its characteristic appearance is the acute type. In more than 75 per cent of all reported cases the central process is already in an advanced condition.

Juveniles show a special tendency to hematogenous dispersion which seems to be increased by the influence of the surroundings due to war conditions.

These varieties of dispersion exhibit the picture of exudative destructive tuberculosis and take a rapidly fatal course.

The quota of the tuberculous infectious diseases in young soldiers is relatively small. So we must expect a high percentage of primary infections because there are many possibilities for an infection in various forms. If, beside the fresh infiltrates, the isolated pleuritis and acute miliary tuberculosis are added to the group of primary infections - as proposed by ULRICI in one of his reports - the primary infections will include more than half of all the cases.

Even in peace time juveniles are especially endangered by tuberculosis and during a war which requires a ruthless use of our young people, tuberculosis has every chance for an anfavorable course.

The fact that it has been possible to bar a spreading of tuberculosis in the fifth year of war in the military and civilian sectors is not mere chance but the result of systematic and careful planning and is in contrast to the experiences of World War I, 1914-1918.

9. Acute tuberculosis in adolescents.

Stabsarzt (Captain MC) WURM.

The actual situation of tuberculosis in juveniles is characterized by widespread contagion of approximately 50-70 percent and a highly accelerated spread of contagion caused by the war with its stirring up of the masses of the people thus spreading the infectious sources. The pathologic anatomical analysis of fatal cases of tuberculosis may contribute to the problem of late tuberculous primary infection. Out of 108 fatal cases of generalized tuberculosis belonging to the age

group from 18 up to 39, 50 cases or 46,8 per cent were due to early spread, 54 cases or 54 per cent to late spread. 77 cases of post-mortem examinations made by the Armed Forces which are included in the above number of fatalities, show that the percentage of early spread with 43 cases or 55.8 per cent is somewhat higher. In 70 cases which resulted in miliary tuberculosis and meningitis the percentage of early spread amounted to 51.4 per cent, in the cases of the Armed Forces, however, to 62 per cent. Amongst the late spreading cases, 7 cases of persons older than 28 years who had shown old caseous primary complexes must probably be traced back to a later primary infection. The numerically greatest group of early spread was found in ages between 18 and 25.

Contradictory reports have been received regarding the peculiarities of the tuberculous picture of the late primary infection. The erythema nodosum, which in northern countries is often found as the initial symptom is of no importance here. The localization of the primary complex is the same as in the primary infection of the children. The changes of the regional lymph nodes resulted in a complete caseation in only 46 percent of the cases, in case of the late spread, however, only 5.5 per cent.

The most important symptom of the progressive late primary infection is the exudative tuberculous pleuritis which, with 60 per cent of the cases, was nearly twice as frequent as in the late spread after an infection in infancy. In a considerable number of the cases the pleuritis was the consequence of a hematogenous dissemination.

Progressive tuberculous changes as for instance the primary infectious tuberculosis and the hamatogenous cavernous pulmonary tuberculosis were found in a small number of the cases.

In the case of the isolated pulmonary tuberculosis of juveniles no symptoms of a late primary infection were seen which fact seems to be contrary to results observed elsewhere (Switzerland). The frequency of progressive tuberculous pulmonary changes in case of late spread is noteworthy.

The picture of the extrapulmonary hematogenous metastasis is dominated by the tuberculous meningitis in case of the group showing early spread and in 64 per cent of the cases it was the cause of death. In the case of the late spreading the frequency of meningitis amounted to 50 per cent. The acute disseminated miliary tuberculosis with its 28 per cent was nearly twice as frequent as in the case of late spreading. Extrapulmonary caseous metastasis in the organs was found in early spreading as well as in late spreading with 38 (resp. 48 per cent) of the cases.

In 50 cases of early spreading the course of the disease was characterized by one or several onsets of hematogenous type. Meningitis as well as miliary tuberculosis were dominant as causes of death. In case of several points of attack, the first one usually appeared as serositis, especially as pleuritis.

It was not possible to ascertain the duration of the

disease form the primary infection to the fatality. There is no doubt that tuberculous primary infection is especially dangerous at an juvenile age when special physical and psychic strain is imposed on the body. It is more dangerous at that age than in adolescents and school children. This is especially true under war time conditions.

Discussion:

LYDTIN: Our concept of tuberculous contagion was revised by the tuberculin-tests of Bruno LANGE. The interpretation of LANGE is confirmed by pathologists as well as clinicians by the fact that the clinican finds in soldiers those varieties of tuberculosis which belong to the group of primary infections.

GRAEFF: Autopsies made during the last three years proved that the total number of persons infected by tuberculosis has decreased.

AMMICH: T he unfavorable course of the late primary infection which is proved by the autopsy material of the army on the southern part of the eastern front, covering the period of April to September 1943, must be explained by the strain of combat besides climatical and constitutional factors. Late primary infections amounted to 2.8 to 3.8 per cent and about 20 to 30 per cent ot these resulted in the death of the patient either by miliary tuberculosis or tuberculous meningitis.

BACMEISTER: The frequency and virulent course of the late primary infection in sailors is caused by influences of the environment on sea and ashore.

DEIST: It is of no avail to search for the origin of each case of exudative pleuritis in the respective units. An examination into the possible influence of the surroundings will be worth while only when several soldiers of the same unit have been infected.

GRASS: Clinical and epidemiological experiences, as well as experiences made with X-ray projection examinations proved, that the onset of new cases, apart from a few exceptions, were observed in juveniles as well as in adults and they are due neither to fresh primary infection nor to secondary infection but rather to a sensitiveness of the patient submitted to extreme physical or psychic strain.

Directions regarding acute tuberculosis of juveniles.

1. In the fidd army as well as in the training army an increase of the variety of the onset of acute tuberculosis was observed with or without a marked involvement of the lungs.

2. The reason for this is:

a) under physical and psychic strain due to war conditions old centers of tuberculosis are reactivated.

b) the number of late tuberculous primary infections has increased considerably.

3. The increase in primary infections is explained by the fact, that at present only 50 - 70 per cent of the 18 year olds have had their primary infection. Those who are not yet infected will be infected very quickly because the sources of infection which always exist have a wider effect owing to the crowding of population caused by the war. The number of evident cases following a late primary infection is largely influenced by the stress of the war.

4. The varieties of tuberculosis which have come into existence after a late primary infection are, after all, the same as in the primary infections of the child. The acute hematogenous onset predominates and the quick development of a progressive pulmonary tuberculosis is rarely observed. It is surprising to see the great incidence of initial exudative tuberculous pleuritis.

5. From the clinical point of view the acute tuberculosis in juveniles appears as pulmonary tuberculosis with infiltrates which are more or less wide spread and with infiltrative casous centers which frequently subside quickly. Therefore, 75 per cent of the patients coming to the hospital because of subjective complaints exhibit cavities. Exudative pleuritis is frequently seen as the first-clinical symptom associated with pulmonary tuberculosis. At an early date hematogenous spread frequently appears in either single centers of the body or as miliary tuberculosis. Either of these may be associated with an extensive pulmonary tuberculosis, or in some cases even without considerable changes of the lungs. The great number of cases of meningitis is striking. Finally we observe caseous swellings of the lymph nodes frequently located in the neck.

6. In order to combat acute juvenile tuberculosis it is necessary to diminish the possibilities of infection and to reduce the physical strain on the body.

In order to diminish a spread of infection, soldiers afflicted with tuberculosis must be separated from the Armed Forces. This result will be attained by the X-ray projection method to be applied in the examination of registrants, when drafted and during the service. Less than 1/1000 of infectious tuberculosis cases were observed in field units and so we may say that the above method has proved satisfactory.

The damages caused by excessive strain on the body are prevented in such a way that soldiers who show tuberculous foci must be used according to their fitness which must be established according to the degree of transmissability of their tuberculosis. By repeated observation a reactivation of the

tuberculous centers is either prevented or recognized early, so that the treatment may be started successfully.

10. The conservative treatment of open pulmonary tuberculosis.

Stabsarzt (Captain M.C.) DOHMEN

The conservative therapy mentioned here differs fundamentally from what most of the sanatoriums understand by that term. Here, the patient is set at rest and all harmful influences are kept away from him. The duration of such a complete rest, lasting sometimes 3, 4 and 5 months depends on the type of disease. During this period of rest any interruption which might arise for personal reasons must not be allowed. It is a matter of course that not every patient may efficiently be subjected to this kind of treatment. His psychic attitude requires permanent supervision and interest on the part of the surgeon at the beginning as well as during treatment. The patient himself should be interested in his proper case and he is fully aware of his condition. After recovery has been achieved, the patient will be brought to a rest cure at a hospital where the treatment is less strict. The patient after having passed three stations will finally be brought to the fourth where the period of the rest-cure will be gradually reduced. If further symptoms of activity cannot be observed or if they have come to a rest we start with subjecting the patient to some strain of the body. At the end of the cure we even begin with the labor duty of the patient in his own or similar profession under constant medical supervision. In this way

299 soldiers suffering from open pulmonary tuberculosis were treated in the air force hospital "Domfront" (near Paris).
193 or 65.5 per cent of the cases showed a considerable change for the better.

Symptoms of activity could not be observed anymore. The sedimentation rate was normal. The sputum which had been examined six times in different weeks was negative and the gastric contents were negative too (three times). There were no serious complaints and corresponding X-ray findings.

A spread was found only twice in approximately 300 soldiers who had been treated conservatively. Massive hemorrhages did not occur. 140 soldiers were discharged as cases of closed tuberculosis, among them were 80 patients with cavities. 64 cases of late examinations by the competent medical services are available which revealed only four cases of aggravation. (X-ray pictures of spontaneous recoveries of open pulmonary diseases with cavity were shown).

Discussion:

KRAEMER: 65 selected cases which had been treated by absolute confinement to bed showed primary success in 44 cases

34 of them resulted in a closure of the cavity. Early cavities and others as well should be treated conservatively in the beginning. If, after a lapse of 8 weeks, they have not become smaller, a spontaneous healing must not be expected anymore. The biological cavity MONALDI is excluded from this therapy (refers to MONALDI's suction drainage of the cavities).

XIV.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON WAR-PHYSIOLOGY

Translation prepared by:

U. S. Naval Technical Unit, Europe, (Medical Section)
Office of the Naval Advisor
Office of the Military Government (U. S.)

Basis and actual state of the objective adaptometry.
(See Section II, Article 1)

Dark adaptation and acuity of vision.
(See Section II, Article 2)

Examination of the circulatory function.
(See Section VIII, Article 8)

1. Experiences in the selection of range finder operators.

Geschwaderarzt (Colonel, M.C., Air Corps) HEINSIUS

The navy has always paid special attention to the selection and training of qualified range finder operators. So, we have available the experience lasting over decades as far back as World War I, which were published by OLOFF and HEINE. Later studies by CAANITZ, PAUL, KRAHNERT, and HEINSIUS have proved the usefulness of the classifications already existing. This is demonstrated by the fact that only 10 per cent of the participants of courses of instruction for range finder operators did not meet the requirements. Suddenly in 1939/40 - 60% of the applicants did not come up to the standard after the navy had to be enlarged. This is due to the fact that we had to entrust ophthalmologists with the examination of fitness who were not sufficiently qualified in that field. Proper measures have been adopted in the meantime. Special directions have been published with detailed regulations regarding examination and classification, special forms for the examination of range finders have been introduced as well as special courses for ophthalmologists in order to secure a coordination of the technique of examination. Upon the introduction of these measures the number of participants who did not come up to the standard declined to the former percentage. Because of the good result achieved the officers in charge of those courses as well as the combatant units requested further improvements of the methods regarding selection and training. All this resulted in the foundation of the "Research Department for Sensory Medicine" (SIMFA) attached to the Medical Department of the Naval High Command "Ostsee", ("Baltic Sea").

The instructions concerning the ophthalmological examination of fitness of range finders are reviewed in detail and as they have proved to be efficient it is recommended that they be adopted by the other branches of the Armed Forces.

Research work is under way regarding the improvement of the methods of examination for persistence of fusion, sensitivity of sensory fusion (TSCHERMAK-HEINSIUS) and of the sensory competition (HAMBURGER)

Dr. KRUEMMEL is going to report about experiences gathered with the stereoeidometer which has been developed after systematic examinations in collaboration with MONJE and HEINSIUS.

The problem of visual capacity at dusk has not yet been solved. According to the examinations of MONJE and HEINSIUS, we must suppose that there are individual variations of the limit up to which range finder operators are able to perform good measurements. This is the only explanation for the varying results of measurements performed in daylight and dusk.

2. Stereoscopic methods of examination in range finder Operators.

Marinestabsarzt (Lieut. M.C., Navy) KRUEMMEL

The use of stereoscopic range finders, despite the keen competition of the electronic measuring instruments, has not lost its importance as the most essential auxiliary instrument of artillery observation. These instruments require excellent stereoscopic vision and even a special type of stereoscopic vision. It must be born in mind that all empirical factors of vision of objects in space such as strength of vision, perspective and color perception are secondary and even have to be pushed in the background intentionally in order to give way to the stereoscopic effect of the diagonal disparity.

After it was learned that the capability for this kind of space-perception varies individually, all methods suitable for measuring this ability have gained more and more interest. The nature of this space perception consists in a centrally controlled sensomotory fusion which automatically changes the lateral differences of the retinal irritant complexes into stereoscopic pictures of different depth.

This report is limited to the methods applied by the navy and practiced on a large scale.

The following instruments have been used:

1. "Zeiss-Linsen-Stereoscope mit Pulfrich-Tafel" (Zeiss-stereoscope with Pulfrich-table)

2. "Raumseh-Pruefgeraet" by Koch (Apparatus to determine stereoscopic vision)

3. The "stereoeidometer" by MONJE

The "Pulfrich"-table proved to be extremely useful because of its excellent calibration of space in steps of 15 ⅄ sec. from 150 ⅄ sec. down to 15 ⅄ sec. of parallactic difference i.e. down to the minimum separable by stereoscopic vision.

It is a necessary condition that the apparatus be well adjusted and that no psychic difficulties will interfere in the examination. The distance of the oculars must not be less than 64.0 millimeters and the testing picture must be placed at the focal point of the ocular lenses. Otherwise in conformity with the laws of optics, diverging or

converging cones would fall into the eye and the individual would necessarily react by diverging or converging movements. The diverging movements must be prevented in the first place because they are unphysiological. A graphic scheme was shown which demonstrated the excellent correlation between the efficiency of individuals in the stereoscope and range finder test.

The stereoscope test instrument by KOCH is based on the color haploscope and its physiological basis is therefore labile. We must examine the limits of stereo-fusion and not the sensitivity of the finer diagonal disparate space vision which must be examined from the opposite direction with smallest angles of parallax differences. From the scientific point of view, however, it is interesting to find out whether the motor limit tested by the apparatus of KOCH has a positive correlation to the acuity of stereoscopic vision or not. According to the experiences gathered by the Air Defense School II this seems to be the case.

The stereoeidometer constructed by MONJE, another new test instrument, is based on the "Drei-Stab"-method (method of the three bars). The arrangement of the bars may be rotated 180 degrees within a circular testing field. The diagonal disparity originating from the movement of the middle hairline is null if the bars are in a horizontal position. The acuity rises with the increasing angle and its maximum is attained at 90 degrees. The difficulties of space perception may thus be increased either by a continuous or gradual progression which allows one to determine the particular angle at which the result of the examination and the actual result in range finding enter into positive correlation. This angle has about 6 degrees. The aperture of the angle is of importance in this connection. An angle open to the right assures a more uniform graduation of correlation. This result demonstrates the influence of the anomalies of the horopter which is the main source of the so-called "personal-defects". These anomalies were analysed more precisely in special horopter instruments. Their description, however, would be too involved.

Discussion concerning experiences gained in the selection of range finder operators:

HEINSIUS: The necessity of the examination of range finder operators being restricted to the clinical-physiological examination is emphasized. The physician must not perform technical psychological tests which should be reserved to the military instructor or to the psychologist.

HAMBURGER: The most important condition for a reliable and continuous stereoscopy is the continuous participation of both eyes in the binocular act of seeing. If the range finder student has no space perception for a long period of time - a circumstance which is frequently observed by all range finder instructors - or, if in the case of another range finder operator the quality of the range determination is inferior because of a temporary loss of the stereoscopic effect we must take for granted that one of the eyes does not take part in the process in both cases. The loss of

the stereoscopic impression means the exclusion of one of the eyes in the binocular act of seeing. I have observed that even little refractive defects (esp. anisometrophy and astigmatism) although not necessarily the direct cause, may favor a strabismus concomitans. Therefore I have examined the refraction of the range finder operators skiascopically and, in fact, it could be proved that a certain correlation exists, between minor refractive defects and bad range finding results. This concerns refractive defects which may easily escape notice in the subjective determination of the refraction as well as in the usual skiascopy with narrow pupil of the eye and peripheral fixation.

