0.01 c.c., and this was the dosage of low virulence adopted for the series of inoculations.

In order to get a broader view of the effect of typhoid vaccine on lowering the resistance, it was decided to have three series of mice, inoculated at intervals of several days, in each experiment.

Mice were inoculated subcutaneously with the standard triple typhoid lipovaccine used in all the camps. The dosage was sufficiently large to cause all the animals to be sick and quite a high proportion of them to die, the idea being to lower their resistance as much as possible. If proportionate dosage were given man it would amount to several hundred c.c., while the dosage actually given is only 1 c.c. Tables 2, 3 and 4 give the data and results of the experiments.

It is probable that under ordinary conditions it is the hemolytic streptococcus of relatively low virulence that is encountered in the camps. In those camps, however, in which more or less of an epidemic of streptococcus infection prevailed, the virulence of the streptococci probably was much increased.

With this in view, a part of the series of mice shown inoculated with typhoid vaccine in Tables 3 and 4 were inoculated with the same strain of streptococcus used for low virulence, which had been raised in virulence through mouse inoculation. Tables 5 and 6 give the data and results of these experiments.

COMMENT

In animal experiments, in which there are always uncontrollable factors to deal with, the only way any reliable results can be obtained is to repeat the experiment. If the same results are obtained consecutively, conclusions may then be fairly drawn. Results of the experiments as a whole should be considered rather than any individual portion, as there would be less chance of wrong deductions when the mass is considered. For example, in Table 3, comparing Series 1 with the controls, one could argue that there is increased susceptibility; comparing Series 2 and the controls, arguments for increased resistance could be brought forth; but taking the experiment as a whole, it will be found that there is practically no difference when Series 1, 2 and 3 are averaged against the controls; and this is without doubt more nearly the truth.

The number of typhoid vaccinated mice inoculated with low virulent streptococci were 111, of which twenty, or 18 per cent., died. Thirty-six control mice were inoculated with low virulent streptococci, of which ten, or 27.8 per cent, died. There is a difference here of 9.8 per cent. in favor of increased resistance to the streptococcus in the mice inoculated with typhoid vaccine. It may be possible, however, that the typhoid vaccine killed some of the mice most susceptible to the streptococcus and that this difference is more apparent than real.

Thirty-three typhoid vaccinated mice received inoculation of highly virulent streptococci, and of these twenty-two, or 66⅔ per cent., died. Thirteen control mice were inoculated, and nine, or 72 per cent., died. Here again there is a percentage in favor of increased resistance to the streptococcus, but it is possible that this difference may be more apparent than real.

There is one point, however, that may account for this apparent slight increase in resistance to the streptococcus. Following typhoid lipovaccination in man there is a moderate mobilization of leukocytes lasting for a few days. This undoubtedly occurs in animals, and it is generally thought that the leukocyte is the

chief factor of defense against the streptococcus. Another point that would favor the view that an increased resistance to the streptococcus follows inoculation with typhoid vaccine (one form of foreign protein) is Jobling's contention that there is a general immune reaction following the introduction of foreign protein.

CONCLUSIONS

There is no evidence that there is increased susceptibility to streptococcus inoculation in mice following typhoid vaccination. There is a slight amount of evidence in favor of increased resistance to the streptococcus possibly due to the mobilization of the leukocytes. It is probable that these facts will be applicable to other vaccines and other diseases, for in a series of thirty-two mice vaccinated against pneumococcus, similar results have been obtained.

WAR NEUROSES, SHELL SHOCK AND NERVOUSNESS IN SOLDIERS *

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A recent visit to France and England furnished me with opportunities for observing the various phases of war neuroses, shell shock and nervousness in soldiers. In France the patients were seen at *triages*, or sorting stations, field and army, and base hospitals. Those seen in England gave as a rule longer histories and were satisfactorily separated from the front by a stretch of salt water. In both countries, facilities for studying the different methods of treatment and management were made freely available to me, and I also was able to profit by the views of medical officers of long experience in these matters. The present article is a summary of the impressions gained from this visit.

