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Recent Researches regarding Tetanus.—The experimental results reported by Ransom and Meyer in the Proc. Royal Soc., July 8th, 1903, affords some explanation of local tetanus and the period of incubation as well as a theory of the action of tetanus toxin and a definition of the sphere within which the serum treatment of the disease is effectual. The authors, on the basis of the following experimental proofs, claim to show that the toxin of tetanus only reaches the central nervous system by way of the motor nerves: (1) toxin was found in the motor nerve after subcutaneous injection in a hind leg; (2) the spinal centres can be protected if the toxin be prevented from passing along the motor nerve by the injection of antitoxin into the substance of the nerve; (3) if a lethal dose of tetanus toxin be injected into the sciatic nerve of a cat, the first symptom is a local tetanus of the muscles of the injected limb. Then follows a progressive passage of the disease from the hinder to the fore parts of the animal which, under certain conditions, can be prevented by the section of the spinal cord; (4) a dose of toxin, which, if given hypodermically, causes no symptoms, is often sufficient to cause death if injected into a motor nerve; (5) even when the blood contains much antitoxin, it is possible to produce tetanus by injecting toxin into a motor nerve which, if given subcutaneously or intravenously, would give rise to no symptoms.

As regards the incubation period, the authors consider this to be but an expression of the time occupied in the passage of the toxin from the periphery to the susceptible centres along the motor nerves. When toxin was injected into the substance of the spinal cord, the authors observed a primary sensory disturbance which remained strictly localised, even when muscular rigidity and the exaggeration of reflexes was becoming general. This symptom of extreme hyperesthesia of some part of the periphery corresponding to the spinal centre into which the injection of toxin had been made, never occurs if the injection be made hypodermically or intravenously, nor after administration into a nerve trunk. To this condition of over-irritability of the pain-reflex apparatus they give the name tetanus dolorosus; they further find that it results absolutely when the toxin is injected direct into a posterior root, a fact they interpret as indicating that the spinal ganglion forms an insuperable obstacle to the transport of the toxin, or, in other words, the pain apparatus in the spinal cord is so insulated from the motor that an intoxication of the one group cannot pass over to the other.

The actual movement of toxin in the nervous system takes place in the protoplasm of the nerves and not by the lymphatics. The theory of tetanus intoxication is to the effect that the toxin is taken up from the point of injection by the motor nerves; passing along these, it reaches the first motor centres in the cord and excites there an irritability, so that the discharges, which in the normal only give rise to mere muscular tone, become abnormally strong. The excess toxin is next carried in the fibres
of the cord to the motor apparatus of the corresponding limb of the other side. Later, and if enough toxin has been given, the nearest connected sensory apparatus of the reflex arc in the cord is attacked, resulting in general exaggerated reflexes. The authors found that when tetanus toxin was introduced direct into a motor nerve, antitoxin, though in excess in the blood, was unable to prevent the outbreak of the disease or hinder a fatal issue. They infer from this that, even in highly immunised animals, the nerve tissues remain free from antitoxin. If this is so as regards the value of serum treatment in tetanus, any toxin which may be in the nerve substance, though perhaps not in the cord, cannot be reached and neutralised by antitoxin, whether given intravenously or hypodermically. An attack corresponding to the quantity of toxin absorbed by the nerves is certain to follow and run its course in spite of antitoxin. On the other hand, any toxin in the blood and lymph will be neutralised by an injection of antitoxin, the absorption of fresh toxin from the point of infection hindered, and by this means an otherwise fatal result prevented.