In spite of this we were not satisfied with the results achieved so far. There were too many exceptions with which in spite of a "bad" refraction good range finding results and in spite of a "good" refraction bad range finding results were achieved. I had to suppose that soldiers who in spite of a normal focal depth had failed during the range finding course would show symptoms of the domination of one eye. This presumption could not be verified. My own examinations showed, however, that another factor is of utmost - probably decisive importance.

It is generally known that haploscopically if similar pictures different in color are presented the so-called competition of colors will occur. This observation is proved among others by the post stamp test of SCHENK-STIRLING. If the range finders are examined as to the frequency with which the two colors change we observe a great variety. In extreme cases we may observe a rather quick change (once or twice/sec.) or the changing may not occur during a couple of minutes, or, it may even fail to appear. The post stamp is always seen in mixed colors. This means that there are individuals who are either sensitive or indifferent to that competition of colors. In certain individuals the slightest differentiation of binocular pictures will give rise to the said competition of colors, in other individuals, however, this competition will not appear at all even in case of a stronger differentiation.

At equal focal depth individuals who are sensitive to the competition will be good range finder operators,. those who are not sensitive will be bad range finder operators. These facts are applicable with only few exceptions and therefore I would like to suggest that the post stamp test be included in the examination of range finder operators. The fact that the sensitiveness to the competition is of such importance is explained in that even in stereoscopy both eyes receive different pictures and that evidently this difference is easier to perceive in the case of a stronger competition. This subject was dealt with in detail in one of my publications which, however, will not come into your hands very soon and therefore I would like to mention it here. In case of an exact haploscopic examination of range finder operators other characteristics were observed as for instance incipient stage of "Horror fusionis". All these details can only be mentioned here in passing.

VAN BEUNINGEN: The principal condition for each examination of stereoscopic vision is without doubt a normal acuity of vision on the one hand and the most exact measurement of the distance of the eyes and an examination of the objective focal depth according to the physiological minimum defect on the other hand.

During some courses of instruction at the Army Range Finder School at Weimar, to which a department for stereoscopic vision is attached, it was frequently observed that some soldiers did not attain the necessary range finding results - demonstrated by minimum defects, - in spite of the fact that they had shown good results under the circumstances mentioned above. After having studied that question thoroughly we came to the following conclusion:

The beginner has special difficulties to adapt the midpoint to the target if the target is moving. It is much easier for him to carry through the measurement if the midpoint is stationary.

There is no doubt that the parallax movement of the midpoint makes the atereoscopic movement difficult.

On the other hand the soldier handling the range finder has particular trouble caused by the fluctuating light in the landscape and especially secondary targets which interfere with the main target. We see that those facts which are useful and advantageous for the estimation of distances present a handicap in stereoscopic range finding.

Therefore we must not aim at getting the student accustomed to the apparatus nor introduce exercises in the mere physiologic focal depth of vision but we should rather practice with the moving parallax and eventually try to overcome the above mentioned disturbing impressions of the landscape such as the contrasts of light and dark and the secondary targets. The range finder operator will get accustomed to glittering air and current of air in general and he will be able to overcome these difficulties by practice. The disturbing factors arising in this way must therefore not be examined in the preliminary examination.

As to the selection of the apparatus for range finding purposes we may say at present that the EMA-apparatus not only gives us a survey of the absolute physiologic depth of vision but at the same time it gives us the means to evaluate the efficiency in case of a moving midpoint (parallax movement). It might be supposed that the difference in the evaluation of the results obtained with EMA-apparatus and the EM 0.9 apparatus are due to the interference of disturbing targets and that this difference offers a standard for the measurement of the different tendency to failures of the soldier in the field of stereoscopic vision.

According to the measurements at hand KOCH's stereoscopic space perception test instrument shows many advantages because of the many possibilities of accommodating the eye more and more to stereoscopic vision. It is, however,

too tedious for the purposes of the army because each training course (up to 300 men) does not last longer than three weeks. Furthermore this apparatus requires color vision (color stereoscopy), stereoscopic vision and manual ability too, so that it takes too much time to train the personnel and to initiate the soldier in mass tests.

MONJE's test instrument is efficient and handy. Its disadvantages are that it does not measure the focal depth directly. By rotating the three bars a rough method of measurement is improved and the evaluation of stereoscopic vision is achieved in the indirect way. Besides this a sufficient correlation with the school finding could not be obtained when using angles of 25, 15, and 7.5 degrees. In the following course we therefore shall reduce the angles to 20, 10, and 5 degrees in order to obtain good measuring results.

Zeiss' stereoscope shows adjusting errors as soon as the interpupillary distance of the oculars is less than 60 or 61 millimeter, which is due to the construction of the apparatus. With the Pulfrich-tableswe generally arrive at an underestimation of the examined soldier.

The following factors must be taken into consideration or examined during the preliminary examination of stereoscopic vision:

1. normal sharpness of vision (objective and subjective),

2. distance of the eyes to be measured as precisely as possible when looking at far distances,

3. purely objective physiological focal depth,

4. attitude towards the mobile midpoint (parallax movement),

5. proneness to disturbances caused by differences of light density within the measuring range.

The addition of all these findings will probably result in a better estimation of the situation. It will be better than the one achieved by the correlation of the judgement of the school and all the other range finding test instruments we have available.

As to the selection of range finder operators of the navy and air force on the one hand and those for the army on the other I must say that the range finders for the army must meet all requirements of the other branches. The difficulties with which range finder operators have to deal in the army are different from those of the other branches of the Armed Forces but they are still comparable. We must not underestimate the fact that the navy and the air force depend largely and exclusively on an optical instrument, i.e. in this case on a range finder as soon as radio range finding is not practicable, for it must be realized that a mere estimation of distance on sea and in the air is not sufficient. The

army needs good range finders too in mobile warfare, This is the only way to arrive at a quick and reliable range determination within about five minutes in contrast to the routine methods of the artillery which takes about an hour. The great advantage of the army and navy coast artillery in relation to the army range finder must be seen in the fact that the calibration plate may be viewed without interference by secondary targets. The range finder operator of the army must in the first place learn that the calibration plate can penetrate the many interfering target on land. On the other hand the tendency to physical derangements probably is not so important in the above mentioned two branches of the Armed Forces in comparison to the army. The physical tendency to derangements is under study in the Army Range Finder School.

Directions for the selection of range finders.

Experiences of various branches of the service show that a preliminary examination is necessary regarding those soldiers to be used as range finder operators. This must be done in order to assure that no physically unqualified soldiers attend the courses. The examination must be made by medical experts who were especially trained for that purpose. Examinations carried out by troops physicians will not be reliable because they do not have the necessary instruments available. The organization of those preliminary examinations to be done by medical specialists is a responsibility of the different branches of service because of the variety of the organization of the units. The existing instructions of the different branches of service are obligatory to its memebers even if the examination is done by medical specialists of other branches of service. As a result of the collaboration of all concerned the following rules concerning the examination of the functions of the eye have been considered indispensable:

1. The power of vision and the condition of refraction must be determined objectively and subjectively with and without correcting glasses and for each eye separately. It must be tested up to 6/4. As long as there are no difficulties regarding replacements, full power of vision should be requested. If there is, however, a lack of personnel we may go as far as 6/8, if an equivalent up to 6/6 can be obtained by use of spheric lenses. Variations in the refraction of more than 1 diopter must always be excluded, those of more than 0.5 diopter, however, only if possible. The method used must always be mentioned in the report.

2. Diseases of the eye:

   The tendency to diseases of the eyelids and of the conjunctiva and especially hayfever must be given serious attention. Soldiers suffering from ptosis, chronic diseases of the eyelids and of the conjunctiva are unfit.

3. Movements of the eyes:

The healthy condition of the eye muscles must be assured by movements of the eyes. The reaction of the pupils and the accommodation must be examined by simple methods without any measuring.

4. Latent strabismus:

The requirements of the different branches of service vary. In each single case the procedure applied must be mentioned in the findings.

5. Fundus:

In general any changes of the fundus caused by disease exclude the candidates from employment as a range finder operator.

6. Capacity of dark adaption:

This capacity must be examined according to the directions which have been given for this purpose. Details will be entered into the record only in exceptional cases.

7. Interpupillary distance must be measured when the soldier is looking at distant objects. The soldier must know the interpupillary distance of his eyes as an item of personal data.

8. Stereoscopic vision:

The physiologic focal depth must be examined by means of one of the methods described in detail in the appropriate directions. Beyond that special requests of the different branches of service must be taken into consideration according to the corresponding procedures. In the report of findings not only the methods applied in each case must be noted but in addition the judgement, the number of examinations performed and the defects found. There is no other possibility for comparing the findings of the different methods. The most common procedures of examination are set forth in the appendix.

9. Special observations:

Besides the medical observation special attention will be paid to those factors which affect fitness for active service, as for instance diseases of the nervous system and other organic systems. To this category belong nervous, restless and easily diverted persons. It is not the task of the examining surgeon to give a psychological analysis of such disturbances.

10. Final judgement regarding fitness:

The different branches of service are responsible for the publication of directions regarding classification. The medical classification should mention the capacity of night vision. The classification of fitness must always be put down in writing in the record.

Appendix:

For the examination of focal depth the following methods are in use besides the real range finding instruments:

1. Pulfrich tables:

The Pulfrich tables are inaccurate and this fact must be taken into consideration when counting the number of defects and judging fitness.

2. MONJE's apparatus:

MONJE's apparatus, only a small number of which are available, must still be calibrated for use in the evaluation of defects in series examinations. It is possible to measure the focal depth if the picture is immobile and if disturbing influences do not interfere. This apparatus, however, does not permit any measurement of predisposed disturbances of parallax movements on the one hand and varying contrasts on the other.

3. The EMA-apparatus (range finding training instrument) constructed by ZEISS:

According to the experiences made so far this apparatus allows the measurement of all necessary factors for the judgement of stereoscopic vision, if, by the introduction of light contrasts the predisposed disturbances may also be measured.

4. Other apparatuses proposed for this purpose have not proven to be efficient according to the experiences made so far and they therefore need not to be mentioned. The range finders, properly speaking, are suitable for the determination of the focal depth only under consideration of many facts unknown to the troops.

3. About the possibilities to practise night vision.

Marinestabsarzt (Lieut., M.C. Navy) VOELKEL

In night vision light intensities of 10^{-6} stilb. are fixed centrally. When darkness is more complete paracentral fixation replaces central fixation. Paracentral fixation vision may be learned and practised. In order to practise and examine night vision several apparatuses were construct

ed during the recent time, especially the NOVAK-WETTHAUER apparatus which requires the perception of a large LANDOLT's ring at 4 meters distance. Progress was achieved by the so-called "Nyptoskop" constructed by VON TSCHERMAK and HEINSIUS which uses vision tests with luminous paint. This instrument is a simple and efficient means of testing the acuity of night vision in large scale examinations. In addition it is suitable for night vision practise. It consists of a graduated rod 1 meter long provided with a scale of luminous paint. A sliding frame is attached to this rod in which card-board discs, the center of which are painted with luminous paint of different strength may be inserted. By means of this apparatus we have examined 200 night fighter pilots in a test series. Moreover, the "Nyktoscop" was used in the examination of 180 night observers among submarine conning bridge personnel who were at the same time examined by means of the adaptometer, nyktometer and the apparatus constructed by NOVAK-WETTHAUER. The procedure for this examination proved to be satisfactory in pilots (where special speed is imperative) and the submarine personnel (who could not be submitted to tedious examinations lasting 3½ hours.) The testing disc was slowly brought toward the eyes of the examinee until he finally was able to recognize part of the letter E. After that the letter was moved backward until the E could not be distinguished any longer. By moving the disc forward the value of increase could be clearly determined. The difference between the first value which was termed recognition value and the threshold-value, presents a valuable criterion in the evaluation of adaptability and fatigue. Encouraged by the fact that the influence of adaptability was clearly recognizable in the very beginning additional series of examinations were carried through in small groups of night observers including 10 consecutive days of schooling with the Nyktoskop. The results obtained were very favorable because in most of the cases an increase in the power of night vision of 100 percent was observed i.e. an increase from 0.1 to 0.2. The fatigue was reduced proportionally with the increase in the power of night vision. To some extent this result is certainly due to adaption or the ability to improve the sensitiveness of the retina i.e. the contrast function of the dark adapted eye. The greater part of the impovement of the power of night vision is due to a change from a central to paracentral vision. In tests made to determine the subjective fixing point in darkness it was observed that the fixing point approaches the macula with an increasing light for instance 10^{-6} and 10^{-7}, whereas the fixation point moves away from the center to the periphery in case of lower light densities. After training the observations are much more precise and more regular. All soldiers trained in this way declared that their power of night vision was improved. Therefore we propose to make use of these results objectively with the night reconnaissance of airplanes and ships. As to the night observers, whose task is of special importance for the troops we recommend practising night reconnaissance by means of the Nyktoscop and the newly constructed apparatus as well, with which the reconnaissance of air and sea targets may be practised in dim light. The power of night vision of the persons in charge should be examined from time to time with varying densities of light especially regarding the progress of practise. The examinations made so far which have caused

much trouble to the physicians and night observers as well seems to be justified. The early detection of the enemy may protect a vehicle or airplane against sudden night attacks.

Discussion:

HAMBURGER: According to my own observations the acuity of vision of the dark adapted retina is in fact somewhat better in the upper part than at the bottom for equal distance from the middle of the fovea.

ECKEL: Comparative examinations regarding practical night vision in connection with air targets and regarding the evaluation of tested personnel carried through with different night vision instruments at the AFS V (Pilot Training School of Air Group Command V) Baden near Vienna, showed surprisingly low concordance of the results of different examinations. In practical night vision tests, as well as in different test instruments, considerable individual variations were observed. These variations made it more difficult to find a sequence for the results obtained in the sight setting of air targets because the tested persons showed individual variations to an extent which almost covered the entire range of possible variations. These test persons were examined with the adaptometer constructed by ENGELKING-HARTUNG and showed a normal power of adaption.

HARMS: According to my own experience the zone of highest sensitivity to light moves more and more toward the periphery with increasing dark adaption, In case of identical conditions of dark adaption there probably exists individual differences as to the distance of the optimal zone from the center.

VAN BEUNINGEN: When judging the Nyktoskop we must emphasize that the fluorescence diminishes the acuity of night vision considerably and is responsible for the quick fatigue observed.

KRUEMMEL: Very recently observations of the constancy of light were made with the Nyktometer by the "Kaiser Wilhelm Institute for Work Physiology" (Prof. GRAF). In these tests deviations of the density of light up to 40 Lux were observed in spite of constant ampere values (fatigue of the filament). In connection with thorough examinations of visual thesholds this observation considerably affects the exactitude of the results.

BRAUN: The introduction of radio measuring instruments should never lead us into the temptation to attach less significance to the capability of night vision of the eye. Night vision will always be of decisive importance for night observers and night fighters even if the best radio measuring instruments are available.

4. Military examination regarding fitness for assignment as listening sentry.

Major OSTERMANN

This report is unsuitable for publication.
(Omitted from original report).

5. Medical examination for fitness for assignment as listening sentry.

Oberfeldarzt (Lt. Col., M.C.) Prof. RANKE

I would like to make some preliminary remarks before dealing with the description of the apparatus. At all times the physician has an important role in selecting from among the registrants the right man for the right job in the service. Just as in civilian life special branches of service require a full productive power in special fields exceeding the normal physical fitness. With the exception of the flying personnel of the airforce this selection has been undertaken by the units themselves without the participation of any physicians. Psychologists temporarily have been consulted and thus changed the above situation. They were unsuccessful, however, because they attached too much importance to the character of the registrant which cannot be determined well enough during a short examination. Nevertheless the selection of specialists without the participation of experts seems to be an inefficient procedure. VAN BEUNINGEN has observed that among soldiers detailed to a training course of range finder operators there were not only many astigmatics with typical near vision but even soldiers with a one-sided highgrade vision.

If, in this connection, we want to assist the troops we have to propose simple methods which may be applied easily in a short time for the examination of specific capabilities which are of importance in the selection of specialists. Here we have especially to deal with sensory powers whereas the mental assimilation depends largely on training so that considerable errors may result from the methods in use so far. It is a fact, however, that the examination of the sensory powers is quite suitable for excluding the majority of unfit soldiers.