IMPORTANCE OF NEUROLOGIC SUPERVISION

The neurologic problems of war have assumed an importance quite undreamed of, and the necessity of neurologists for a modern army is receiving general recognition. In battle areas the need of neuropsychiatry exceeds that of general medicine, as the nervous and mental casualties may exceed 10 per cent. of the total casualties. France maintains 20,000 neurologic beds in the rear, most of which are occupied by functional cases, and at the front tries to maintain one and one-half neurologic beds for each thousand troops. Major Arthur Hurst, R. A. M. C., estimates that 26,000 beds are occupied each year in Great Britain by purely hysterical patients. The previously held neurologic conception that hysterical paralysis and contractures did not occur in conjunction with physical wounds has been completely overthrown, as the war has demonstrated that functional disturbances of this character complicate surgical injuries with frequency. The longer the war goes on, the more it becomes evident how widespread are the effects of functional nervous disease both in combatant troops and in patients hospitalized for any cause.

* The cessation of hostilities and the proposed rapid demobilization of the Army have rendered many of the war time methods of the treatment of "shell shock" impracticable. This article should be read as of the time when it was written, that is, as of a time when no end of the war was in sight.

The web of mystery and vagueness that enveloped the entire shell shock group in the initial phases of the war has been swept away, and now there is an essential agreement of opinion that the great bulk of the cases are functional, that it is possible to prevent the occurrence of many of them, and that, even when of long standing and fully developed, they are curable. Actual experience has now shown that a substantial proportion of the nervous cases which appear at the front can be so managed that they do not run on into neurosis. The preventive measures are most sure of success in the battle areas, where they can be instituted almost immediately after the occurrence of the casualty. It is believed that from 80 to 90 per cent. of the patients of this class can be returned to the lines if they are promptly cared for in small neurologic units directly connected with the armies. The prevention of the cases that originate in the base hospitals is more difficult, but can be greatly furthered by a diagnostic alertness of medical officers on the lookout for the first manifestations of hysterical symptoms. It has also been proved that chronic, long standing cases, whether developed at the front or in base hospitals, can also be effectively cured, although the therapeutic arrangements for cases of this character are more elaborate.

It is thus seen that the outlook for the war neuroses is much brighter than it was. At one time it seemed impossible to stem the flood of these cases or to devise means of rehabilitating the patients. But in spite of this favorable change in the situation, shell shock still remains an actual as well as a potential problem for the medical department. Its potentiality can be held in check by efficient medical officers acting at the right time and place; but it will always be actual. There will always be many soldiers whose nervousness cannot be controlled at advanced points, either on account of the essential character of the nervousness itself or because, in the rush of warfare, it is impossible to carry out medical policies, desirable in themselves, but incompatible with the main object in hand.

In our army the task of the cure of the patients is difficult by reason of the sweeping application of the principle of compensation for disability. Article III, Section 300, W. R. I., Act of Oct. 6, 1917, as amended June 25, 1918, provides that officers and enlisted men or other members shall be taken to have been in sound condition when examined, accepted and enrolled for service, and thereafter entitled to compensation under the act for disability. Thus, as far as compensation is concerned, line of duty may be held to include all insanities, feeble-mindedness, epilepsy, etc., irrespective of their having preexisted or not. Legally, no disorder can have preexisted in a person accepted for military service. As far as the neuroses are concerned, this law puts it beyond the power of medical officers to throw any doubts into the mind of the patient that he will surely be compensated if he persists in his neurosis long enough.

It is believed that the great success of the French with their neuroses is due to the fact that the neuroses are not pensionable and that no soldiers are discharged for such cause. The first factor is not available to us, but the second is; and for economic reasons alone every effort should be made to effect cures in neurotics, so that, even if they discontinue the service, they cannot claim disability on their return to civil life.

It was at one time thought that the doing away with the term "shell shock," with its implication of organic injury, which impresses the mind of the patient and the public alike, would help in the treatment. But it seems now as though the term had entered too deep into the language to be done away with. Efforts to offset the bad effects which the introduction of the expression brought with it will probably have to be expended in making it generally known that shell shock is an essentially curable condition.