R. H. Firth.

The Estimation of Boric Acid in Milk.—In the British Food Journal, 1902, iv., 210, Cassal and Gerrans suggest a colorimetric method, based upon the formation of a magenta-red colour, which the authors find is produced when solutions containing boric acid are evaporated to dryness after the addition of turmeric and oxalic acid. For the estimation of boric acid in milk, from 15 to 20 grammes of the latter are rendered alkaline with barium hydroxide and evaporated to dryness in a platinum basin on a bath at a temperature of 100° C. The residue is cleaned, acidified with hydrochloric acid and extracted with hot water, the extracts being filtered into a 100 c.c. flask. The filter paper and contents are made alkaline with barium hydroxide, ignited and extracted with acidified water. The total extract is then made up to 100 c.c.; 10 c.c. of this solution are mixed with 10 to 15 grammes of clean sand in a porcelain basin; the mixture is made alkaline with barium hydroxide and evaporated on a bath. The dry residue is rendered just acid with hydrochloric acid, 2 c.c. of a saturated oxalic acid solution and 2 c.c. of alcoholic turmeric solution (1 gramme to a litre) are added, and the mixture again evaporated. During the evaporation the basin is covered with a funnel, the stem of which is connected with a set of potash bulbs containing barium hydroxide solution, a current of air being aspirated through the apparatus until the mass in the basin is dry. The colouring matter formed is then extracted with successive quantities of alcohol and filtered. The solution in the potash bulbs is separately evaporated, after neutralisation, with oxalic acid and turmeric solutions, the further yield of colour being dissolved in alcohol and added to the main quantity. This is then compared in a tube or vertical glass with the colour obtained from a known weight of boric acid.

R. H. Firth.

The Bacillus of Soft Chancre.—In the Journal of Medical Research, June, 1903, is an elaborate paper by Davis, giving the results of certain experiments which suggest the specific nature of the bacillus discovered by Ducrey in 1889, and by him claimed as the cause of chancroid or soft sore. The bacillus is about 1.5 microns long and 0.5 micron broad, has rounded deep-staining ends with a fainter-staining central portion. These
bacilli occur both singly and in masses, and occasionally in chains; they are to be found in the pus of ulcers and in the chancroidal buboes, while in the chancroidal tissues the micro-organism stains evenly, taking boric dyes well, but decolourising with alcohol and by Gram. These bacilli have been observed in no form of ulceration other than soft chancre. Since Ducrey first described this bacillus, it has been the subject of study by Leught, Nicolle, Griffon, Besançon, and Le Sourd, who succeeded in producing, by inoculation with a pure culture, the disease in monkeys. The author gives a series of forty cases of genital ulceration, clinically resembling chancroid, in thirty-two of which he found a bacillus similar to that described by Ducrey. Only one case of these showed a mixed infection, and in that syphilis developed later. From the analysis of his cases, Davis concludes that the organism is present in the pus of the ulcers in the vast majority of cases of chancroid, and not infrequently in that of the buboes. He says that it may be identified by its morphology and staining reactions, together with its inability to grow on ordinary culture media. Characteristic growth in a pure state is best obtained in a medium of fresh blood and bouillon. Inoculation in monkeys reproduces the lesion from which the original organism can be recovered. The author details certain cases from which he obtained the same micro-organism in pure culture from extra-genital sites, notably the hands. Clinically, these lesions were chancroids, and he lays stress on the importance of bacteriological examination of ulcers of this type as being likely to establish a greater prevalence of extra-genital chancroid than is generally suspected.

R. H. Firth.

Desertion and Absence without Leave.—That this subject possesses considerable interest for German Army Surgeons is shown by the length of an address delivered by Chief Surg. Dr. E. Stier, of Berlin, and reported in the D. Militärarzt Zeitschrift, April, 1904. After alluding to the erroneous belief that the majority of deserters are actuated by a desire to escape from irksome duties, and adopt a preconceived plan, Stier refers to the distinction in the German Military regulations between desertion and absence without leave. The intention of the man has to be discovered and taken into account.

He next considers the motives which are not so obvious as might be supposed. A large proportion of deserters return voluntarily; they know that their absence will be discovered, and yet in many cases the offence, though always punished, is committed twice or thrice, or even more often. The course of action is decided by sentiment, and not altogether by ideas. In the fortress-prison at Cologne, during more than a year, several hundred deserters were questioned as to their motives. Stier believes that in the majority of cases the true motives were discovered. The results of his investigations may be thus summarised. The first and most numerous category includes those actuated by a longing for some distant object; this comprises a smaller group, in which the desire is of a sexual character. In such cases the consequences for the soldier are often slight; after two or three days' experience the man returns to duty, but the offence is liable to be repeated, and the punishment is then severe. The number of deserters from this cause is particularly large in spring and early summer. Home sickness is another cause of desertion, and often
acts in combination with the one just mentioned. These deserters, wearing their uniform, rush home as fast as they can go. After a few days they usually return to barracks. Another offence, viz., overstaying leave, has often a similar causation.