As to these specialists in which sharp vision is of special importance we are fortunate enough to dispose of adequate equipment for the examination of the capacities of the eye separately because of the well-known physiology of the eye. Defects of refraction, accomodation, adaption, acuity of vision, colorvision, the latent and manifested strabismus and, as far as the mental elaboration is concerned, the stereoscopic fusion may easily and quickly be examined.

It is much more difficult, however, to obtain a true evaluation of specialists with particular auditory powers and I am convinced that this is due to the lack of a recognized physiology of the auditory process. In all text-books

we find the theory of hearing but nothing or a few words only about the physiology of the auditory process. There is some knowledge regarding adaption, fatigue and accommodation but next to nothing is found about the physiologic conditions of sound location. Therefore we do not know well enough if and to what extent the auditory threshold constitutes an independent partial function in connection with volume of sound, differences of volume of sound and frequency in connection with the sound location, or, if in proceeding this way we leave unconsidered the most important functions of the auditory organs. As to radio operators and listening posts the acoustic memory and the ability to concentrate one's attention on certain kinds of sound may be of much greater importance.

We are, however, in a position to establish a negative judgement: in case of elevated auditory thresholds - regardless of whether it is present in one ear or in both, whether the entire frequency is concerned or only an essential part of it - registrants will be considered as unfit for assignments in which the ear plays an important part. Therefore it will be of decisive importance for the development of suitable methods for the selection of soldiers for such assignments to examine the auditory thresholds. Therefore we have to put on the agenda the general demand for apparatuses suitable for the determination of the auditory threshold. For the purposes of preassignment examination such an instrument must answer the following requirements:

1. certain calibration which may be checked even under changing conditions as for instance connection to different voltages,

2. handy size and easy transportability,

3. frequency bands of about 100 to 8000 Hertz with intervals not greater than one octave,

4. easy graduation of the volume of sound of about 5 to 5 phon.

Only the mass production of such instruments will make it possible to compare examinations made at different places. Therefore we are greatly interested in the development of an instrument which is also suitable for the aurist and not only for scientific examinations. Only in this way will it be possible to make sufficient observations and evaluate them. I would appreciate it very much if some assistance would be given to us by rhinolaryngologists. Apart from bulky scientific instruments we ourselves have only one Otaudion LORENI of a Copenhagen firm. That instrument has some bad features but nevertheless Oberregierungsrat (Government Counsellor) Dr. FLIK has obtained some fairly good results in connection with the examination of sound locators.

6. Experiences with electric audiometers.

Oberfeldarzt (Lt. Col., M.C.) Prof. HUENERMANN

The medical examination of soldiers to be selected for listening posts is, first of all, a matter of the examination of the ears, of the nose and of the acessory nasal cavities. In an anti-aircraft artillery school after a mass preliminary medical examination, soldiers detailed to such courses were, for the first time submitted to special medical examinations at their replacement-units with regard to their new assignments. In general no gross defects were observed in soldiers detailed to such courses. Nevertheless it may happen that soldiers suffering from chronic catarrh of the acessory nasal cavities and Estachian tubes and one-sided deafness are assigned to those courses. Those soldiers must be quickly discharged so that we do not waste precious time on them. I was informed that an auditory examination of all applicants does not take place but only in those cases which do not give a clear picture to the troop physician. The course of the examination is as follows: After examining the tympanic reflex, for which purpose it may be necessary to rinse the auditory canals, the perception of whispered speech is examined. If the hearing capacity is less than 4 meters the hearing must be examined by means of the tuning fork or he must be sent to a specialist for final decision. Then follows the inspection of the tonsils, of the teeth, of the nose (septum, turbinates) and, according to the finding, the soldiers are classified into four groups. No. 1 is the normal finding, No. 2 minor defects, No. 3 diminished perception of whispered speech and a tendency to tonsillitis and catarrh of the Eustachian tubes, and under No. 4 will be classified all those who must be rejected as unfit because of deafness and eczemas. It was observed that by this rough examination it is possible to separate unqualified registrants. This became clear by the fact that about 90% of all registrants selected for the course came up to the standard. How strong the influence of the will to be efficient and the inner disposition is for the performance of the strenuous duty of a sound locator may be seen in the fact that during the preliminary examination 2 - 4 % of all newly assigned candiates feigned incorrect hearing in order to escape from the course. On the other hand it was furthermore observed that a women's auxiliary battery recruited from volunteers showed much better results in comparison to one consisting of drafted women. Out of this comes the conclusion that in addition to the real auditory efficiency psychological considerations have a great influence upon the efficiency of hearing. The above outlines rough auditory examination may be satisfactory in connection with the practical requirements in general. The troop physicians of the schools and searchlight troops, however, would appreciate it very much if they could dispose of an instrument which would enable them to determine the auditory efficiency objectively. Therefore I suggested three years ago that electric audiometers similar to those constructed by Western Electric which are handy, efficient, resistant and easily connected to the lighting current should be made available. A big electric firm has been entrusted with the corresponding preliminary work. That firm, however, has showed just as little interest in that work as before the war, This is amazing because

of the fact that even civilian physicians are highly interested in an instrument like that and, on the other hand, nearly all of the Otoaudion-instruments are out of order and cannot be repaired. Therefore I was very interested in seeing at the clinic of UNTERBERGER an instrument developed by the medical assistant Dr. BLAUENSTEIN which is not larger than an audiometer and which probably is suitable for eliminating the above mentioned shortcomings. I would like to describe it here in a few words and to suggest having it tested by higher authorities and to bring about its construction. This will be all the easier because it consists of ordinary radio parts which have only to be assembled according to the directions of Dr. BLAUENSTEIN. The audiometer makes it possible to operate within the limits of 16 - 16 000 Hertz whereas the audiometer of the Western Eelctric has a frequency band of only 128 - 9700 Hertz. The zero point adjustment is controlled by a cathode ray tube so that it is possible to set even low frequences correctly. The tone may be interrupted without additional noise by means of a push button and the volume of sound adjusted from 0 - 120 decibels. The audiogram may be traced either as a typical presentation of impaired hearing or as a diagram of the absolute hearing capacity. The control of the initial voltage is controlled by an incandescent lamp. As a sound-transmitter we use a Western Electric electro-dynamic-head phone. Estimates of the firm producing this apparatus figure at about 5 - 600 marks for each apparatus. The special advantage of the introduction of an electric audiometer for the examination of listening posts is the possibility of obtaining a more precise testing. On the other hand it will be possible to check feigned statements and above all, to examine in a more precise manner than would be possible with a tuning fork. Furthermore we shall be in a position to find out to what extent a loss of the hearing capacity of sound locators progresses with such an assignment. According to SCHMIDT this drop in the efficiency originated either from organic injuries or internal, mostly psychic, reasons rather than from fatigue. I could imagine that an exact testing of hearing capacity is likewise affected by the possibility of hypersensitive hearing capacities of the sound locators. The possibility of elimination of these errors alone justifies the expenditure for this apparatus which will render inestimable services not only to the clinician, but first of all, in connection with the otoneurologic examinations of head traumatologists. I have succeeded in getting two audiometers, one for Brussels the other one for Berlin. Many hundreds of examinations have been performed by qualified medical personnel who had been trained for a short time for this purpose. They have shown the value of the electric audiometers which in foreign countries are generally adopted and every radio dealer takes advantage of them. I am submitting herewith some curves to you demonstrating the results of hearing tests.

In Germany the diagnostic value of the audiometer was first put on a broader basis by RUEF and LANGENBECK. Its main value consists in the possibility of achieving more objective and uniform values than with the tuning fork and BEZOLD's tonometry. First of all the conductibility of the bone for high and low tones is much easier tested with the elctric audiometer than with the tuning fork. In spite of all advantages these apparatuses, which technically

are not far developed in Germany, were not generally introduced. It is getting high time to make up for this unfavorable situatio. and therefore it is recommended to evaluate the apparatus constructed by BLAUENSTEIN. There is an urgent demand, first of all in connection with the examination of sound locators, but also in relation to diagnostic purposes in other otologic fields.

2. Selection of sound locators in the Navy by medical experts.

Marinestabsarzt (Lieut.M.C., Navy) UFFENORDE

The American "Sonotone-Audiometer", which is at the disposal of the Navy, was recently used in connection with the scientific examination of injuries caused by detonations. It has not yet been used as an instrument for the selection of sound locators in the Navy. The selection of sound locators by experts in the Navy is preceeded by a spychological test including the detection of sound direction and the maximum hearing capacity below water. Formerly the selection by specialists was limited to examing the tympanic membrane reflex and the perception of whispered and conversational speech. In this way an exact examination as to the capacity of sound location and binaural hearing was not guaranteed. Up to 30 - 40% of the applicants of a number of groups at sound locator schools did not attain the required efficiency. This may be partically due to the fact that unintelligent candidates unfit for other careers have been detailed without bearing in mind that this kind of service requires intelligence, ability to concentrate and resistance against weather conditions.

The supplements to the classification regulations published by the Research Department for Sensory Medicine one year ago proved to be satisfactory. These regulations prescribe not only a careful examination of the ears but also an examination of the nose and throat in order to find out whether the registrant shows a tendency to colds and chronic infections of the mucous membrane. The prescribed examination concerning the hearing capacity with regard to the upper and lower frequency as well as the time of perception of the c^5 tone constitutes an important advantage of these regulations. The failures which were so frequent in the courses were reduced to a minimum. Besides this an ear-specialist was assigned as the chief medical officer of the Navy Anti-aircraft Defense School which is in charge of the training of sound locators and the searchlight personnel. In this way it is guaranteed that all sailors detailed to these special courses are submitted to another examination by a medical specialist at the very beginning of the course.

The introduction of daily test series of the extended auditory examination, however, takes much time and therefore can be used only as a makeshift solution. In consideration of this fact the Research Department for Sensory Medicine (of the Navy), in cooperation with the Physiological Institute of the University of Innsbruck suggested the construction of a very simple and handy auditory threshold-measuring -instrument. It should be constructed in such a way that STENGER's apparatus may be attached in order to be able to examine sound location. Because

of the war conditions the so-called "GOERICKE-apparatus" could not be demonstrated here. A report about its construction and functioning was submitted instead. This auditory-threshold measuring-instrument is relatively small (20 x 20 x 40 centimeters). It may be connected to the light current and provides frequencies from 10 to 30 000 Hertz. The adjustment of the volume of sound may be set in decibels from 0 up to 115 dbs. in intervals of 5 dbs. The instrument permits the reading of the absolute value of sound pressure in millibars and the examination of hearing capacity by means of both continuous and interrupted sound.

This simplified and efficient apparatus may be used not only for the selection of sound locators for the air defense forces and submarine personnel but also for clinical examinations, simulation tests and scientific research work.

Discussion concerning examination of fitness:

RANKE: Objective audiometry is necessary in order to determine objectively a decrease due to fatigue and injury.

HOLZLOEHNER: The practical experiences gained in sound locators of anti-aircraft artillery apparently showed that in this case fitness depends less on the auditory threshold which may be measured, by means of the audiometer but more on the binaural hearing. This circumstance had to be expected theoretically. The apparatuses for the examination of these values seem to be suitable and worthy of improvement.

VON EICKEN: I would like to point to the tuning rod mentioned by Prof. WETHLO. It is made of duraluminum and its vibration lasts much longer than the e^3 - tuning fork. Only registrants who hear very well can hear the very last vibrations of this tuning rod.

PERWITZSCHKY: The construction of audiometers will be very difficult if the apparatus is to answer to technical requirements. The question is whether or not such a precisely working instrument, which of course must be required for the physical research work, is necessary for the examination of hearing capacity.

It is my opinion that for purposes of sound location the practical examination is much more valuable than the measurement of the acuity of hearing.

Directions for the examination of hearing capacities in special units.

The units demand the cooperation of medical officers in connection with the selection of soldiers for special purposes. So far it has not been possible to come to a complete agreement regarding the results of the medical examination and the requirements of the units. Therefore it is necessary to further develop this method. An exception of this is the determination of the unilateral or bilateral deafness. In accordance with the clinical requirements of otologists it is very necessary that a handy and sturdy audiometer be developed which may be calibrated at any time in order to find the number of auditory

thresholds in the entire range of frequency. The hitherto existing equipment does not correspond to the necessary requirements neither regarding their number nor their efficiency. The cooperation between clinicians and the physiologists must be guaranteed so that further progress may be achieved regarding the development of these instruments.

8. Ear protective device.

Oberstabsarzt (Major, M.C.) Prof. PERWITZSCHKY

Prof. PERWITZSCHKY has constructed an apparatus with which it is possible to protect the ear against the pressure of explosion and, at the same time, to prevent impairments of the ear and thus secure the safety of the soldier. This apparatus takes advantage of the physical peculiarities of the wave of detonation and of the acoustic wave.

Discussion:

UFFENORDE: More than 100 artillerymen of the Navy have been tested in anti-aircraft schools as to the external ear. Calibers of 2, 3,7 and 12,8 centimeters had been used. Comparative examinations of the ear drum and of the hearing were made with normal and whispered speech, furthermore, c^5 -continuance of hearing after applying the ear-phone, THIELE's plug and by plugging the ears with the fingers. At the same tima all test groups had to examine whether or not the head straps proved to be a hinderance when carrying steel helmet and gas-mask at the same time.

NOACK: The Navy needs the ear protecting capsule principally for the gun crews of capital ships.

RANKE: Discussed the volumes of sound which actually exist in gun-tests . At the same time the question is raised whether these circumstances alone cause combat fatigue.

VAN BEUNINGEN: In some ear adaption tests in the institute we have exposed the ear to a sound of 1000 Hertz and to a pressure of about 1 dyn/sqcm during varying periods of time. We have observed that the ear reacts in the following way: In the beginning its threshold stays constant after the sound has been switched off. After several repetitions the threshold of hearing decreased to about 6 decibels during the test-period after a lapse of 10 - 15 minutes and the time of recovery was shorter. In continuance of the same test the threshold increased considerably about 40 minutes later. A specific phase of sensitivity is followed by a phase of fatigue. When considering the time required for the recovery of the threshold during the course of the entire test we see a direct relation between the time of adaption and readaption in the phases of "constancy" and "sensitivity" of the threshold. In the phase of fatigue, however, such a clear relation cannot be observed. The practical significance of this finding is the following: A sound locator who during a certain period of time has to listen to a sound of certain volume which is near to the threshold volume shows, after a lapse of 40 - 50 minutes, symptoms of fatigue to such an extent that a decrease in

efficiency must be taken into consideration. Therefore the limit for the hearing of sounds near the threshold is from the point of view of time about 50 minutes. It seems to be imprudent to employ a sound locator for such special tasks longer than that time. On the contrary he should be allowed an acoustic relaxation for at least one hour.

2. Calcium requirements in soldiers's diet.

Oberfeldarzt (Lt. Col., M.C.) Prof. LANG

It is not easy to determine the calcium requirements of the human body. More than 99% of about 1200grams of calcium contained in the human body is contained in the skeleton. This large depot of calcium makes it difficult to determine the calcium requirements of the body by means of a differential analysis. Under the influence of vitamins or hormones and entirely dependent from the supply of food either an increased storing or a deduction from the depot may occur. It is a matter of course that it is impossible to determine the calcium requirements of the body by means of blood calcium examinations because the quantity of calcium actually contained in the blood is largely independent from the supply of calcium. The blood calcium level is the resultant of all regulations and counter regulations, which govern the processes of movements, storage and mobilization of calcium. Therefore the only possibility to determine the calcium requirements of the body is to institute long lasting close observations.

Everybody knows that the metabolism of calcium must be considered only in connection with the entire metabolism of minerals. It is, however, of special importance to examine the metabolism of phosphorus at the same time. Numerous tests under most varying conditions (study of balances, graph of growth, growth of later generations, analysis of animals, development of rickets) all have proved that all the functions of life show an optimal course if not more than two mol. of phosphate are added to each mol. of calcium.

All factors influencing absorption are highly inportant. It is surprising, however, that both soluble and insoluble calcium salts are fairly well absorbed. Two exceptions from this rule, however, must be noted; Calcium oxalate and calcium phosphate. The oxalate is found in many green vegetables. Therefore they are of secondary importance with regard to the supply of the organism with calcium.

Cereals contain much phytin which causes rickets. This effect was observed by MALLENBY. The largest quantity of it is contained in the ingredients of bran. It has been well known for a very long time that the human body absorbs calcium poorly in the presence of phytin and at the same time that phytin-phosphorus is used up only with difficulty. Rats, however, easily absorb calcium-phosphate because their bowel contains phytase - a fermant that causes a splitting of phytin.