CAUSATION

No entirely satisfactory explanation has been offered for the unprecedented frequency of these neuroses in this war. The great increase in the number and intensity of explosives does not altogether explain it, as they develop after gassing, after machine gun firing, and perhaps oftenest when there has been no direct exposure to firing at all. They develop in the base hospitals in France, and practically all of the symptoms quoted as war symptoms have been observed in the home cantonments during the training period. Neither does it seem probable that it is an entirely new development of this war, but rather that it existed in earlier wars in smaller numbers surely, and probably under a variety of names—in our Army, nostalgia, perhaps. Also in view of the fact that absenteeism as an idea has a foreplace in the minds of both officers and men whose sole reason for discharge is a war neurosis, it seems probable that among the 600,000 cases of absenteeism reported from the Union Army during the Civil War, an absenteeism which took the form of desertion or removal of patients from the medical services by friends or committees, there might have been found a numerous representation of modern shell shock.

The factor of predisposition is not to be denied in considering the causation of these conditions, but it is generally believed that it is sufficiently marked in most cases to have justified the rejection of the recruit.

With the exception of epilepsy, no single disease has been demonstrated as being an essential factor in causation. However, a diminished resistance may be inferred from the fact that the larger number of cases are observed during the first few months of service, although it must not be forgotten that there are a great many cases in which the soldier has not only given long service, but has also been distinguished for his morale and his bravery. It is not uncommon in French hospitals to see hysterical patients personally decorated and also wearing the *fourragère*.

Neuroses are credited with being more frequent in the infantry in common with other casualties, and also more common in trench warfare, although the latter has not been the case with our troops. The early impression that they were more common among officers has not been borne out by later experience. In a small proportion of the total number of cases the individual has been exposed to a traumatism severe enough to have caused lesions of the central nervous system without external wound. It is needless to state the uncertainty often surrounding the actual occurrence of injuries; but the injuries of the nervous system may be verified by definite signs. It is unfortunate that these relatively infrequent organic cases came to notice so early, as largely in consequence of them the idea became fixed that shell shock was an

organic condition and so to be regarded quite differently from those functional conditions that are the result of suggestion and are curable by psychotherapy. There has been reproduced what happened when the nervous effects of railway accidents first came into prominence. The new name, the new circumstances, the malassortment of diverse clinical conditions into one group, and the permitting of the group to carry the stigma of the most serious cases, which were the least frequent, the failure to recognize the material motive as a powerful provoking and sustaining motive—all these circumstances combine to make the history of shell shock a repetition of the history of railway spine.

On the factor of exhaustion too much emphasis can hardly be laid. The break is often preceded by weeks of disturbed sleep, due to bombing and artillery fire, and during an advance the story is common of several days of excessive exertion, nervous strain, no sleep at all, exposure to cold, only cold food and but little of that. The wish to be out of the war, which all along may have been latent, comes more to the surface when the shaken soldier staggers to or is brought to the first aid station or when he emerges from a period of unconsciousness. Under the influence of food, rest and encouragement, this imperfectly formulated wish may sink back of itself or may require additional efforts on the part of the medical officer to make it recede. This period, this interval, is one of greatly exaggerated susceptibility, and during it the most trivial circumstance may petrify the idea of illness, and a way out by means of it. But it is also a period when the kind, firm and confident attitude of the medical officer may completely reassure the shocked man as to his ability to carry on again and inspire in him the firm intention to do so.

CLINICAL VARIETIES

After the elimination of all totally foreign conditions, such as mental disease, organic nervous disease, and endocrinopathies, the war neuroses may be roughly divided into three general classes, between which occurs the same overlapping as is seen in the neuroses in civil life. These classes are: A, concussions; B, neuroses of neurasthenic or psychasthenic type, and C, hysteria.

A. Concussions.—These justify the assumption of the existence of minute and more or less disseminated lesions of the central nervous system, and may be accompanied by such symptoms as unconsciousness lasting for several days, retention of urine, loss of knee jerk, blood in spinal fluid, paraplegia, etc. Some patients of this class recover perfectly within a few weeks; others do not recover satisfactorily, and still others develop the symptoms of neurosis, illustrating the relationship between organic and functional disease.