The question as to the part played in these cases by mental disorders is not easily answered. In France the tendency is to regard nostalgia as a symptom of disease; but such is not the case in Germany. In the current instructions for French Military Surgeons persistent nostalgia is mentioned as a disease. During recent years there has been a decided diminution in the number of cases. Where really morbid nostalgia exists, it is almost always associated with melancholia, hypochondriasis, or other forms of mental disease. Another category, somewhat sharply marked off from those already mentioned, comprises men who have no distinct object in deserting. Actuated by indefinite impulse, but without any plan, they run away, and eventually reach their old homes. Such cases form a most interesting group; some of them have been connected with well-known morbid conditions, but there is still a remainder upon whom attention has been concentrated, because of their military and legal importance. Charcot and Duponchel attempted to assign a definite name to this condition. Donath called it "Epileptic Poromiomania"; Ernst Schultze (1903) has suggested "Krankhafter Wandertrieb" (morbid impulse to wander). In cases belonging neither to epilepsy nor to hysteria, conditions occur in which a person, without consciousness of any motive, without any plan or object, withdraws himself (it may be) from very pleasant surroundings. The action is due to some purely external inducement, the insignificance of which is often inversely proportionate to the number of repetitions of the offence. The attacks are distinguished from epilepsy by the absence of any real mental confusion; the shortness of the absenteeism and the good behaviour in the intervals, suffice to show that the delinquents are not ordinary vagabonds. Stier thinks that it would be a mistake to describe such attacks as "Epileptic." Among several hundred prisoners under sentence for desertion, he met with only one case in which epilepsy was the cause, and with two cases attributable to "morbid impulse to wander." The terms "epilepsy" and "epileptic" must not be too freely applied, or confounded with weak-mindedness. Among 22 deserters pronounced by the Austrian Health Committee unaccountable, because they had committed their offence while in a peculiar "epileptoid" condition, no fewer than 20 showed signs of defective intelligence.

It is difficult to estimate the part played by hysteria in causing desertion. There is, however, another symptom, viz., nocturnal incontinence of urine, often met with among deserters, and hitherto insufficiently appreciated. The majority of deserters described as "epileptic" or "epileptoid" suffer from this ailment. Among 31 cases of nocturnal incontinence in the Cologne prison 14 were deserters. The sense of shame caused by the complaint, and the jeering of comrades, may account for desertion, more or less obviously devoid of any plan.

Another and a more numerous category includes men whose feeblemindedness accounts for their desertion. They are unequal to the requirements, mental and bodily, of military service; they are objects of derision to their comrades, and serious obstacles to the proper training of the companies to which they belong. Such men become irritable and
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despondent; the reasons they usually allege for desertion are almost always the same; “military service does not suit me,” is the almost invariable answer. They are often illegitimate and the progeny of diseased parents, and, perhaps, brought up in workhouses. They are useless for military service, and soon commit offences for which they are sent to prison, where their mental condition often goes from bad to worse. In the Cologne fortress-prison last year, of the prisoners discharged owing to mental disorder, more than one-half consisted of men belonging to the class just described.

Strolling players and hawkers are very undesirable additions to the Army. They rarely acquire clear notions of discipline and order, of duty and serious work. Accustomed to wander about the country, they soon try to return to their former life.

The last category comprises men led astray by masterful comrades and drunkards, whether habitual or occasional. Cases of the latter kind are only too common, and require no special notice. Most of such deserters return to barracks, but some escape across the border.