In different tests McCANYE and WIDDARSEN proved that the absorption of the calcium contained in whole wheat bread is much more difficult than that in rye bread. This is due to the higher percentage of phytin contained in rye bread. Our experiments have proved that the greater part of phytin contained in German rye-bread is split enzymatically during the process of fermentation. So much phytin is left over, however, that with regard to the soldier's actual daily bread ration 0.1 up to 0.15 grams of calcium may be withheld from absorption.

The quantity of protein greatly influences the extent of the calcium absorption. The findings of McCANYE, according to which the absorption of calcium is improved with increased contents of protein, could not be confirmed by our own series of experiments. This fact, may lead to the conclusion that calcium is absorbed by way of an amino-acid-calcium salt complex, respectively peptic-calcium salt complex, which can be proved by numerous other findings.

There are only a few food-stuffs which are of great importance as to supplying the human body with calcium, most important of which are milk and cheese. According to the analysis by F. HOLTZ the calcium contents of the different food-stuffs varies so much that it is impossible to determine the exact quantity of calcium contained in the different food-stuffs out of tables. Conclusions may be drawn only from the analysis of the food itself. By using water varying quantities of calcium are added to the food but these amounts are generally negligible.

In repeated balance-tests made at my institute SCHUETTE has found that the necessary supply of calcium is frequently not covered by the soldier's food. The daily deficiency amounting to about 0.1 up to 0.2 gram of calcium is due to the following factors:

1. the diminished supply of milk and dairy-products;

2. the large quantities of finely ground flour which amounts to 50% and more of the soldier's daily diet. This bread contains much phytin and its unfavorable calcium-phosphate-relation is detrimental to the calcium economy of the body.

If we suppose a daily calcium deficiency amounting to 0.2 gram then, 70 to 75 grams of calcium are withdrawn from the body in a year, i.e. 5% of its own balance. Such a deficiency may last a long period of time before any recognizable damage may be observed. It is a matter of course that there exists great regional variations according to the supplies of the troops and the possibility to obtain additional food-stuff (vegetables, milk).

It is realized that steps must be taken to increase the calcium supply. Therefore during the last conference of the committee for the food control of the Armed Forces we made proposals to eliminate the calcium deficiency by admixing calcium in the soldier's bread (0.5 gram of Calcium - 1 kilogram of bread). In this connection it does not make any difference which type of calcium salt is added and the choice depends on the possibility of supply. Our own thorough examinations have proved that in this way an immediate balance i.e. a positive calcium balance is secured. The taste of bread prepared in the above way does not differ from ordinary bread.

Discussion:

GUTZEIT: Advises carrying out the proposed admixture of calcium in the soldier's food. This seems to me to be the more useful as our own findings in paradentosis-examinations in German soldiers stationed in Norway revealed a slight prophylactic effect in those troops which had been given calcium in the drinking water. At the same time this addition of calcium obviously diminished the susceptibility to minor infections.

VOLLHARD: I would also like to recommend the admixture of calcium, especially in Norway. I am personally inclined to see a close relation between the paradentosis and calcium deficiency.

HORSTERS: Report on the effect of the admixture of calcium in PW's. An increase in the capacity for labor and little increase of weight was observed.

LANG: There is no calcium-deficiency in the civilian population. The actual rations of bread and skimmed milk which contain much absorbable calcium guarantee a sufficient calcium supply. There is no evidence that a calcium deficiency can be proved only during certain seasons because all of our tests were made all the year round.

KATSCH: Contrary to the experiences made during the first World War, late rachitis and osteomalacia changes in old women have been rarely observed so far in my own field of research. During the last years, however, tetany which in general was rarely observed at the Baltic Sea has become more frequent. It is, however, not verified that this is due to the changed calcium balance in the foods. A calcium shift in the body caused by pathological conditions may result in an increase of the blood-calcium levels therefore one cannot rely on the blood calcium levels as an indication of the calcium reserves in the body (for example: the very rare clinical picture of the generalized muscle petrification with accompanying decalcification of the bone).

GUTZEIT: With a total of 1200 grams of calcium in the human body, 1/3 of the calcium reserves of the body would have been used up in 5 years of war. So important a loss of calcium would necessarily be visible in X-ray examinations of the bones in the form of decalcifications and curvatures of the bones. Nothing of this kind has been observed in my clinic and the affiliated hospital although special attention has been given to this matter.

VOLLHARD: Does the admixture of calcium influence the taste of the bread? In one farm on the Bergstrasse, 5 milk cows had to be slaughtered because of osteomalacia and because "Vigantol" could not be obtained. A reason for this may be the lack of calcium in the pasture caused by the very serious drought during the last Fall.

SCHENCK: Clinical observations did not show any signs of calcium deficiency in soldiers and prisoners. Allusion is made of the possibility of observing the calcium metabolism in the formation of callus.

Further, calcium propionate is mentioned as a means of disinfecting bread. The question is raised whether the calcium balance is not influenced by the seasons and whether this deficiency is not existent under different conditions of nutrition and time.

Finally he shows that it is possible to find the calcium content of the body by the quotient calcium-defecation/calcium-urine.

BOHNENKAMP: The significance of calcium cannot be overestimated, especially regarding sensitivity of the nervous systems and conditions of permeability. As to the blood it is not possible to speak of a fixed and constant level in the blood. This was demonstrated by many tests made during the late years which revealed the dependence of the blood picture on gastric-secretions, vegetative structure, periods of rest, work, nourishment, procedure of absorption or intestinal trouble etc. We have developed a new method for this type of research to be applied in future tests. This method makes it possible to quickly find out the exact amounts of Ca, K and Na, by using only small quantities of blood. Hundreds of tests were made and we found considerable calcium-variations. On the other hand we found numerous, and in some cases very impressive conditions of tetany which were caused by reduction of calcium. Such latent conditions of tetany are indeed very frequently observed. Special attention must be paid in this respect.

It is proposed to examine the influence of calcium deficiency by means of the so-called A.T. 10 tests, the measurement of the time of hypoventilation until the onset of tetany, furthermore, calcium determination, appreciation of the clinical symptoms of tetany and X-ray examination of the skeleton.

Conclusions regarding calcium deficiency in soldier's diet.

Extended balance tests have shown the existence of a small calcium deficiency in the soldier's diet. Therefore it was proposed to cover this deficiency by adding calcium to the bread.

10. Metabolism of energy in case of (excessive) heat.

Professor WEZLER

As an introduction he reviewed the importance of the increase of the metabolism under the influence of extreme cold (1st chemical regulation of heat), which, together with measures to eliminate the radiation of heat efficiently protects the body against cooling. Then the question was raised whether in a similar way in case of excessive heat a regulative functional decrease of the formation of heat (2nd chemical heat regulation) can be proved which, besides stimulating the physical reaction of an increased heat radiation,, impedes the transfer of heat. This question and others, such as a change of energy under the influence of heat were studied with the help of his findings and those obtained in collaboration with R. THAUER regarding the tolerance to heat by using the climate chamber of the Institute for Animal Physiology at Frankfurt. Nine diagrams were discussed in detail.

The consumption of O_2 and the body temperature are shown as a function of time if the exposure lasts several hours during which time the air temperature is at 30, 40 and 50 degrees Celsius with 50 % relative humidity. After that he described how the change of gas depends in conformity with physical laws, on the outside temperature, at least up to + 50 degrees Celsius. A closer analysis of the curve of the O_2 consumption as a function of the body temperature allows the demonstration that the increased metabolism, amounting to 16 - 17% per degree of increased body temperature, must be interpreted as a slight decrease of the regulation of the combustion process in the sense of the 2nd regulation of heat and that this appears if the total increase of metabolism in the range of the stored heat is decreased by that amount which, as a minimum, is inherent to the physical mechanisms of regulation, i.e. to the increase of the function of the heart, of the respiratory muscles and perspiration glands.

The curve that represents the body temperature as a function of the outside temperature at 50 and 90% relative humidity allows the recognition of the range of efficiency of all regulative functions under the influence of heat and besides that the specific influence of the ambient humidity at constant temperatures. A higher degree of ambient humidity will cause a more marked retention of heat even if the other conditions are the same. This, however, causes an intense increase of the O_2 consumption. Finally in two examples it is demonstrated in which way additional strain on the organs i.e. work of the muscles and O_2 deficiency-breathing (12% O_2 mixture) - cause an increase of the O_2 requirements thus impeding the function of the regulative mechanism under the influence of heat as a consequence of an increased generation of heat, respectively accelerating the process of heat storage in a general manner.

In some final remarks the essence of the discussion is summarized as follows: The human organism is capable of protecting itself much more efficiently against cold than against heat. This is especially due, in contrast to the 1st regulation of heat, to the low regulative potencies of the so-called 2nd regulation of heat. The adverse increase of metabolism connected with the increase of the body temperature increases the storage of the heat.

11. Metabolism of energy under the influence of heat.

Unterarzt (Warrant Officer, M.C.) MEITNER

In connection with the question of the 2nd chemical regulation of heat, i.e. the question of the decrease of the metabolism of energy in heat, nine persons were tested in climate chambers of the Institute for General and Military Physiology. On the one hand we were interested in learning the reaction of the metabolism of energy during the change, during the stay in the same climate and the extent of an eventually occurring decrease of metabolism. The results were the following: the reaction of the metabolism varied during the change into higher temperatures (40 and 50 degrees Celsius with a little relative humidity). A number of persons showed an immediate increase, in others, however, the metabolism decreased distinctly in the beginning and increased later beyond the initial temperature. This

varying picture may be explained by the buffer action of the skin as was mentioned by KOENIG. It can be proved that a decrease of the metabolism occurs during the change into higher temperatures if the skin was cooled previously. A decrease of the metabolism, however, cannot be observed in general if the skin of the body is exposed to heat at the beginning of the influence of the test climate. In this case a buffer action exists and the temperature increases immediately and the physical regulation begins much earlier.

During a longer stay in unchanged climate, in most of the cases an increase of the metabolism was observed after 1½ hours in high temperatures. It cannot be determined to which extent its height is influenced by a decrease of combustion in the sense of the 2nd chemical regulation of heat. In two persons, one of whom suffered from bronchial asthma, the metabolism constantly stayed under the initial value during the entire time of the experiment or it increased only to a negligible extent. In these two cases, in which the whole regulation of heat is greatly influenced by the chemical regulation of heat, a certain release from stress of the physical regulation of heat, and with this of the circulation occurs. The decrease of metabolism in heat is in no case so great that a reduction of the daily requirements of calories seems to be justified in hot territories.

Discussion concerning loss of energy in high temperatures:

SCHWIEGK: In asthmatics, hyperthermy often causes relaxation of the bronchial spasm and at the same time a reduction of the respiration which would explain the decrease of the metabolism in the sense of the 2nd regulation of heat.

WEZLER: The results achieved by H. MEITNER were confirmed by my own tests of cooling and warming of the persons used for the experiments. Also in these dynamic experiments the extent of the 2nd chemical regulation of heat was not essentially higher than 10% of the basal metabolism. This finding supports a genuine regulative decrease of metabolism, which for practical purposes is almost insignificant.

BUETTNER: The inverse course of the temperature of the center of the body and of the main temperature in case of strain caused by climate has been well known to me since my joint experiments with PFLEIDERER and KOENIG. There also occurred regular variations at intervals of about 10 minutes for almost one hours. The temperature of the center of the body is surpassed by the average skin temperature only in case of heat waves, in which the coldest spot lies anywhere below the hypoderma or if the humidity and temperature of the skin drop below the corresponding values of the air. By applying excessive humid heat the course was in general as follows: Constancy of the central temperature of the body until the average skin temperature increases to 35 - 36 degrees Celsius. After that both temperatures rise together with a difference of 0.5 degrees Celsius between them.

12. Circulation and metabolism in case of local freezings.

Stabsarzt (Captain M. C.) H. SCHWIEGK

The development of local damage by cold does not depend on the degree of cold to which the tissue in question was exposed. On the one hand damages by cold may occur at temperatures varying from 5 - 8 degrees minus Celsius, on the other hand a damage may not occur at all even in case of freezings of the tissue caused by temperatures below zero. It is obvious that the reason for these damages by cold are due to special changes of the metabolism during exposure to cold. In this connection one especially thought of a suffocation-metabolism during the exposure to cold with the formation of lactic acid. This is understandable because of the fact that during the exposure to cold and even hours and days later a very marked diminution of the blood circulation can be observed, Therefore by animal tests the question was studied as to what changes take place in the blood and in the muscles of an extremity which is exposed to temperatures down to 0 degree Celsius. At the same time we measured the content of oxygen and carbonic acid, the content of lactic acid, water and albumin, blood sugar and phosphate fractions and the alkalline reserves in the arterial and venous blood. furthermore, the contents of glycogen, total amount of sugar and phosphate fractions of the extremity in question. The tests proved that together with a marked decrease of the circulation during the exposure to cold there is a decrease of the consumption of oxygen down to 1/5 to 1/8 and a decrease of the arterio-venous blood sugar and lactic acid difference. Therefore during the exposure to cold not only a suffocation-metabolism could not be proved but neither was there an increased formation of lactic acid. The requirements of energy are covered by the oxidative metabolism. This may be traced back to the fact that the metabolism is significantly lowered according to the "R.G.T."-rule. Furthermore these tests have proved that tissues which are exposed to cold can absorb considerable quantities of oxygen from the arterial blood in spite of the changed dissociation of the graph of oxygen. With this the theory that the escape of oxygen which is rendered more difficult in low temperatures is the cause of a suffocation of the tissue is no longer sound,

Tests with ESMARCH's bandage during which the ligated parts were exposed to cold and warmed up again have proved that a complete ligature of the regions, up to 9 hours, can be endured by the tissue without considerable damage. If, however, the ligated parts are warmed up at the same time most serious capillary damages occur even within two hours. They lead to disorder of the permeability, formation of edema, condensation of the blood and all this results in a collapse of the circulation. From these experiments the conclusion must be drawn that with local freezings the onset of the damage of the vessel and of the tissue occurs in the phase of warming up. During that phase the metabolism is already increased, the circulation of blood, however, is still seriously decreased because of the significant narrowing of the vessel. Therefore, in case of local freezings, the therapy to be applied must first of all increase the circulation of the blood in the damaged parts which must itself be kept cool. This can be achieved by preventing a general exposure to cold, by massage of the affected parts which must be kept cool and the elimination of the vaso-constrictor sympathetic tonus by eliminating the

sympathetic nerve by means of novocain. The results will not be so good by eliminating the peri-arterial nerve in the fossa ovalis by means of novocain.

Discussion:

HOLZLOEHNER: Special attention must constantly be paid to the differences in the causes of the symptoms and also to the treatment existing between the effects of a general exposure to cold and the local freezing. Otherwise a progress in the one field would cause serious damage in the other.

WEZLER: In my own experiments we have also observed an increased utilization of the blood in cold.

During the exposure to cold the spasm of the vessels, up to the medium sized arteries, lasted several hours even under an intense warming of the skin which was proved by my own experiments during which parts of the body were exposed to cold and heat.

DRUCKREY: Have any therapeutic tests been made with alcohol, caffein, or nitrite in order to eliminate a spasm of the vessel after an exposure to cold?

BROCK: I suggest eliminating these spasms of the vessels by using a centrifuge in conformity with the improvement of REYNAUD's gangrene by using centrifuges.

LANG: The findings that the nature of metabolism is much the same during the exposure to cold as in general, i.e. oxidative, is of fundamental significance. It removes many speculations concerning freezings being due to suffocation. Physicians frequently speak of a suffocation-metabolism even if this is not possible because of the O_2 pressure.

XV.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON DISEASES OF TEETH, MOUTH AND MAXILLA

Translation prepeared by:

U. S. Naval Technical Unit, Europe, (Medical Section)
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1. First surgical and orthopedic treatment of maxilla and face injuries.

Oberstabsarzt (Major M.C.) Prof. REICHENBACH

The first aid for soldiers with face and jaw injuries should be given in a special hospital near the front lines to which the injured should be brought as soon as possible and without having received previous surgical treatment.

Cooperation with the associated specialities (eyes, throat, nose and ears) has to be available in one and the same hospital.

The treatment of patients with jaw and face injuries should be performed by one surgeon (surgical and orthopedic treatment).

According to the experiences of this war there are practically no limits to the early surgical treatment. The surgical wound treatment with the aim of closing the wound is the method of choice in the region of the jaw and the face. In case of wounds on the surface of the brain, open pneumo-thorax, and opening of the joint cavities as well as with jaw and face injuries, the approximation suture should not be used to produce a total closing of the wound. When first aid is given in the front lines the effected parts should be kept at rest. If the patient has lost teeth and suffered fractures, bandages similar to a prosthesis have to be applied.

The most suitable material for the sutures is stainless steel wire. The suture with wire plates and the suture in the deep tissues according to WASSMUND also proved to be very good.