B. Neuroses of Neurasthenic or Psychasthenic Type.—These may develop as a result of concussions, but as a rule their origin cannot be connected directly with any physical injury. They differ in no essential particulars from the neuroses of civil life except that they carry a strong coloring of the war situation. Many of them are associated with symptoms suggestive of endocrine disturbance, and the thyroid picture, especially in gas cases, is much in evidence. Thus, in addition to the symptoms of fatigue, lack of confidence, phobias, compulsions and general hyperesthesia

are observed rapid pulse, cardiac irritability, pain over the heart, vomiting, and terrifying dreams with war content.

C. Hysteria.—Babinski's conception of hysteria as a condition produced by suggestion and curable by psychotherapy has been of inestimable practical value at this time, not only in showing the correct management of hysteria *en masse*, but also in bringing to the light the frequency with which hysteria lays its crippling hand on conditions not primarily neurologic. A brief historical retrospect may help to an understanding of this subject, which has gained so much in importance during this war.

The creation of hysteria as a clinical entity must be credited to Charcot. He assembled old observations and made new ones, and left the picture of a characteristic disease with a definite symptomatology. He recognized the essentially suggestible nature of hysterics, but he did not define the origin of the suggestions, nor did he indicate the means by which they might be avoided. His influence was enormous, extending to teachers and authors of all nationalities, so that at his death hysteria was accepted, practically all over the world, as he had fashioned it. But he showed no practical way out.

For the past twenty years Babinski has been destroying the disease which Charcot created, leaving more or less to one side the personality of hysterics. He has shown that the classic symptoms of hysteria are the results of suggestion originating in medical examinations, or from misapplied medical or surgical treatment. As a proof of the correctness of his view, it is stated that the "grande hystérie" of the Salpêtrière has now practically disappeared from the French clinics.

Babinski, like his illustrious predecessor, has exercised a great influence on the medical profession of France, and at the outbreak of the war it had practically adopted his view on hysteria. The advantage to France from this was that its medical officers were from the first in a position to realize how hysterical symptoms arise and how they can be cured.

Among the symptoms that may be mentioned as being produced by suggestion are deafness, blindness, mutism and deaf-mutism, tremors, contractures and paralyses. Some few of these, such as deafness and mutism, which are so closely connected in consciousness with states of terror and in which the original insult is in itself a powerful suggesting factor, come on immediately; but the development of the larger number is delayed for days or weeks during the period when the patients are particularly suggestible and are exposed to the suggestions of medical men who examine them, and to the suggesting example of other sick and wounded. It is at this period particularly that the wisdom and discretion of medical officers can accomplish so much in suppressing the tendencies to the development of disabling symptoms.

A particularly interesting condition, which has first received detailed attention during this war, is a peculiar form of contracture affecting arms and legs, especially the feet and hands, which develops in sequence to some minor surgical injury. In these cases, various trophic disturbances are added to the functional incapacity. The exact pathologic condition in these cases is still not clear, but most of the patients are curable under carefully prepared psychotherapy.

TREATMENT AND MANAGEMENT

General Considerations.—The importance of a definite understanding as to discharge and compensation has already been emphasized. If the contrary to what is known to be wise maintains, if it is accepted throughout the Army that functional nervous disease is a grave disability which, if persisted in long enough, will insure a separation from the service under favorable pension conditions, the task of medical officers will become exceedingly difficult; not only will they miss an effective argument in influencing the minds of their patients, but they themselves will be affected by the atmosphere which tends to foster invalidism and make it comfortable. Except at the very beginning, except during the period of suggestibility before symptoms of neurosis have shown themselves, the hospital atmosphere should not be made too attractive for these patients. The attitude of medical officers should be that they are there for the express purpose of ridding the patient of his neurosis and firmly intend to do it, and the hospital itself should be organized along lines of strict war discipline. A war neurosis is a personal reaction to a military situation, and it must be cured in terms of the situation. It is an infantile reaction, and the medical officer must call to his aid some of the resources of the schoolmaster. A hope of reward should spur on the patient who lends himself readily to treatment and does well, and there should be some suggestion of punishment for those who are refractory and who tend to relapse.