Stier gives the following statistics of deserters and absentees without leave, classified according to their motives: 25 per cent. are actuated by sexual desire; 20 per cent. by nostalgia; 2 per cent. by some indefinite impulse (epilepsy, hysteria, morbid impulse to wander); 15 per cent. are intellectually or morally deficient; and 35 per cent. are drunkards. In the remaining 3 per cent. are found cases of decided mental disorder, and a few others that can scarcely be classified.

Stier gives an interesting account of the life and subsequent history of such deserters as are not brought back by their friends, or voluntarily return to their duty. Having no papers, they soon fall into the hands of the authorities. A few old and experienced vagabonds, provided with forged documents, wander about Germany until some new crime restores them to military jurisdiction. If they succeed in crossing the border, they get on best in Sweden and Norway, where they can do as they like. The next most convenient places are Denmark, Holland, Austria and Italy, whence they are almost always extradited. In Belgium, if found destitute, they are escorted to the border, where they are certain to fall into the hands of the German police. A still worse fate awaits them in France and Switzerland. In the former they are almost invariably caught up by recruiting officers for the Foreign Legion. By dint of persuasion, often having been well plied with liquor, they sign an agreement binding them to serve for five years. They atone for their previous behaviour by their experiences in the dreary garrisons of Saida and Belabes in the wastes of the Sahara, or fall victims to the terrible climate of Tonkin or Madagascar. Should they live and return to Germany, they find many old friends and acquaintances in the Cologne prison, where about 20 per cent. of the deserters confess to a similar experience. Weak-minded men are seldom admitted into the Foreign Legion; they wander from one country to another, perhaps begging in the streets, finding temporary work in circuses, markets and similar places. A few find their way into foreign armies; Stier met with men who had served in the Dutch Indies, in the Brazilian and Chilian Marine. Two others had taken part, as carriers, in geographical expeditions; one in Africa, the other in Brazil.

In the concluding paragraphs of his article Stier alludes to the two main questions which the military surgeon has to consider with regard to
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...deserter, these are: (1) their fitness for further service, and their accountability. The case of a deserter actuated by sexual impulse or by homesickness presents no special difficulty. Cases of "wandering impulse" are often very puzzling, unless epileptic or true hysterical attacks have been previously noticed. It appears that even in the largest garrisons in Prussia there are no arrangements for keeping insane men under observation, but in order to determine their condition they must be sent to lunatic asylums. Cases of alcoholism usually come before the authorities on account of other crimes, e.g., violent assaults.

The Army Surgeon has a very difficult task when weak-minded men, the subjects of mental degeneration, come before him. Nowhere is the border-line between health and disease so indistinct as in these cases, for in some there is mere stupidity, or youthful folly, and in others, decided imbecility or moral insanity. The question is where to draw the line marking off those fit for military service, and the line for legal accountability. A general answer may be easily given. The bounds for fitness for service should be very narrow; but those for accountability as wide as possible.

In view of recent events in the German Army, it is interesting to note that, in Stier's opinion, the obstinacy and incapacity to learn, often shown by recruits, are the causes of almost all the maltreatment which officers are provoked to inflict. It is a common delusion to imagine that thoroughly stupid and obstinate men can be educated and improved by strict discipline. At the same time to prevent such men from entering the Army, is to give a premium to depravity and degeneracy, but the Army as a whole is benefited by their exclusion. "It should not be forgotten," says Simon, at the end of his excellent but too little known work, "that the ideal purpose of a standing Army is to convert our best men into a strong and reliable bulwark for our fatherland, and not to serve as a reformatory for poorly endowed, morally degenerate youths." Among the "signs of degeneration," the most frequent and important, from a military point of view, are nocturnal incontinence of urine, stammering, and left-handedness.

In conclusion, Stier discusses the position of the Army Surgeon, who has to decide whether a man who has committed an offence is or is not to be held accountable for his actions. He reiterates his opinion that the bounds of accountability should be stretched as far as possible. By sending such men to prison, a warning is given to other soldiers; and prolonged detention protects the better class of men from evil company and bad influences.

T. P. Smith.

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1 Ein Beitrag zur Kenntniss der Militarpsychosen, 1899.