It is best to differentiate between immediate suture (instead of primary suture), early suture, late suture, (instead of secondary suture).

We must warn against a complete immobilization for a long period of time. It is useless to wind a bandage round and round the head but a many tailed bandage or one secured by wrapping under the jaw, even using paper tissue, are suitable.

2. First surgical and prosthetic treatment of jaw and face injuries.

Oberstabsarzt (Major M.C.) LENTRODT

1. Contrary to the first World War where the injured soldier arrived after much delay in the homeland hospitals, we now accomplish the surgical and prosthetic first aid of jaw and face injuries by specialists in the immediate vicinity of the front lines, either as provisional aid in the advanced main dressing station or as definite treatment in the maxillary surgery department of the Army.

2. It is desirable that all special departments be combined in <u>one</u> hospital.

3. It was always possible to establish our own technical laboratory in the medical departments behind the front lines.

4. Before establishing the course of treatment we made X-ray pictures in two planes and here the "Siemens ball" (property of the department, refers to a compact type of X-ray tube) with darkroom was very helpful.

5. We did not always use the same method of splinting. The majority of the cases were treated with wiresplint. With linear fractures and defect fractures we used combined prosthesis with wire arches secured to the individual teeth by wrapping. In case of toothless jaws the so-called Mummel-splint with supporting head and jawcap bandage is used.

6. For the advanced main dressing station we recommend the use of bandages similar to a prosthesis and for the maxillary surgery department of a hospital splints made according to impressions are recommended.

7. Generally we first perform the prostetic and then the surgical treatment.

8. Within the first three days we had the best success in healing with the surgical treatment and following immediate suture. After the lapse of this time we waited for the wound to clean up and then made an early suture, according to GANZER.

A successful suture requires adequate drainage. Drainage to the outside, at the lowest point and to the corner of the mouth has turned out better than drainage towards the oral cavity. As material for the suture we use stainless steel wire almost without exception. For the lips we use it 0.1 and 0.15 millimeter thick, for the rest of the soft tissues 0.2 and for the wire tension sutures 0.3 millimeter.

9. Complications are first of all secondary hemorrhage and aspiration pneumonia and besides this erysipelas and diphtheria.

10. Tracheotomy is a very severe operation in case of demolition of jaw and face. The medical detachments perform tracheotomies too frequently in the front lines according to our experience.

11. The tranfer of patients to a homeland hospital before a lapse of 2 weeks is always endangered by secondary hemorrhage.

12. Freshly operated patients should be attended by doctors for at least 8 days and cared for by trained nurses, and sometimes even feeding by nose-gavage is necessary.

3. The final treatment of face and jaw injuries.

Oberstabsarzt (Major M.C.) Prof. AXHAUSEN

The lecturer denounces, as regards face and jaw injuries, both the common surgical wound treatment and the delayed con-

servative treatment. He believes that they require classification as special war wounds which call for special wound preparation and closure by the use of carefully placed approximation sutures (cerebral, pleural and joint injuries).

The cause of concern is not the occurrence of serious infection; it is rather found in the unfavorable course of recovery in case of a spontaneous healing. Surgical wound treatment favors the course much more. It eliminates the almost certain infection of the wound with its profuse suppuration. The development of sequestration of the bone will be limited or even avoided. Foreign bodies within easy reach can be removed. The course of recovery will be much shorter, physical strength is preserved and bandage material can be saved to a large degree. Sometimes the bother of drooling and disfiguration can be eliminated at once. Frequently delayed plastic operations can be avoided or in any event they are simplified. The objections to this procedure are without foundation. They originate from the erroneous supposition that the surgical wound treatment is identical with the method of treatment described by FRIEDRICH (radical excision of the wound and complete closure by suture).

These two methods of treatment do not have anything in common. The procedure according to FRIEDRICH is possible only in case of small and superficial wounds, as FRIEDRICH states himself that it cannot be used with large wounds. The exact time limit, which FRIEDRICH established for his method of treatment (the 6 to 8 hour limit) cannot be put into effect for the surgical wound treatment. The purpose of the latter is the basic improvement of the wound conditions which will permit the accurate approximation by suture. This effect can be obtained at any later date. The surgical wound treatment therefore does not depend upon a short period of time: PICHLER states that it is effective at any time. LINDEMANN thinks that it is dangerous; but it is not. Erroneous transfer of FRIEDRICH's method of treatment can become dangerous, that means the complete closure by suture of large wounds in the field of the maxilla but without the previous surgical treatment of the wound, which assures a healing without infections by keeping it open sufficiently. The surgical wound treatment with accurate approximation suture is not to be made in the front lines, but in the special departments behind the front lines. In this case a thorough knowledge of the matter has to be presumed. The objection that no special aid is necessary for the execution of the surgical wound treatment (LINDEMANN) is not entirely correct. Damaging losses of tissue and nerve lesions in the preparation of the wound can always be avoided, if it is properly executed.

Disadvantages of this method are non existant and the advantages are great. The demand for the final wound care should be expressed as follows: Following the dental and jaw orthopedic preparation the surgical wound treatment is followed by partial suture which is performed to reinstate form and function.

4. Final treatment of jaw-face injuries.

Stabsarzt (Captain M.C.) SCHUCHARDT

The indication to use adjacent and distant flaps to cover defects in the area of the maxilla and face is discussed in the beginning. The plastic preparation of adjacent flaps which should be preferred, is limited by the size of the defect and by the formation of new scars. The use of visor and pistol grip flaps is denounced, as by using the new scars are made in visible places. As a distnat flap the author prefers the tube graft which makes it possible, by avoiding open wound areas, to transplant the necessary tissue taken from the neck, arms, chest, or flank, to cover the defect. In numerous examples successes obtained by treatment with adjacent and distant flap operations from the field of plastic surgery of the face were shown. Most interesting cases of total orbital plastic repair and replacement of chin structure by new methods of treatment using tube grafts were shown. For some cases of osteoplastics of the upper and lower jaw the tube graft is used, the bone transplant is imbedded into it, and is thus brought to the defect together with the graft.

The goal of each final treatment in case of injuries of the jaw and face is to cover the defect with tissue originating from the same body and to make the patient independent from prosthesis as much as possible.

5. Plastic repair of the nose with a tube graft.

Stabsarzt (Captain M.C.) SCHUCHARDT

We will briefly discuss the possibilities of soft part substitution with free and pedunculated grafts in defects of the nose. For all partial plastic operations on the nose, flaps of the forehead and cheek are very suitable. SCHUCHARDT, however, used only flaps from the face if the donor site could be closed again by suture without disfiguring deformaty of the mouth, lower eyelid and eye brow. In case of large flaps from the forehead the covering of the donor site is possible only by free transplantations of skin. As this always causes the development of ugly scars, SCHUCHARDT denounces the total and subtotal plastic operations of the nose using skin from the forehead. The ideal means for total and subtotal plastics of the nose is the tube graft. On the one hand it has to be chosen according to the extent of the defect and on the other hand according to the suitability of the donor site, the upper arm, neck the chest or flank. It is better to rebuilt an individual nose with the abundant material offered by the tube graft than by using an adjacent flap from the face. A special advantage of the tube graft is the complete avoidance of visible secondary scars. The technique for forming a profile frame and the importance of using orthopedic methods of support and pressure bandages in cases of large plastic reconstruction of the nose was demonstrated. Pressure dressing for shaping the transplanted soft-part tissue is pointed out.

Discussion of the lecturers about the first and final surgical and orthopedic treatment of jaw and face injuries.

WASSMUND: Exhibition of a new extension clamp which was developed by WASSMUND for the extension of the lower jaw. BRUHN's extension forceps used up to date took hold of the teeth of the lower jaw with one arm, the other arm is a one prong hook which adapts to the lingual surface of the lower jaw. The individual manufacture of these extension forceps requires some working time in a laboratory. The cap-splint which overlies the teeth, disturbs an exact adjustment of the bite and its examination. If only a few teeth are left, the capsplint cannot find any support; also not if the aveolar process is broken in the front area. With a toothless lower jaw BRUHN substituted the capsplint by a second hook, which, lying in the oral cavity, grasps the aveolar process from above. But in this case the use of a prosthesis is impossible. It was my desire to make the extension apparatus in the simplest way and without work in the laboratory. It has to be suitable for every lower jaw and even a toothless lower jaw. This can be accomplished by using a 3 prong extension clamp. Two prongs apply to the lingual area of the jaw, the third one is made like a screw and applies to the font area of the chin. By this the chin is firmly fixed and can be extended as desired. The clamp was worn for months in about 15 cases without causing any inflammation of the soft parts or the bone. Up to now, we have manufactured the extension clamp ourselves in the laboratory from 3 mm thick stainless steel wire.

Its mode of application iw shown in the case of a serious comminuted fracture on both sides of the lower jaw. Both horizontal branches were demolished, the small middle piece of the chin was toothless. It was markedly dislocated in the direction of the hyoid bone to the back and downward. A closing of the lips thereby becomes impossible. The chin was grasped with the extension clamp which was extended to a head-splint. It was kept at rest in the right position for about 5 months. By achieving the extension and the resting position in this way a bony consolidation of both side defects was obtained which was about 4 to 5 cm large. It has been said that by combined efforts of extension and resting position a spontaneous bony regeneration can be gained, even in case of very large bilateral defects of the lower jaw, so that a further osteo-plastic operation will be unnecessary, and the period of treatment is considerably shortened.

PERWITSCHKY: The method of early wound treatment in my maxillary surgery hospital differs in two regards from the points of view of the speaker:

1. Fixed time of the wound treatment,

2. uninterrupted suture, respectively partial suture and suture with drainage.

Comments to #2: I treated all cases by an early suture with the exception of those where the extent of the defect did not allow a connection of the wound edges on account of a loss of substance. Furthermore the joining on the edges of the wound

in their whole extent becomes so solid that they close completely. In no case did I have to put in a drain and in no case did an infection occur which would have forced me to reopen the suture.

Comments to #1: I closed all cases as soon as possible without exception by suture, i.e. as soon as the fracture was put in a resting position by a splint in case of a fracture of the lower jaw. Only the necrotic shreds macroscopically visible, are removed (foreign bodies and bone splinters lying loose in the tissue, too of course). How is it possible to explain the contradiction between the experiences of the speaker and Mr. WASSMUND and my own? The answer may be that I always closed the wound early without keeping any portion of the wound edges apart artificially by insertion of a drain or a tampon to facilitate an outflow of the wound secretion. It is probable by this that the damaged cells located close to the wound edge are preserved or that their necrosis escapes an observation with the naked eye.

On account of WASSMUND's operations I watched throughout the last year for a different manner of wound healing and did not find any differences in case of wounds which were closed on the second, tenth or even the 28th day. A limit is made only through epitholializing the edges of the wound.

According to my opinion my experiences are specially important for the surgeon in the front lines, because they do not limit him to the imitation position with regard to the suture.

Comments to SCHUCHARDT's dissertation: Lately I preferred the tubegrafts from the back pedunculated on a level with the shoulder. This method of treatment will bring less pain to the patient such as I observed with the fixation of the arm in case of a transfer of a flap from the flank. Exceptions are made only with smaller defects of the face where I find that a tube graft originating from the neck is quite sufficient. Furthermore the tube graft from the back has the advantage that it is possible, on account of its thick muscular apparatus, to take a thick flap even from skinny patients, and furthermore the skin is less hairy than on the chest.

FLOHR: The question of active surgical or conservative treatment in case of face and jaw wounds, which was not quite clear in World War I and at the beginning of this war, has, according to our experience, been determined in favor of the surgical wound treatment. In spite of the persistency with which some schools stick to the conservative open wound treatment, we decline this method as unfavorable and less successful for the patient, as it frequently leads to extensive plastic operations and unnecessary prolongation of the time of treatment on account of the bad functional results and mutilation of the face.

According to our experiences those cases, which were given only first aid by the medical units in the front lines, i.e. where just the hemorrhage was controlled or a debridement of the wound was made, showed the best results. Therefore, contrary to the methods applied during the first World War, the first special treatment should be made in a maxillary surgery hospital near the front lines. The most frequently observed mistakes

violating the principles of the first treatment of soft parts and bones of the face are:

1. too extensive excision of wounds,

2. neglect to suture the mucous membrane,

3. bone suturing and

4. lately, marrow nailing of the jaw bones.

It is justified to forbid the suture of gun shot wounds of the trunk and the extremities. But in the area of the face we should like to consider it as a logical measure after the surgical preparation of the wound, It would be contrary to common sense to excise the wound and later on expose it again to the oral fluids with all tis germs and residual food. In our field we do not excise because we dread an extension of the infection, but to gain an approximation of the facial parts with a suture, by creating clean wounds. Our experience of many years showed very clearly that a suture should be striven for, although the decision, whether a complete or partial, immediate or primary suture, if approximation suture or delayed suture under open granulation should be made depends on the age, kind and state of the wound, as well as the experience of the surgeon.

Special consideration was given to the use of mucous membrane for closing off the source of infection coming from the mouth and by this to exclude the disastrous adherence of soft tissues of the face to a wrong part of the jaw bone. This very important point is not much discussed in our professional literature although the bad functional results and the difficulties which meets later when freeing such scarred deformities are very well known to every maxillo-facial surgeon.

Comment on the treatment of fractures: The Bauer-SCHROEDER's wiresplint bandages used for treatment of jaw fractures and modified according to WASSMUND, still dominates the field today. In the first year of the last war I recommended a limited use of wiresplint bandages. According to a well based explanation by REICHENBACH, he too recommends that the wire bandages be substituted by splints, similar to a prosthesis, if one has to deal with defect fractures in the horizontal ramus of the jaw and fractures in a jaw with too few teeth. Shortly after the beginning of the war we declined the use of wire formed into a loop according to HAUPTMEYER as a splint for jaw fractures. It proved to be a failure. In his latest publication REICHENBACH took a similar, although not so completely adverse standpoint. We did not consider the SCHLAMPP-splint as favorable as several others simply because its application with special ligaments is complicated, time consuming and depends upon the use of special instruments.

Wire Suture in Case of Bone-Plastics.

The skillful fitting of the implantations into the defect, the pointing and making of impaction holes sometimes creates the possibility of an infection on account of the length of time of the operation and the extension of the bone stumps. For

these reasons the operation is frequently without success. If possible we nowadays expose only the edge of the lower jaw, freshen it to a large degree and fix the implantation securely by two wire sutures. To shorten the long waiting time from the day of injury till the osteoplasty, i.e. 4 - 6 months after the injury, we expose the edges of the bones around the defect about 4 weeks before the operation is supposed to take place, cut out all infectious tissue and eliminate the ulcerating edges of the bones. In this case we do not rely on the X-ray picture. 4 weeks later the real transplantation of bone with wire suture is performed. By this procedure we gain about 4 - 6 months time. If fragments cannot be supported by a prosthesis we successfully bridge over the defect by means of ivory sticks of the thickness of a pencil and cover the defect itself by broad, flexible tibia chips. Up to now we have operated about 30 cases in this manner and gained good healing and consolidation almost without exception. The ivory sticks healed in and consolidated almost universally according to our experiences over 4 years.

UNTERBERGER: A thorough, special and immediate treatment of gunshot injuries in the upper jaw is essential to avoid secondary suppuration of the injured area and furthermore it is the best prophylaxis against the occurrence of dangerous and even life endangering complications, originating thereform. On account of our experiences in many cases with injuries in the middle section of the face, of which injuries of the upper jaw and Highmore's antrum take the first place, a surgical after treatment was necessary chiefly for the following reasons:

1. Secondary treatment was most frequently caused by residual secondary infectious foci of shattered bone with continuous suppuration externally (formation of fistulae).

2. second to mention are operations on account of complications caused by infections extending from the focus of shattered bone towards the outside. Several complications were observed:

a) Purulent infections in the area of the cheeks originating from the shattered maxillary sinus. The channel of infection is exposed down to the maxilla in this case, abscess drainage towards the maxillary sinus is made. If possible, an incision from the outside should be made too.

b) Orbital complications. First of all removal of splinters in the area of the roof of the maxillary sinus should be made. Furthermore one should try to find the site of entry of the infection into the orbit. Finally an opening anddrainage of the infected parts of tissue is necessary. In case of serious processes with danger to the eyeball it is advisable to combine the operation with drainage of the orbit cavity towards the outside, by removal of either the lateral or medial wall of the orbit.

c) Possibilities of infections of the back wall of the maxillary sinus. The infection tends into the fossa infratemporalis towards the outside if the back wall is injured. The larger outer part of the fossa is formed by the fossa infratemporalis, the smaller inner part is formed by the fossa pterygopalatina. If the infection extends within the fossa infratemporalis it is possible that it spreads into the parapharyngeal space and extends by gravity into the mediastinum. (mediastinitis). If the infection

rises from the fossa infratemporalis the route of spread of the infection passes subtemporally and thereby causes a swelling of the temporal area. The best way to reach the focus of infection in case of such a subtemporal extension of the infection is to make an incision from the outside into the soft parts according to KROENLEIN and with a descending way of infection, opening of the parapharyngeal space and in case of necessity mediastinotomy may be necessary.