In the advanced French centers the patients, even those who have been subjected to violent concussions, are told that they will soon be well again, and that the furlough, to which every French patient discharged from hospital is entitled, will make their cure perfect. If, however, the patient does not respond to encouragement of this kind, a different tone is adopted, and he is told that patients who develop nervous symptoms get no furlough. It is difficult to be specific in these matters or to lay down general rules, but the general rule is that the longer the patient persists in keeping on the road that leads to neurosis the more uncomfortable he will find it. It would be well if every one could grasp this view of the matter and could realize that the more discipline is relaxed, the more the patients are permitted to believe that they are suffering from serious disorders, the more of them will be found in soldiers' homes after the war. Such public utterances as that of a member of parliament to the effect that no soldier who had suffered from this terrible affliction should ever be asked to bear arms in France again injures the morale of troops and tends to postpone recovery in patients who under proper conditions might soon be well.

The whole difficult subject of discipline receives a certain illumination from a consideration of a system of management employed at certain French centers and known under the name of *torpillage*. Torpillage consists in the brusque application of galvanic currents, strong enough to be extremely painful, in hysterical conditions, and the continuance of the procedure to the point at which the deaf hear, the dumb speak, or those who believe themselves incapable of moving certain groups of muscles are moving them freely. The method has proved highly effective, and requires but little time and practically no personnel except the

medical officer who applies the treatment and the non-commissioned officer who takes the patient at the end of the treatment and continues the exercise of the affected parts. One treatment suffices. The apparatus is of the simplest, the only accessory to the electric supply and the electrodes consisting of an overhead trolley which carries the long connecting wires the whole length of the room, thus making the patient unable to run away from the current which is destined to cure him.

This method is more cruel in appearance than in fact, as the contacts are brief and only a few are necessary. What it really consists in is giving authority to a medical officer to inflict pain on a patient up to the point at which the patient yields up his neurosis. Its unquestioned effectiveness carries a lesson which makes plain that under circumstances a military neurosis disappears under punishment. It substantiates what was previously said in reference to rewards and punishment. As far as punishment is concerned, it should never be presented to the patient as such. It should rather be explained to him as a certain form of treatment which is of necessity not agreeable. The most feasible means for the carrying out of this idea is isolation. All of the French centers have isolating rooms, locked on the outside, into which refractory patients are placed and shut off from companionship, reading and writing materials and tobacco, until such time as they show themselves amenable to treatment. Rooms of this kind are especially necessary and effective in the management of relapses. As a matter of practical fact, the knowledge that isolating rooms are on hand and available is usually all that is necessary. They are not often used, and in one center they were found given over to the lodgment of attendants. But the underlying idea should make plain that a stubborn war neurosis is cured by the physician's stubbing the patient. In many, but not in all, patients, persuasive measures are sufficient; but when they fail, disciplinary measures should be made available; and the very knowledge that they are available will render it rarely necessary to make use of them. It seems probable that the reason so little of this variety of persuasion can be made use of with officers is that the treatment of neuroses in officers is generally difficult.

At the Front.—The general plan of the treatment of these cases at the front has already been given. Nothing further need be added here except to report that Lieut.-Col. T. W. Salmon, senior consultant in neuropsychiatry, American Expeditionary Forces, has perfected and made operative comprehensive plans for the early treatment, in direct connection with the armies, which have worked great good to our troops.

In Base Sections.—If rehabilitation of the nervous soldier fails at the front, cure is inevitably delayed. During the days or weeks of his being transferred from one hospital to another, he not only fails to receive appropriate treatment, but is exposed to the suggestions of illness which deepen the roots of a beginning neurosis. In all bases treatment is slower and less certain of effecting a return to the fighting line. It has been shown to be necessary to have hospitals specially organized as to personnel, general equipment and surroundings. If such hospitals are located in France, it is still possible in fairly recent cases to return patients to their original duty after a few weeks of treatment.