If the infection proceeds by way of the injured back wall medially through the fossa pterygopalatina, the infection spreading from the fascia pharyngea causes an infiltration or abscess of the pharyngeal wal , and furthermore can extend as an infiltration of the larynx and oesophagus wall and even become an abscess. As the formation of an abscess is usually superficial itfrequently occurs that it spontaneously ruptures into the pharynx and thereby heals completely; on the other hand an incision from the inside may be necessary on account of increasing difficulties of swallowing or dyspnoea. In especially grave cases the danger of suffocation has to be feared and can be met only by an immediate tracheotomy. Seen from the oral cavity the infectious focus of extension, originated in this way, shows up as a swelling in the area of the lateral pharynx, the soft palate quite frequently shows considerable diminution of the movability of the soft palate, and thereby the pronounciation becomes nasal and swallowing becomes more difficult on account of regurgitation of the liquid through the nose. If the infection extends towards the ostium pharyngeum, secondary ear symptoms occur.

A parapharyngeal abscess can be caused by an abscess of the pharynx wall penetrating into the pharyngeal space, so that an operation, usually necessary only in case of an abscess of the parapharyngeal space, may have to be considered.

3) Complications following sudden severe hemorrhages. The Beellque tamponade is the best auxiliary procedure in case of sudden hemorrhages from mouth and nose. Complications as a sequence of injuries of the middle part of the face skull are reported about by my assistant, Stabsarzt Dr. KRETSCHMER in ZIMMER's Monograph, Wehrmedizin. Kriegserfahrungen. 1939/43. I Band. Kriegschirurgie, Verlag DEUTICKE.

WASSMUND: All lecturers agree that an early closure of face wounds is desired. PERWITZSCHKY's conception deserves a closer examination. I think we lay too much stress upon the freshening of the wounds in case of an early suture. The extensive and snug closing of the revised wounds of the face as performed by PERWITZSCHKY is, according to my opinion, not favorable, as it serves secondary hemorrhage in case of wound areas still oozing or bleeding. If the wound areas are cleaned on the 10-12 day and when granulation has started, it is not necessary anymore to freshen them; the condition of the wound and the power of resistance of granulating areas is very good and does not require improvement. It occurs frequently that wounds of the face are excised in the main dressing station and the field hospital without even intending or executing a partial suture. This procedure, that turns out well in case of shot wounds on other parts of the body cannot be accepted for the face and should be forbidden, as it sacrifices precious tissue without need and necessity. An excision of face wounds is sensible only if a

partial suture follows immediately. As a rule this would be performed only after orthopedic treatment of the bone fractures and therefore should be executed in the special department for maxillo-facial injuries.

I use the tube graft from the back as observed by PERWITZSCHKY with some of my patients, only in special cases, for instance if chest and abdomen are too hairy. I would not prefer to take a tube graft from the back as a general procedure, as the skin of the back is very thick and cannot be fitted into the tender skin of the face as well as other material.

SEIFERTH: From the point of view of a maxilla, nose and ear specialist I am supporting an early surgical treatment of jaw injuries inflicted by gunshot on account of the danger of rising infections in the inner space of the skull. It is possible that damage due to impact may be caused by the explosive effect on the base of the skull in case of jaw and maxillary sinus gunshot wounds which in rare cases even causes dura and brain injuries. Therefore a revision of the maxillary sinus has to be made to avoid intracranial complications.

SCHUCHARDT: I am surprised about PERWITZSCHKY declining the use of the tube graft from the flank. The bother to the patient, which is connected with the use of the long tube graft flap from the back is considerably more than that caused by the use of tube graftsfrom the flank. The patient is very much hindered in lying if the tube graft from the back is used.

A fixation of the head, lasting for several weeks, does not damage the sound shoulder joint and the patient easily gets accustomed to the forced position within 1 or 2 days. If the tube graft is separated from the upper arm, the pains in the joints will decrease shortly thereafter. I very rarely could find a reason to use a tube graft from the back.

It is a disadvantage of the tube graft from the neck that keloid scars develop after the peduncular flap is taken. We there fore prefer the acromio-pectoreal round peduncular flap to the round peduncular flap from the neck.

6. The Cause and Treatment of Life endangering secondary Hemorrhages in Case of Injuries of the Face-skull.

Stabsarzt (Captain M.C.) K. W. SCHNEIDER

Extensive hemorrhages in case of face injuries almost regularily require a ligation of the external carotid, because control of hemorrhage in the area of injuries very seldom succeeds. A total of 21 (20%) mostly severe secondary hemorrhages occurred in case of 106 ligations we trace the causes of these sedondary hemorrhages. In addition to the knowledge we have up to now about larger anastomosis of the head arteries it was proved by experimental experiences that all head arteries on both sides are in close connection among themselves. By arteriograms of corpses and preparatory examinations of the vessels it was possible to detect two large direct connections between the two internal maxillary arteries and several anastomoses of the internal maxillary artery with the internal cartoid of the same side.

Our experiences gained from clinical observations and postmortem examinations prove that these secondary hemorrhages can basically be traced back to the large anastomoses between all head arteries which make a retrograde refilling of vessels possible. Besides this, the meningeal reflex, started by the ligation of the carotid externa (70-100% increase of the blood circulation in the carotid arteries on both sides) increases the danger of starting secondary hemorrhages.

Hemorrhages following injuries of the inside of the nose, especially of the ethmoid - sphenoid sinus area frequently originate from the vessels of the internal carotid artery, but we always have to take into account diagnostic difficulties, especially in case of hemorrhages from the upper part of the nose.

The treatment of hemorrhages and secondary hemorrhages which follow injuries of the face-skull always has to take into account these close connections between all head arteries. The most successful staunching of hemorrhages in the area of injury cannot be made most of the time as the structure of the face-skull makes the location of these vessels exceedingly difficult of access. Besides making a pressure tamponade, the supporting main-vessel, which in most cases is the external carotid artery has to be interrpted too. The secondary hemorrhages starting thereafter can generally be traced back to the supply over the same sided internal carotid, rarely over the contralateral external carotid. The supply over the internal carotid can be stopped effectively only by eliminating the direct connections.

7. Hemorrhages in the maxillo-facial area.

Oberstabsarzt (Major M.C.) LENTRODT

Late hemorrhages of the face-skull differ functionally but not principally from other large hemorrhages on account of their extensive collateral circulation and this has to be taken into consideration in attempts to control such hemorrhages. The collateral circulation of the internal carotid artery in case of late hemorrhages is of minor importance, but there is an important anastomosis between the artery vertebralis and the artery occipitalis.

Guiding principles:

1. Every minor, unimportant secondary hemorrhage can lead to a life endangering one and therefore revision of the wound, respectively the wound extensions, is required.

2. To apply a tampon to a wound in case of late hemorrhages does not bear any success, but only wastes precious time.

3. The only secure method of hemostasis in case of late hemorrhages of the face-skull is control of the hemorrhage at the very place of the bleeding.

4. If it is not possible to discover the origin of the hemorrhage, or if the additional operation appears more difficult than a ligation of the external carotid, the carotid can be tied off. If the hemorrhage recurs, it would not serve any purpose to tie up the carotis communis, hemostasis has to be accomplished at the site of bleeding and one should not hesitate to perform a trepanation or resection of the maxilla. If there is a repeated hemorrhage with penetrating injuries of the face-skull after a ligature is applied to the carotid and it cannot clearly be recognized from which side it originates, then the external carotid on the other side can be ligated.

5. Either before or during each operation a blood-transfusion has to be made.

Discussion concerning hemorrhages in the maxillo-facial area.

WASSMUND: The number of 106 ligations of the external carotid as reported by SCHNEIDER is quite high. It is not quite clear why the common carotid is ligated prophylactically in this case. When the ligation is made at the place of choice, a hemorrhage of the external carotid is not to be expected. It is surprising that, in spite of this, SCHNEIDER reports 20% secondary hemorrhages. I myself observed secondary hemorrhages of the arterial system only in very rare cases. By the same token it is possible that veins are injured or can be eroded from which secondary hemorrhages can start. Therefore as a rule it is required to make a ligation not at the place of choice, but at the place of the hemorrhage. The gunshot wound is to be opened widely and has to be kept wide open after the bleeding vessels are ligated. It must stay wide open, be tamponaded and has to heal under granulation. Only if this procedure is not possible or fails, should a ligation of the carotid be made.

BECK: In spite of a ligature applied to the external carotid, secondary arterial hemorrhages can occur out of its anastomoses. One example showed that the hemorrhage stopped after a ligation was applied to the arteria spheno-palatina.

In some cases an existing aneurysma of the carotid has to be considered. The picture of an autopsy specimen is shown, demonstrating an aneurysma of the internal carotid on a level with the naso-pharyngeal area. The patient died on account of hemorrhages and asphyxia. If an aneurysm is suspected, an arteriography with Iodsol or Vasoselectan is recommended. We refer to PHILIPPIDES article in "Der Chirurg", 1942, Heft 19.

SCHNEIDER: First of all I should like to make certain corrections: We have to distinguish between hemorrhage and secondary hemorrhage. By secondary hemorrhage I understand a hemorrhage subsequent to or succeeding a vessel-ligature. Secondary hemorrhages occurring with a ligature of the external carotid naturally have originated from the area of injury and not from the ligature of the vessel having injured the vessel itself. I think that the ligation of the common carotid is necessary as in case hemorrhages arise I have immediate control

of it by a tenporary ligature of the vessel. This ligation will never present any danger for the wall of the vessel. A tamponade of the wound bed is necessary, as the influence of the anastomosis with the other vessels has always to be considered. The knowledge of the physiology of the flow of blood in the head is the basis for treatment of such hemorrhages and secondary hemorrhages. During my speech I always stressed that on account of a ligature of the external carotid a continuous increased flow of blood of about 70 - 100% is caused in the carotid on both sides. As the blood pressure regulation of the arteries of the head is completely independent from the blood pressure of the body by self regulation, therapy intended to increase the blood pressure does not have any influence on the blood pressure of the head. A ligature of the common carotid artery stimulates the carotis sinus at the same time and thereby causes an increase of blood-pressure by vasoconstriction in the head.

8. Gunshot injuries of the joint of the jaw.

Oberstabsarzt (Major M.C.) Prof. MASSMUND

Gunshot injuries of the joint of the jaw are frequently connected with injuries of the auditory canal and auditory organ; and succeeded by a suppurative inflammation of the auditory organ. Fractures of the base of the skull and squamous portion of the temporal bone sometimes exist at the same time. The danger of cerebral complications is to be considered. The otologist and neurologist have to be consulted in time. In spite of an undamaged covering of the soft parts over the fracture of the joint, it is possible that the injury in the joint is infected, as the missile passed through germ containing cavities of the face-skull (oral cavity, pharyngeal cavity, maxillary sinus) or because the wound in the joint communicates with the auditory canal. A closed, infected injury of the joint demands an early opening and undisturbed outflow of the secretion. In case of an open injury of the joint a suture of the capsule within the first 24 hours may prove very useful. An injury of the joint, closed and without inflammation (aseptic) should not be touched.

It is necessary to put the lower jaw in a resting position for the duration of the inflammation (4-6 weeks). Following thereafter active and passive movement has to be started. Trismus (Kieferklemme) has to be overcome by stretching - exercises, other wise a scarred contraction or ankylosis cannot be avoided. A deviation of the lower jaw towards the injured joint has to be prevented by an inclinated plane or a splint (applied to the sound side).

The indication and the danger of secondary injuries has to be examined before missiles close to the joint are removed. A missile in an infected missile-bed has to be removed. A chronic suppuration from a fistula in the area of the joint as well as a chronic suppuration from the ear can possibly originate and be supported by the missile. An encapsulated missile can remain in its place. Small missiles should be left alone, while large ones have to be removed if they disturb the movements of the joint or if they cause pains. The physiological reaction has to be considered. Some soldiers are not fit for service,

2. Diseases of the joint of the jaw.

Marinestabsarzt (Lt. Cmdr., M.C., Navy) BECK

The roentgenological picture of the diseased joint of the jaw can be made by the possibility of opening the mouth during the exposure according to PARMA-PORDES. In case of a closed jaw the most certain view of the joint of the jaw is possible by using the modified SCHUELLER -position, which at the same time allows an exact interpretation of the conditions of the joints. Traumatic conditions of the joint of the jaw require an additional occipito-frontal picture of the skull, which, in case of insufficient results with the usual positions have to be made with perorbital presentation of the joint of the jaw. A new modus of X-ray photography will be introduced.

Secondary changes of the joints are of importance for jaw surgery in wartime. The various operations of the joint of the jaw are being discussed, starting with experiences made with the treatment of fractures of the jaw.

In case of ankylosis a broad resection of the joint of the jaw should be made. Orthopedic aftertreatment to overcome the muscular contraction can be started immediately after the operation. The incision according to AXHAUSEN-BOCKENHEIMER should be chosen to gain access to the joint of the jaw.

The intermediate grating of the joints is part of the clinical picture of deforming arthropathy. Chondreal changes demand the excision of the disk. Osseous diseases of the head of the joint, combined with severe disturbances of function, require the resection of the diseased parts of the joint.

The habitual luxation can be removed by means of splitting open the articular eminence according to LINDEMANN or by an osteoplasty. Very often the formation of scar-tissue between the articular eminence and the joint of the jaw by opening this space, and a subsecuent prolonged tamponade are quite sufficient. Injection-treatments are rejected.

The displacement of the disk towards the front according to KONJETZKY is recommended only in case of simultaneous disease changes of the disk of the joint. (terminal and intermediate grating of the joints).

If the head of the joint is fixed firmly between the cartilage disk and the articular eminence, in other words, if a subluxation exists, it is sufficient to make a slanting excision of the front part of the disk to remove the mechanical obstacle. If there is a luxation at the same time this measure will be preceded by a plastic elevation of the body of the joint. Thereby it is possible to avoid the inadequate use of the cartilage areas of the head of the joint and its counter-beds in case of a loss of the disk.

In case of loss of the joint of the jaw the disturbances of occlusion can be balanced by an extension of the jaw-arch according to TRAUNER's method. A sliding plastic operation behind the crest, of the ascending lower branch of the maxilla is mentioned.

If large defects of the lower jaw require a covering by plastic operation, short fragments of the joint should be left alone. It is advisable to fasten the proximal end of the transplant in the soft parts.

Discussion concerning gunshot-wounds and diseases of the joint of the jaw.

SCHUCHARDT: The functionnal after-treatment of diseases of the joint are very often of decisive importance for the final result. To avoid a deviation towards the side it is not sufficient to contrive an inclined plane on the sound side. Much more important than this is systematic exercise therapy, which, if proper instruction is given, can easily be learned by the patient. When he makes exercises of opening and closing the mouth in front of the mirror for instance, he should be told to watch that with a maximum opening of the mouth, the middle of his lower jaw should remain in the mid-line of the face.

BECK: There are situations which force us to remove even splinters remaining in the surroundings of the joint of the jaw. The following case shows a patient wounded at the northern front.

The X-ray pictures show splinters lodged medially to the joint of the jaw next to the base of the skull. For 3 years he had fistulae in the right side of the neck and neuralgia. We declined removing the foreign bodies by making the operation inside the mouth on account of the danger of injuring important vessels and eventual formation of scars in the area of the inner masticatory muscle. An osteotomy was made in the ascending ramus and access was gained to the splinters lodging in the joint of the jaw, which could now be removed easily.

PERWITZSCHKY: Comment to Wassmund's lectures: I am very conservative when it comes to the removal of gun-shot splinters laying near the joints. I operate only if by a series of X-ray pictures it can be proven beyond doubt, that the foreign body presents a mechanical obstacle for the movement of the joints. Lockjaw is caused quite frequently by scars of missiles which have penetrated deeply. If in this case an operation is made, I necessarily have to consider that the scar made by the operation will always be larger then the one made by the missile itself, and furthermore the disadvantageous effect has to be considered.

Directives for the Treatment of Injuries to the Face and Jaw.

General Comments.

1. The medical units in the front lines (medical company, field hospital) should limit their activities to the first aid of injuries to the jaw and face such as: operations for saving life (hemostasis, tracheotomy), putting the fractures in a resting position by simple methods, dressing of wounds. Any kind of surgical treatment even excision of wounds, should not be made. The most important thing to do is to transport the injured to the nearest special department as promptly as possible.

2. The special maxillary and face department of the medical establishments in the rear areas are responsible for the final treatment. As a rule they start with the orthopedic treatment of the fractures, which then is succeeded by the surgical wound-treatment. The latter one consists in the surgical preparation of the wound followed by a partial suture, depending on whether or not the condition of the wound allows or demands it. A complete closure should not be made, as the undisturbed outflow of secretion has to be assured. In case of large losses of substance a suture under tension and plastic coverage are unsuitable. Plastic operations should be made by the special department for maxillo-facial surgery (Restoration-Surgery). In case of a possibility of injuring the accessory organs the competent special surgeon should be consulted.

3. If it is not possible to send the injured to a special maxillo-facial surgery hospital within the first week after the injury the final treatment has to be given by the medical units in the front lines according to the above mentioned rules.

x Particular Details.

Gunshot Injuries to the Joint of the Jaw.

If the joint of the jaw is injured by gunshot, very frequently an injury to the base of the skull, the temporal bone and the auditory organ is inflicted at the same time. It is advisable to have the patient examined at the earliest date by an otologist and neurologist.

A closed injury of the joint without inflammation should be left alone. In case of an open injury of the joint a suture of the capsule within the first 24 hours may prove useful in some cases.

If an acute infection arises, the closed joint has to be opened immediately by an incision in front of the tragus (edge of the auricle).

After gunshot injuries it is necessary to keep the lower jaw in a resting position for approximately 4 - 6 weeks. Immediately thereafter active and passive movement has to start on account of threatening contraction and ankylosis.

The head of the joint may be removed only if it is infected and necrotic.

10. Extent of Tooth diseases in the Armed Forces and their inference for the Dental Service.

Oberfeldarzt (Lt. Col. M.C.) STUCK

Taking into account the records of treatment of about 1,600,000 soldiers we should like to define our attitude regarding the dental care of the troops. Should we prefer an extensive dental treatment to a limited treatment, in which latter case special consideration is given to combating extensive foci of infection, caries and paradentosis and furthermore to the matter of skill as regards the dental treatment. It is determined, that only highly skilled dental care assures a long lasting health of the oral cavity. An increase of the range of dental care has been taken into consideration, but it was rejected as detrimental, as the success of dental treatments depends on the exact execution of each phase of the treatment, even the smallest one. This cannot be achieved, if the dentist's time for treatment is limited.

Emphasizing the matter of skill does not mean that larger numbers of soldiers needing dental care cannot be treated, but it requires a certain change of dental methods from the treatment of roots, which does not offer much success, and prostheses which are not essentially necessary, to an intensive treatment against caries and paradentosis, as well as surgical treatments (extractions and apical osteotomy) for focal infections which frequently originate from apical foci.

In order to accomplish this, we suggest the introduction of new directives concerning therapy together with suggestions concerning organization.

1. Removal of all roots as well as all teeth if a focal infection exists and a cure cannot be guaranteed on account of apical diseases or adjacent destruction which extends deep into the guns and is associated with suppurative inflammation, or decayed pulp.

2. Simple methods of filling for all teeth with new caries. Special consideration should be given to interdental spaces. The time consumed for this task can be justified as it is only a fraction of the time that would be needed for treating a tooth with an inflammation of the pulp.

3. Treatment of dental pulp is justified if in the particular case the teeth are still of value functionally. The treatment has to be done according to rules which exclude apical complications.

4. Insertion of dental plates or dentures is to be undertaken where the general health is seriously endangered without them.

11. Dental Materials.

Oberstabsarzt (Major, M.C.) Prof. FALK

Of the new materials generally used in the German Army the most suitable ones are those obtained from the basic substances of carbon, lime and water, and developed into polymerizations-mixtures such as Paladon and Palapont. As a basic substance for prosthesis we prefer Paladon to caoutchouc not only on account of its better cosmetic effect, but especially because it adheres better to the tissues.

If proper indications are followed, Palapont may be used for single crowns, connecting links for bridges and as a substitute for metal teeth, meets all requirements and saves the preparation of amalgams and of metal teeth, and in addition it saves time because of its simple method of manufacture. Teeth made of Palapont adhere better to the basic material made of Paladon than teeth with button-pins. Press-dies for manufacture at the clinic should be available in every large dental hospital, because they help to overcome difficulties in supplies.

Silver-tin amalgams used as a substitute for precious metals are only a temporary solution. Silver-tin amalgams are very suitable for fillings, crowns and bridges, provided the directives for manufacture are properly observed and the finished material is submitted to the hard or diffusions adjustment. As a partly finished material as well as raw materials, precious steels are a valuable additional material to our armamentarium, espcially for plates, clasps of metal, crowns, bridges and clamps which are to be manufactured in the laboratories. BH_3 steel especially has become an indispensable means on account of its relatively simple method of preparation and its attributes. As the manufacture requires certain knowledge of the peculiarities of the material it should be used only by skilled personnel. Inappropriate procedures impair the resistance and firmness of the material. Parts of steel should be connected only by a soldering with gold-steel-solder, the obtaining of which is, according to my experience, a matter of considerable difficulty. The welding together of parts of steel requires further trials and experience.

12. Indication concerning Tooth-Substitutes with regard to Preservation and Restoration of Fitness for Front-line duty.

Stabsarzt (Z) (Captain M.C., Reserve) ISSEL

The lecturer discussed the meaning of "fitness for duty in the front lines", as concerns the function of mastication. Complete fitness for frontline duty does not exist, if the rations which are available for the troops are insufficient, or can be made into small bits only by a large expenditure of time and energy. Here we have to consider the special troops, such as crews of submarines, flying personnel, air-borne troops and parachuters who have to depend on hard, special rations sometimes for days, and furthermore musicians, playing brass instruments belong to this group. In special cases a disturbance

of the function of speech can reduce the fitness for frontline service. (Transmission of orders verbally and by telephone).

In order to establish clear directives wh ch should serve the restoration of fitness for frontline duty we discussed critically the fixed and removable dentures and their indications. Special consideration was given to the materials available in war-time.

New materials of metal and non-metal (steel and Palapont) were subjected to a critical examination, and the indications for their use were established. The construction of dentures with these materials in order to preserve the fitness for frontline duty was rejected because they were not found suitable by the experience of the last 3½ years. Among others, large steel bridges extending over the area of the front teeth and there fastened by pin-crowns were rejected. The peculiarity of the steel and the way it has to be treated does not assure an exact fit of the pin-crowns with or without a ring. If steel crowns were used as anchors steel was suitable, if the denture was made properly.

As regards Palapont, the lecturer requested that firmly fixed replacements of teeth (crowns and bridges) c be made in such a way that the Palapont can easily be replaced if repairs are necessary, without removing the bridge respectively the metal structure of the crown from the mouth. These requirements are not met with scaffold bridges and for this reason they should not be made.

Firmly fixed replacements of teeth have been limited to those cases where only by this means will the fitness for frontline duty be restored or retained; and furthermore to those cases where existing replacements of teeth have been destroyed or teeth have been lost by a disability due to the war. In all cases an X-ray control of all the pressure lines is essential.

The crown with attachments was rejected as an unsuccessful construction.

Setting aside the special cases mentioned above, removable dentures are indicated in case of insufficient ability to masticate. The ability to masticate is looked upon as sufficient if 4 pairs of masticators articulate with one another in the side of the dental arch. In many cases the normal time for recovery of about 8-12 weeks had to be reduced to 4-6 weeks in order to serve the interest of an early restoration of fitness for frontline duty. In special cases a provisional arrangement can be made immediately after the extraction. We have learned by experience that such provisional arrangements function well for quite some time (REICHENBACH).

Prostheses which can be removed have to be manufactured as simple plate-prosthesis with simple and purposeful clamp-fastenings. The use of the lingual bar without a simultaneous use of continuing clamps was rejected for the free-end prosthesis, worn on both sides only gingivally on the lower jaw. Here the base plate is indicated which adheres to the front teeth with its upper edge and thus opposes the tilting up of the free-end saddle.

Prostheses for jaw defects take an exceptional position for soldiers injured by gunshots, as here not only the missing teeth but also parts of the jaw have to be replaced. The fastening of these prostheses was discussed and explained by pictures. In order to preserve the remaining teeth the lecturer strongly urges, as a result of his experiences during World War I, regarding the late prosthetic treatment of soldiers injured in the jaw by gunshot, that clamp-teeth should be connected by crowns, respectively bridges with one another and the defect prosthesis should be suspended on them with some flexibility. So-called clamp-crosses, made of steel-wire, render valuable aid. If appropriate arrangements are made, they can be used as splints and so serve for the fastening of defect prosthesis. If in some cases the stiffening of crowns is not necessary, a clamp system has to be chosen for fastening the prosthesis, which at the same time has to have the characteristics of a splint.

Concluding, the lecturer pointed out that a cooperation between the maxillo-surgeon and the prosthetic surgeon is necessary. By this cooperation lost time can be avoided in fitting the prosthesis by avoiding later correction of the alveolaris crest.

13. Urgent Elimination of Pains at the Front Lines.

Oberarzt (Z) (1st Lt.M.C., Reserve) LUTZE

The word "front-lines" as used in the title of my lecture does not mean the transverse section of the medical units on duty in the front lines, but actually the field of fire of heavy arms. I collected my experiences for the main part in this zone and should like to give a short account of them.

In case of an offensive, the elimination of pain is the primary purpose of our treatment. In contrast to major surgery in our field the elimination of pain is accomplished in the same manner in mobile warfare as in static warfare.

Because of a generally relatively bad condition of the teeth of the troops, the main activity of the dentist in the front-lines is taken up by conservative treatment.

From the very start of may career I not only performed therapy to eliminate pain, but if it was possible - and it is possible in static warfare - I restored every set of teeth after having discussed the matter with the competent medical officer of the troops.

In order to preserve a healthy and useful set of teeth, it is essential that every conservative treatment is made exactly and in a neat manner. Special consideration should be given to the treatment of roots. As the time available for this treatment is limited, it was sometimes very difficult to determine the proper therapeutic treatment. The deciding factor, besides elimination of pain was always the question whether or not the tooth was worth preserving.

With the various diseases of the pulp an exact diagnosis has to be made according to the anamnesis and the clinical report. The pulp of all single rooted teeth was extirpated, the canal dilated, cleaned and filled (Lentulo, Root-filling paste, gutta-percha-points, cement). If a partial pulpitis could be recognized the crown of the pulp of all molars and multi-rooted pre-molars was amputated. If the infection had already seized the pulp of the root and the tooth had to be preserved for reasons of mastication I amputated, although the incompleteness of such treatment was clear to me. In most cases it is less dangerous to tr at the pulp of a root medicinally, than to have a half or an unfilled canal of a root. By trying to fill roots which are either difficult to penetrate or are bent, our manipulations will cause the greater damage. We will always carry the infection to a place where is should not be and do much damage in the apical paradentium. Molars which were carious and not worth preserving, with gangrenous, decayed pulp and such teeth where no apical osteotomy could be made, were extracted.

Not all teeth could be preserved by conservative methods, therefore the forceps had to be used frequently. In case of each surgical treatment we attempted to make either an ana - esthesia or at least try to reduce the pain. For eliminating pains completely in most cases, we now have the ideal procedures of terminal and regional anaesthesia and the treatment with ethylene chloride (causing freezing). I always used the record syringe, it is simply to pack, easy to sterilize and transport. As injection fluid I used Novocain-Suprarenin in ampules ready for use, containing a 2% solution. In a few exceptions I used a 4% solution. It is desired and often necessary that of certain instruments, such as bayonetforceps and levers, several are at hand so that a sterilization of the instruments does not have to be made after each operation especially if large parts of the jaw have to be cleaned. In order to alleviate the fitting in of false teeth, I surgically removed and smoothed the edges of the bones after having extracted roots of teeth which were not worth preserving.

In advanced dental stations of the frontlines, operations of the medium dental surgery can be executed besides extractions and incisions. In most cases the wounds heal normally and without complications, if the wound is properly dressed., In cases where a primary or secondary infection of the blood coagulum occurred, the empty aveolaris should be loosely tamponaded with Marfanil-powder or with a piece of gauze soaked with chlorphenol-camphor. With only a few exceptions the patients were free of pain at the next visit and a normal wound-healing took place. This local therapy could be supported favorably with the application of heat. Incisions and operations of abscesses could be performed relatively painless, if they were frozen with ethylene chloride beforehand. Larger operations like the removal of difficult and displaced wisdom-teeth, operations of large cysts abd resection of points of roots should be made at the main dressing station. Such an operation usually requires a relief from out door duty and furthermore secondary treatment for about a week. In order to achieve a better and faster healing of the wounds it is advisable to hospitalize the patient. The best systematic care can be given at the main dressing station.

If in the beginning of my lecture I maintained that a local or intraoral regional anaesthesia is sufficient, this was only in relation to the general dental treatment. With the treatment of people, injured in the jaws this method failed in most cases. Here experience was our best teacher. The first patients injured by gunshot wounds in the jaws were treated with a provisional splint under anaesthesia of a 2% Novocain - Suprarenin solution. Cases of severe destruction of the face were made ready for transportation by applying a temporary or adhesive-plaster dressing. If the anaesthesia and the resorption of the injection fluid connected with it had subsided, we frequently observed secondary hemorrhages in the demolished and distended tissue, which could hardly be controlled. Very soon we rejected this regional anaesthesia in the area of the face and gave an S.F.E. injection strong (Scopalamine, Pukodal, Ephetonin) intramuscularly to the patients. The patients fell into a twilight sleep and we could work undisturbed. According to our experiences it is essential for the transportation of the patients to apply a provisional splint to the jaw, i.e. to put the fragments into a resting position with a temporary dressing after the manner of SAUER in order to prevent extensive dislocations and save pain for the patient, and after this the wounds of the face can be treated. If this is done, these injured should be sent by air transport to a specialist in a field hospital or a station hospital in the homeland for further and final treatment and cure.

14. Focal infection - Treatment of roots and Apical Osteotomy.

Stabsarzt (Captain M.C.) IMMENKAMP

In case of focal infections every thoughtless mutilation of the set of teeth by extraction of all dead teeth has to be avoided, as the restoration of the ability to masticate by false teeth requires a long period of time and by this the soldier will not be fit for duty for months. At the same time we decline the attempt to preserve badly infected teeth by long conservative treatment, especially in the case of poly-rooted teeth, as success can probably not be gained.

The treatment of an infected tooth, especially a mono-rooted tooth will promise success if it is made conscientiously and all therapeutic means available are applied.

In case of osteitic processes originating from the tooth system, the removal of the focus of granulation is not sufficient, it has to be preceded by a thorough treatment of the canals of the roots with fillings that cannot be penetrated by bacteria; a resection of the point of the root has to be made, which has to be followed by an apical osteotomy, if the location and form of the focus in the bone is favorable. With focal infections of mono-rooted teeth a successful surgical operation can be made.

The chlorine-tablet, which corresponds to a quantity of 2.25 cubic centimeters of chlorine (=12.5 cubic centimeter 20% chlorine mixture) proved to be excellent for the treatment of

roots (air corps). The use of chlorine tablets makes it possible to prepare a dis ased tooth clinically without reaction, within the first session of treatment up to the Foramen apicale. Furthermore a thorough mechanical and chemical cleansing was possible and the tooth could be closed. Gangrenous teeth can be tr ated and finished in 3 sessions within 3 days.

With chronic and apical paradentitis an apical osteotomy succeeds the treatment of the root, if the location and the size of the bone-focus is favorable. Teeth with more than one root cannot be treated this way, because their complicated anatomical structure and the unfavorable location of their roots does not promise a full success.

With severe focal infections where the state of the patient demands prompt aid, it is justified to remove the tooth and then make a thorough currettage, of the alveolaris if possible an exposure of the alveolaris and cleansing of the osteitic process.

In case of chronic, marginal infections, which can be evaluated as foci, a radical removal of the infected tissue as well as removal of the deep pockets of the gums by radical operation is necessary.

Discussion concerning dental diseases.

APPELSTAEDT: The army does not request a report of treatments in order to control the performances of each single dentist, but to give the higher echelons a survey of the entire situation. Besides this it facilitates a better distribution of material and instruments according to the requirements of the different dental stations. The scheme of panel-account which is known to all panel dentists has been chosen in order to enable a financial calculation of the treatments and by this to draw a comparison with the treatments of the civilian dentists. The dental stations of the army stated that the writing out of reports of treatment does not mean an additional task for them.