If, however, the patients are returned overseas, the chances of returning them to foreign service again are not good. With soldiers of this class returned home, England enters into a kind of agreement or understanding that they shall not be ordered to France again for a period of six months. Practically it amounts to an understanding that they shall not go to France again for the period of the war. But even if soldiers suffering from the neuroses are not expected to rejoin their expeditionary comrades, once they have reached home there nevertheless should be no relaxation of the principles of management in the home hospitals. The same principles hold good that the most humane thing for nervous soldiers is to hold them in the military service until they are cured. At home it may be expected at least to reestablish them sufficiently to enable them to do some work useful to the army during the war, so that the end of the war will find them able to resume their civil occupations.

It is to be the policy of the medical department of the American Expeditionary Forces to retain all the patients of this class in France as far as possible. But it cannot retain all of them in France, and sufficient numbers of them will be returned to necessitate the establishment of one or more special hospitals in this country, which should be organized with great care. They should be remote from large cities and situated in a locality of which the climate will permit outdoor occupation for the greater part of the year. One thousand beds is the limit of size, as the atmosphere of cure, which they must have, is difficult to maintain in larger units.

Whenever it is possible, the commissioned personnel should have had expeditionary experience, as an actual knowledge of conditions in France will strengthen the influence of medical officers over their patients. Men or women nurses may be employed, but should be selected with special reference to their attitude toward the patients which facilitates cure. The patients should be kept as constantly occupied as possible, and the occupations (indoors) should be of useful character, such as basket making, tailoring, shoemaking, typewriting and carpentry. Agriculture is the best outdoor occupation. Occupations are to be considered as an essential part of the treatment; in addition to their moral benefit, they aid in restoring facility to parts that have been paralyzed or the seat of contractures. Physiotherapy should be instituted with the same end in view. Setting up exercises are to be carried out by an experienced noncommissioned officer, and ladders, steps, bars, walking floors, etc., are to be arranged to overcome the effects of any local disabilities.

The principle behind all the procedures of physiotherapy should be that the patient is made to do them for himself as quickly as possible. He should be put on his own initiative, and overseen rather than watched. Massage, electricity and hydrotherapy have little part in the treatment. Massage has a place in case of atrophy, but as a general practice it is opposed to the main principle, which is that the patient is to prove to himself that he can do the things which he thought he could not do. Massage is opposed to that principle.

The classification of cases, to be made in the receiving ward, is extremely important. Neurasthenics and psychasthenics should be separated from the patients

with local hysterical symptoms, as the methods for these two classes is different. Also, at the time of reception, an effort should be made to ascertain the general morale of the patient. Many show evidences of ill nature and resentment and come to the hospital with their minds made up that they will not be cured. Such are usually easy of identification, most betraying their intentions by malicious glances of the eye. If allowed to associate freely with well intentioned patients they are apt to corrupt the general morale of the ward.

As far as the treatment of the cases of actual concussion which have developed into neurosis, and the neurasthenic and psychasthenic cases are concerned, there is little new to be said. The treatment is that of the psychoneuroses in general with special reference to the military situation. Among the symptoms common to this class are insomnia, war dreams, vomiting, pains in the head and precordial pains. Stammering is often found in this class, and is reported as difficult to deal with. Cases with hysterical manifestations, such as aphonia, coarse tremors, paralysis and contractures require quite a different management. Such patients are to be given to understand, on reaching the hospital, if possible before reaching the hospital, that they have come there to be *cured*, and that they certainly will be cured at one sitting. This is the great practical demonstration of the war in psychotherapy, that hysterical conditions can be cured almost instantaneously, when proper arrangements have been made, even if the condition has lasted for years. The idea of a cure, of a crisis, seems to be the crux of the matter. It does away with the hospital idea of "care and treatment," and fixes a definite moment when the crippling effects of illness will disappear as quickly as though they had been cut away with a knife. The more completely the preparations are carried out to make the idea forceful, the more certain will the effects be.

There must be some air of magic about the performance. Examinations at this point are better brief, and if the diagnosis has already been established, would better be omitted altogether. Often the patients have already been examined too much. Elaborate history taking is also superfluous, as an intimate knowledge of the patient's case is not necessary before the cure, and is better obtained during conversations while the cure is being effected. The cure itself is effected by means of suggestion and persuasion, various methods being employed with equal success by different operators.