A uniform regulation for all parts of the Armed Forces concerning dental replacements is appreciated. However, it has to be requested, that the same regulations will be issued for the civilian sector, because otherwise the soldier will be worse off than the civilian and this would cause discord. The directives published on 10 October 1942 for the Army proved to be good. (Reading of the directives published in the Army Bulletin part B, 1942, # 784-).

With the army, permission for dental replacements are given by the director of the dental station of the army, dental replacements which are made by a contract-dentist have to be approved by the physician of the troop. As the approved application for dental replacements serves as the dentist's voucher for the KZVD (German Society for Panel Dentists) and prosthetic treatment can be given only in very rare cases during the first session, no further delay in the treatment and no further burden as regards writing is included for the contract-dentist. Only applications for bridges and metal plates reuire the approval of the physician of the corps area, who performs this job in

line with his other tasks. Regarding the necessary limitation of time consuming metal work we cannot denounce this control, as part of our dentists still do not act according to circumstances and prefer the time-consuming but lucrative dental replacement to the economical plat -replacement. We do not consider it useful to prohibit the use of gold furnished by the patient, as such a prohibition could be ordered in a justified way only if the civilian patient would have to undergo the same restrictions. Besides this the use of gold is always simpler and not so complicated and can therefore be made with less expenditure of time than by using steel.

Large laboratories did not prove successful with the army, as the organization and adm nistration of them requires too much personnel. Besides this too much time would be lost by sending the models to and fro; a local cooperation between dentist and technician assures a more individual treatment of the patient.

BICHLMAYR: The directives are excellent and we cannot understand why a layman in the Navy (a physician or some other aid station)should decide, whether a removable or firmly fixed prosthesis, if silea-metal or gold, or which method of splint should be made or chosen. Only a specialist, in this case the dentist himself, is able to judge these questions.

Paladon is excellent, but it proved a failure with partial dentures, for instance, if the third teeth left and right in the upper jaw or in the lower jaw still exist, the danger of breakage is too great.

LENTRODT: S.E. E. (Scophedal, Eucodal, Ephetonin) weak and carefully administered up to 1,5 cubic centimeters and injected subcutaneously, intra-muscularly and intravenously have prroved to be very good in thousands of cases. If S.E.E. strong, 1 cubic centimeter, was injected intravenously it caused pronounced disturbances of respiration in cases of severe maxillofacial injuries so that in many cases we were obliged to inject it only subcutaneously. In case of repeated injections of S.E.E. weak within several hours, we frequently observed a motor restlessness and preferred to give a morphine derivative after the first S.E.E. effect had subsided. S.E.E. proved to be very good in the treatment of maxillo-facial fractures for the reduction as well as for splinting. Evipan is used almost exclusively for the removal of splinters supplemented by S.E.E. weak intravenously. Contrary to otorhinolaryngologists we reject the use of Evipan with inflammatory processes of the floor of the mouth and with acute pyogenic infections in the area of the maxilla.

I once saw a Novocain-poisoning with a badly wounded Russion prisoner of war who had a short period of excitement and convulsion which gradually passed into a paralysis associated with paleness, profuse perspiration and epileptic spasms. With the use of Suprarenin special precaution should be taken if diphtheria and possible myocardial-damage has occurred recently. MADLENER reports an acute arrest of heart action after 10 cubic centimers of Novocain-Adrenalin solution had been given without any preceding S.E.E. or morphine; the diagnosis was severe changes of the myocardium and diphtheria.

15. Gingivitis and Paradentosis.

Professor WESKI

The lecturer refers to the endeavour of the medical authorities to clarify the etiology of paradental pathology and stresses the importance of chronic inflammation of the gums which is harmless in itself, but leads to the development of severe damage of the paradental tissues, stomatogingivitis ulcero-necrotica and to paradentosis. The field medical officer can accomplish a lot to keep the soldiers free from paradentosis by instructing them about the importance of a rational care for the teeth and its control. The diagnostic importance of bleeding gums for the recognition of early paradentosis is stressed because it allows the field medical officer to institute an opportune prophylactic treatment in case of already existing severe degrees of gingivitis and paradentosis. It is appropriate and recommended that special places for prophylactic dental treatments be established.

16. Paradentopathies with the Front Line Troops.

Oberstabsarzt (Major M.C.) Prof. REICHENBACH

In winter 1941/42 the cases where soldiers had to be transferred to the reserve-army on account of paradentosis increased in the area of an army. The medical officer of the Army requested that a hospital for expert-opinion on paradentosis and a station for paradentosis treatment should be attached to the maxillo-hospital near the front-lines. The examination of the material - we had approximately 100 new cases per month - resulted in the necessity of dividing the patients into three groups.

The first groups, which amounted to 12% had only marginal inflammations. The second group with about 84% had additional pathological pockets in the gums, outflow of secretion and loosening of the teeth. Only in a small group of about 4% we did not have any indications of inflammations or loosening of the teeth, but striking signs were exposure of parts of the roots of the tooth and sides of dental groove. The examinations showed that it is useful for reasons of exploring pathogenesis and its treatment not to name diseases of the tooth supporting apparatus as paradentosis, but to separate from them the inflammatory forms of paradentitis which apparently occur more frequently in the front lines. They can be treated without difficulty because we could send back for front-line duty about 96% of our entire patients, and only 4% had of necessity to be transferred to the reserve-army because splint treatment was indicated, which could not be performed in the front lines.

On account of these facts we can draw the conclusion that even in the front lines an examination and uniform expert opinion and treatment of the diseases of the tooth supporting apparatus is necessary. The word paradentosis and the imagination of a complete loss of teeth connected therewith is a widespread opinion amongst laymen, so that with an improper diagnosis, as happens often with the troops, an unneccessary severe psychic strain can be aroused. On the other hand the

patients would like to go to their homeland because they think that only there can they get proper treatment.

Discussion concerning paradental diseases.

BICHLMAYR: Most of the dentists state that improper hygienic conditions of the mouth are the cause of gingivitis and stomatitis. In addition to this, it is the lack of Vitamin C and B. The therapy has not changed during the last years. Aside from the usual local treatment, where iodoform-glycerin-lactic-acid pulp is especially preferred, intravenous or subcutaneous injections of Cebion or Redoxon were given and by this means a quick fading away of the disease was accomplished. The results gained in Norway are especially interesting, as according to former points of view many diseases should have originated there. This is not true according to the reports on hand. Food, lacking vitamins, lack of sun-light and furthermore the lack of lime in the water are not responsible for these diseases, but as already mentioned before, unhygienic conditions of the mouth. Ship-test: no fresh water, only distilled sea-water for drinking water, lacking lime. Result: dirt paradentosis, no other treatment but supply of vitamins, etc. was made, furthermore care of teeth, systematically under control and all signs disappeared. I learned that vitamins and lime are no longer looked upon as cause of paradentosis since the Third Conference of the Military Medical Academy. This results in three final conclusions:

1. Gingivitis should be treated only by dentists, and not, as happened frequently, for many weeks by physicians. Immediate transfer to the dentist is necessary.

2. As long as no better therapeutic means are available, it is recommended to instruct the soldiers about proper function of mastication and care of teeth by a specialist (dentist).

3. All reports regarding danger of paradentosis and loss of teeth in Norway and on submarines are exaggerated. The diagnosis were made by laymen. The Norway and submarine psychosis is overcome.

BLASCHKE: It is suggested that a tooth-brush be made which is approved by the German Dental Society in order to eliminate the unsuitable and material wasting types made by the industry.

A toothbrush should be supplied and given to the soldier as a part of his equipment. The medical officer in the front lines and the dentist should force the soldier by explanation and order to use it properly and regularly.

STUCK: The Director of the German Society for Dentists supports BLASCHKE's suggestion for introduction of a standard toothbrush for the Armed Forces .

LENTRODT: Genuine paradentosis as a chronic degenerative process and gradual atrophy of the paradentium was observed in a few cases only with old soldiers, mostly participants in the First World War. In those cases neither splints nor radical operation could help, but only extraction of the teeth.

Very frequently patients were transferred to our hospital on account of acute stomatitis, and the diagnosis of the medical officer in the front lines was "paradentosis". According to an order of the medical officer of the army all patients with paradento athies were transferred to our hospital for either treatment or opinion as regards the method of treatment. Neither an officer nor a soldier ever left the area of our army because of genuine or false paradentosis. According to our experiences insufficient care for teeth is the cause for the rapid spreading of gingivitis among the troops. This conclusion can be drawn by the fact that inflammatory symptoms disappear quickly after a thorough cleaning of the oral cavity has been made. It was striking in Esthonia that most cases of stomatitis occurred in the oil-shale area. Only a small percentage of the patients required a long treatment in the maxillary department of our hospital. Here we saw severe stomatitis with extensive ulcers. As most of our patients were relatively young, the ulcerative stomatitis healed completely on account of the treatment, without leaving any defective tissue in the paradentium. On the floor of a paradentosis the ulcerative stomatitis became chronic and lead to relapses. GROSS pointed this out some time ago. In case of pressure dystrophies we made a compensation of articulation and removed badly fitting or faulty articulating crowns and bridges. As regards extractions we were very cautious if we had to deal with acutely inflamed areas. As a rule we waited for the fading away of the stormy symptoms and then followed SLAUK's proposals as regards the medicinal early treatment. With severe stomatitis and especially in case of hemorrhages of the gum without visible signs of an inflammation we gave doses of vitamin C either orally or intravenously. In all stomatitis cases we examined the tonsils and accessory cavities very carefully and established a temperature curve. With every stomatitis with increased temperature we made a blood picture and consulted an internist. Owing to an intensive sanitation even with the medical units in the front lines, we were able to meet severe difficulties prophylactically. The establishment of tooth and prosthesis hospitals at the front lines stood the test as well as the employment of a special maxillofacial departmtant.

Directives for Treatment of Diseases of the Teeth and Tooth Beds.

According to records of treatment of about 1,600 ,000 soldiers we should like to define our attitude regarding the dental care of the troops. Should we prefer an extensive dental treatment to a limited treatment, in which latter case special consideration is given to combating extensive foci of infection, caries and paradentosis and furthermore to the matter of skill as regards the dental treatment. It is determined that only highly skilled dental care assures a long lasting health of the oral cavity. An increase of the range of dental care has been taken into consideration, but is was rejected as detrimental as the success of dental treatments depends on the exact execution of each phase of the treatment, even the smallest one. This cannot be achieved, if the dentist's time for treatment is limited.

Emphasizing the matter of skill, does not mean that larger numbers of soldiers needing dental care cannot be treated, but it requires a certain change of dental methods. The treatment

of roots, which does not offer much success and prostheses which are not essentially necessary must be set aside for an intensive campaign against caries and paradentosis, as well as surgical treatments (extractions and apical osteotomy) for focal infections which frequently originate from apical foci.

In order to accomplish this, we suggest the introduction of new directions concerning therapy with suggestions concerning organization.

1. If apical osteotomy is not indicated with mono-rooted teeth, extractions and furthermore removal of all roots as well as all teeth should be made when a focal infection exists and a cure cannot be guaranteed because of apical diseases of adjacent destruction which extends deep into the gums and is associated with suppurative inflammation or decayed pulp.

2. Treatment of dental pulp is justified, if in the particular case the teeth are still of functional value. The treatment has to be done according to rules which exlude apical complications.

3. Simple methods of filling for all teeth with new caries. Special consideration should be given to interdental spaces.

Paradentosis:

1. The "leaflet for medical officers of troops about treatment of paradental damages"informs the medical officer of the troops to strive for closer cooperation with the dentist.

2. In regular health-inspections the troops should be informed - possibly by the dentist - of the proper use of the tooth brush and the proper execution of mastication. In most cases this may prevent the occurrence of paradental damages.

3. The treatment of chronic gingivitis is a matter pertaining only to the dentist.

4. It is suggested that a standard tooth-brush be introduced for the Armed Forces as a part of the equipment. The industry should be induced to produce standard tooth-brushes according to forms examined and suggested by the Armed Forces.

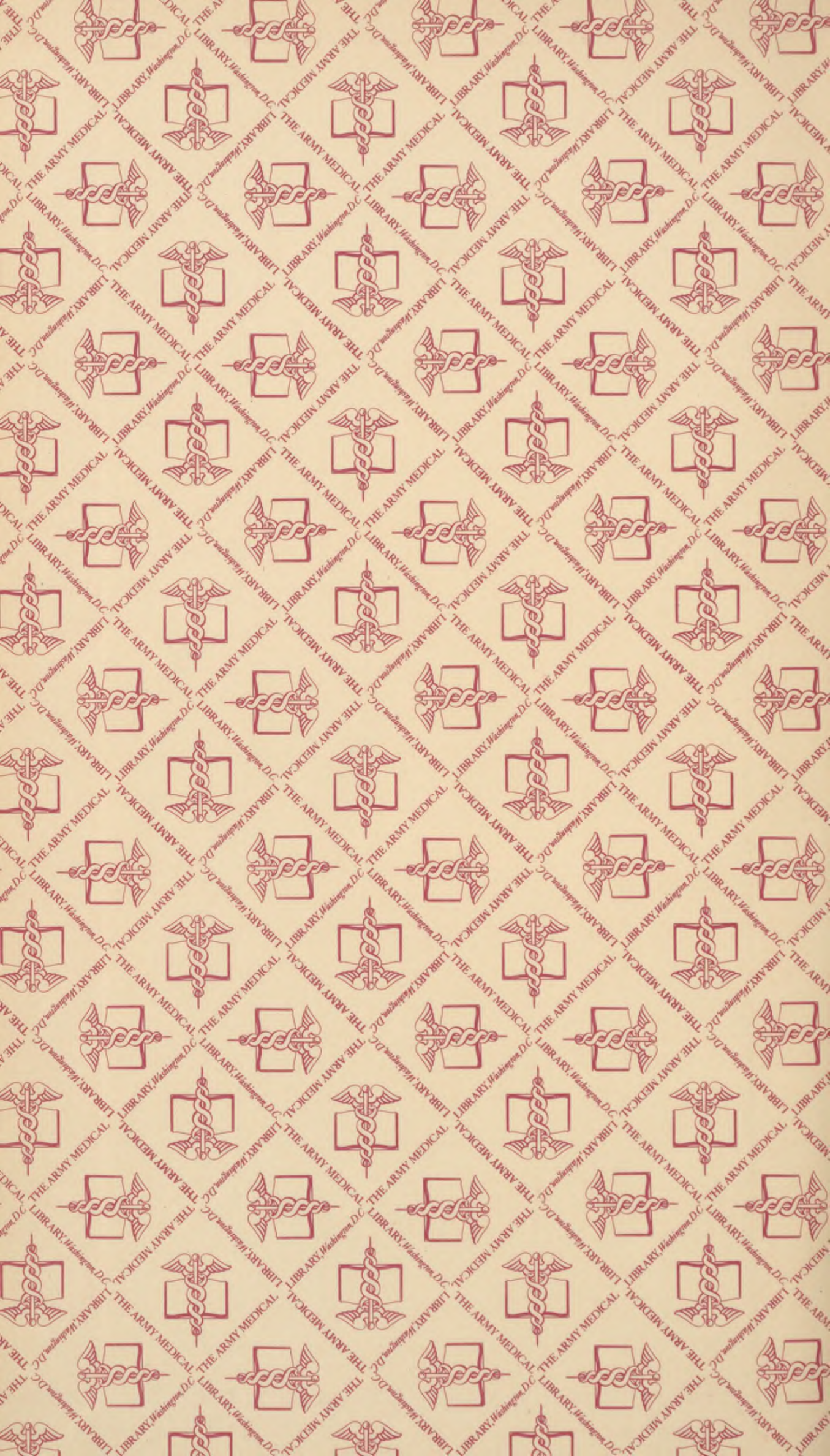
Prosthesis:

In order to secure dentures for older soldiers who have to join the Armed Forces now to a large extent, certain limitations of the up to now used methods are essential. Removable dentures can be made only if less than 4 molars are left in the upper jaw which fit into 4 molars in the lower jaw in the act of mastication; or if front teeth or teeth lost by disability due to the war, respectively damaged teeth, have to be replaced.

Fixed dentures should be made only if teeth damaged by disabil ty due to the war have to be restored and at the same time spaces between teeth have to be bridged over; especially

if these dentures are for flying personnel, parachuters, crews of submarines and musicians playing brass instruments. Other acceptable cases are if badly destroyed teeth can be preserved only by crowns or pin-teeth (even if not essentially necessary for preserving or restoring fitness for duty). If these crowns respectively pin-teeth with an intermediate link can be combined into a bridge, these bridges can be made, if by this means a space up to two teeth can be closed.

It is the supposition for inserting fixed dentures, that in every case a roentgenological examination of the holding teeth excludes an apical inflammation or considerable atrophy of the aveolar-bone.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