In all, with the exception of *torpillage*, the patient is put at his ease, assured that he will suffer no pain, made to relax, and in some way or other made to move the part that is paralyzed or contracted, made to speak, to hear, to cease tremors. Most operators avail themselves of a mild faradic battery to emphasize their suggestions; others use no artificial means at all. The time required for the cure varies from a few minutes to a few hours to all day and night. The principle is that once the physician has shut himself up with the patient he shall not leave him until the object is achieved.

PREPARATORY SUPERVISION AND AFTER-TREATMENT

Quite as essential as the cure itself is the period that precedes it and the period that follows it.

The first, the period of preparation, should be utilized to prepare the patient's mind for a favorable reception of the suggestions that are to cure him. With this end in view he is not treated immediately on arrival at the hospital, but is made to wait several days during which nurses, attendants and patients who have been cured tell him of the certainty of cure and its painlessness. In the treatment room of the Salins hospital there is a large pile of canes, crutches and orthopedic apparatus that have been discarded by cured patients, a pile well calculated to strengthen the faith of the doubting.

The period after the cure is devoted to careful supervision of the patient to the end that he keeps doing the things which a short time before he thought himself unable to do. A sharp lookout should be kept for relapses, and relapses should be dealt with with promptness and firmness. Military drills should be begun as quickly as possible, but the most satisfactory arrangement for a postgraduate course is a special training camp under the command of a line officer. Under present regulations a patient discharged from a hospital goes to a replacement depot without having been tried out under service conditions. But neurotics are too uncertain equations to be passed on without having first proved themselves. Unless fortified by an actual trial of the capacities of the patient, the decisions of classifying boards are apt to be erroneous.

Some explanation must be given as to the significance of cures and relapses. Cure means the disappearance of the symptoms that were created by suggestion and made to disappear by psychotherapy. Cure removes what was produced by a situation without any particular attempt to determine the mechanism of the production. It is quick and pragmatic and adapted to be applied to large numbers, as opposed to being time-consuming and analytic and individualistic. Those who favor the analytic school of mental medicine will doubtless deny, and with some reason, that the disappearance of one or more hysterical symptoms is proof of the cure of the patient. But to this may be answered that the cure of the patient begins with the removal of the obstacle that immediately prevented him from performing his duties. If, on such a removal, he is able to resume duties that tend to build up character quite as much as the explanations furnished by psychanalysis, he may be said to be practically cured.

The fact is that many patients treated in this way are able to carry on again. Roussy of Salins sends a goodly proportion of his patients back to the line in spite of the fact that most of them have been crippled for months or years. He is aided greatly by the training camp and also by the authority given him of recommending a change of service when he considers such a change necessary. For example, he often returns infantrymen to the artillery.

Relapses consist in a return of the symptoms in a patient once cured. The tendency to them is common, especially when the patient is removed from the care of the medical officer who effected the cure. Patients relapsing should be returned as soon as possible to the place of the original treatment, to the same medical officer, and as relapses are indicative of a bad morale on the part of the patient, of an unwillingness to profit by what he has learned, strict and if necessary disciplinary measures should be used.

New and Nonofficial Remedies

THE FOLLOWING ADDITIONAL ARTICLES HAVE BEEN ACCEPTED AS CONFORMING TO THE RULES OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR ADMISSION TO NEW AND NONOFFICIAL REMEDIES. A COPY OF THE RULES ON WHICH THE COUNCIL BASES ITS ACTION WILL BE SENT ON APPLICATION. W. A. PUCKNER, SECRETARY.

BENZYL BENZOATE.—Benzylis Benzoas.— $C_6H_5COO.C_6H_5CH_2$.—The benzyl alcohol ester of benzoic acid. It contains not less than 95 per cent. benzyl benzoate.

Actions and Uses.—Benzyl benzoate lowers the tone of unstriated muscle, and has been suggested as a remedy against renal, biliary, uterine, and intestinal colic and other spasms of smooth muscle, including angiospasm. Its clinical use is still in the experimental stage.

Dosage.—0.3 to 0.5 Cc. (5 to 7 minims).

Benzyl benzoate is a colorless oily liquid above about 20 C. It is odorless, or has a faint aromatic odor, and a sharp burning taste. It is insoluble in water or glycerin but miscible in all proportions with alcohol, chloroform and ether.

Benzyl benzoate boils at 340 to 350 C. with partial decomposition. When ignited it burns with a very smoky flame.

Specific gravity 1.09 to 1.13 at 15 C., 1.083 to 1.122 at 25 C.

Benzyl benzoate is neutral to litmus. It is readily saponified by alcoholic solution of potassium hydroxide. The solution obtained when neutralized yields a flesh-colored precipitate with ferric chloride solution, and upon acidulation a white crystalline precipitate of benzoic acid separates. This precipitate may be identified by extracting with ether and applying the usual tests for benzoic acid.

Ten Cc. benzyl benzoate should leave no weighable residue upon evaporation and heating until all carbon is burned away. To about 2 Gm. benzyl benzoate, accurately weighed, add 25 Cc. half-normal alcoholic potassium hydroxide solution and heat the mixture to incipient boiling under a reflux condenser for one hour. To the cooled solution add phenolphthalein and titrate the excess potassium hydroxide with half-normal hydrochloric acid. The volume of half-normal potassium hydroxide used should indicate not less than 95 per cent. benzyl benzoate (each Gm. benzyl benzoate requires for saponification not less than 8.9 Cc. or more than 9.4 Cc. half-normal alcoholic potassium hydroxide solution).

Benzyl Benzoate-H. W. and D.—A non-proprietary brand of benzyl benzoate complying with the tests and standards for benzyl benzoate.

Manufactured by Hynson, Westcott and Dunning, Baltimore, Md.

Solution of Benzyl Benzoate, Miscible-H. W. and D.—A solution of 20 Gm. benzyl benzoate in 78 Gm. ethyl alcohol to which is added 2 Gm. of powdered castile soap as an emulsifying agent.

Actions and Uses.—Same as benzyl benzoate.

Dosage.—1.5 to 2 Cc. (20 to 30 minims).

BARBITAL.—Diethyl-barbituric Acid.—Acidum Diaethyl-Barbituricum.—Diethyl Malonyl Urea.—Malo-Urea.—2,4,6-trioxy-5-diethyl pyrimidin, $CO(NH-CO)_2C(C_2H_5)_2$. First introduced as veronal.

Actions, Uses, Dosage, Physical and Chemical Properties.—See New and Nonofficial Remedies, 1918, p. 95.

Diethylbarbituric Acid-Merck.—A brand of barbitol complying with the N. N. R. standards.

Merck & Co., New York, distributors.

Diethylbarbituric Acid-Merck Tablets, 5 grains.—Each tablet contains diethylbarbituric acid-Merck, 5 grains.

BARBITAL SODIUM.—Sodium Diethyl-Barbiturate.—Sodii Diaethylbarbituras.— $Na(C_8H_{11}O_3N_2)$.—The monosodium salt of barbitol (diethyl-barbituric acid).

Actions, Uses, Dosage, Physical and Chemical Properties.—See New and Nonofficial Remedies, 1918, p. 96.

Sodium Diethylbarbituric Acid-Merck.—A brand of barbitol sodium complying with the N. N. R. standards.

Merck & Co., New York, distributors.

Sodium Diethylbarbituric Acid-Merck Tablets, 5 grains.—Each tablet contains sodium diethylbarbituric acid-Merck, 5 grains.

Fat Embolism as Factor in Traumatic Shock.—According to an abstract in the *Nederlandsch Tijdschrift*, H. Siegmund has reported that he found evidences of fat embolism in the lungs at necropsy after wounds with much shattering of bone or injury to soft parts. When there had been phenomena of shock, the fat embolism was the most pronounced and extensive, amply sufficient to explain the fatal outcome. In the prolonged cases the fat embolism involved the brain or was general.