work comes the anaesthetist is of more importance than the anaesthetic. Though open ether is my anaesthetic for choice, most of my colleagues had had the training in the giving of chloroform. To all of them I wish to express my thanks for help in many a long day's work. The use of nitrous oxide gas for short and painful dressings proved a great boon. Local anaesthetics and spinal anaesthetics were made use of in selected cases, but neither method is suitable when the staff is small and many cases waiting.

REFERENCE.

¹ *The Elements of Bandaging and the Treatment of Fractures and Dislocations.* London: H. Frowde, and Hodder and Stoughton. 1913.

ULCERO-MEMBRANOUS STOMATITIS AND GINGIVITIS AMONG TROOPS ON ACTIVE SERVICE.*

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DURING the last few months my attention has been drawn to a freely communicable disease, which, while of a minor nature in so far as it rarely has a fatal issue, is nevertheless of serious import in that it very materially lowers the health and effectiveness of those attacked. I have found it widely prevalent among our troops, more particularly among men returned from the front. Without going into full details, I would here call attention to the symptomatology of the condition, its apparent causation, and what, in my hands, has proved a simple and rapid method of cure. I may state that these observations are based upon the study of more than 100 cases.

Symptoms.

Considerable attention has been given for some years past to pyorrhoea alveolaris, a condition in which small pockets of pus form between the tooth and the gum, so that pressure upon the gum just below where this abuts upon the tooth leads to the discharge of a drop of pus. American observers have shown that this condition is frequently associated with the presence in the pus infiltrating the tissues at the base of the pus pocket of amoebae, somewhat resembling those found in amoebic dysentery, and, like those organisms, acted on specifically by emetine, as demonstrated by Bass. Frequently pyorrhoea alveolaris can be cured by the exhibition of this drug; but not all cases of so-called pyorrhoea alveolaris show themselves equally affected by this treatment.

An examination of cases coming both from the front and from troops in the Shorncliffe area shows that in cases of this condition, both those presenting the amoebae and others in which they could not be found, the most striking feature revealed upon the examination of the smears made from the pus is the presence of what are known as Vincent's organisms in large, not to say preponderating, numbers.

Further study has shown that these same organisms are present in what appear to be excessive numbers in a spreading affection of the gums and the tonsils, which cannot be included under the term "pyorrhoea." Thus, upon the gums (particularly around the last molars), the tongue, mucous surface of the cheeks, and the tonsils (which are most frequently affected), ulcers are to be found. The ulcers tend to spread laterally, save in the tonsils, where they burrow deeply into the tissues. They are covered by a white, friable membrane easily removed, and then leaving a bleeding surface beneath. This membrane is different from that found in diphtheria, which is tough and easily comes away intact. The lesions may suggest syphilis, and indeed Vincent's angina† may be superimposed upon a syphilitic infection of the mouth and throat; but in uncomplicated cases of the condition the Wassermann reaction has always been found negative.

The condition of the mouth in advanced cases strongly suggests scurvy. The gums bleed easily, are injected, retracted from the teeth, and spongy-looking. The teeth

are apt to become loose, and are often tender when tapped by a metallic instrument. In many cases they have become so tender that none but the softest of food can be masticated, and for weeks the men are unable to take the ordinary rations; as a consequence they become seriously run down. The breath becomes extremely fetid, and the patients complain of a foul taste.

There is always more or less glandular enlargement, the submaxillary and sublingual glands being most often affected. Although several authorities speak of a rise of temperature to 105° or higher, in the cases thus far examined from the British troops the temperature has varied between the normal and 102° F. at the highest. Accompanying this constitutional disturbance is lassitude and lack of "go." The most serious constitutional symptom, and one always present when the teeth and gums are affected, is severe depression.

What may be regarded as the acute malignant form of this disease is seen in noma, in which the necrotic tissue shows a dense massing of these organisms of Vincent.

We thus have the following conditions found associated with the presence of masses of the organisms in question:

1. Some (complicated) cases of pyorrhoea alveolaris.
2. Membranous stomatitis and tonsillitis.
3. Noma.

The term "Vincent's angina," in England at least, is generally understood to refer to a particular form of tonsillitis. Ulcero-membranous stomatitis appears thus to be the more satisfactory designation, unless we speak of "Vincent's disease."

The condition is clearly communicable. In our series of cases several were traced to a dentist who had treated a severe gingivitis for pyorrhoea, and the same day also the mouths of three other men; all three had contracted the disease, and were shown by stained smears to be infected with Vincent's organisms. In another case, while the disease had been unknown in two successive battalions that had occupied certain quarters in France, a third battalion using these quarters exhibited no less than 50 cases of the condition. The close association of troops either in camp or in the trenches, and using the same utensils, appears to favour the spread of the condition.

Vincent's Organisms, *Bacillus fusiformis*, and *Spirochaetes*.

If in these cases, by means of a sterile swab, a small portion of membrane or exudate is removed from the mouth and rubbed up in a little warm 0.85 per cent. saline solution on a slide, an examination with a dark-ground illuminator shows in all instances the presence both of spirochaetes and of characteristic fusiform bacilli. Both forms are motile; the fusiform bacillus passes backwards and forwards with a tumbling motion, and not steadily as is the case with the flagellate bacilli, such as *B. typhosus* and *B. coli*. If smears be made and stained, the clearest picture of these organisms is given by Giemsa's stain. Successful results are obtained with plain methylene blue or Loeffler's solution, which show the fusiform bacillus and the spirochaetes distinctly. The bacilli are not stained evenly, but are usually barred, with an occasional granule deeply stained situated anywhere in the organism. The bacillary forms are from 12 to 15 μ long, and vary in width from 1 to 5 μ . The spirochaetes are very slender and delicate organisms. The number of convolutions varies from 5 to 12, the usual number is 9. No membrane can be seen. In stained smears these spirochaetes have no definite relation to the fusiform bacilli present in the same specimen; they are found sometimes in large bundles, sometimes singly.

This Vincent's spirochaete can usually be distinguished from *Spirochaeta dentium*, which has commonly no more than five convolutions, and from the *Treponema pallidum* of syphilis, which has between five and twenty-five, and also stains faintly and with difficulty. *Spirochaeta refringens* (a form not uncommon in the mouth) is much coarser and has broad sections.

The organism has been cultivated by Tunncliffe, who states that she was able to obtain distinct transition from the bacillary to the spirochaetal form. We have obtained cultures by taking some of the exudate upon a sterile swab and rubbing this up with hydrocele or ascitic fluid, and inoculating the emulsion into a deep tube of peptone broth,

* The fuller paper, of which this is an abstract, will appear in the *Proceedings of the Royal Society of Medicine, Medical Section*.

† So called after Vincent, the French bacteriologist, who clearly laid down (in 1898 and 1905) the relation between these organisms and ulcero-membranous tonsillitis and stomatitis.

into which has been dropped a small piece of sterile kidney or liver from a rabbit. The tube is closed by a sterile rubber stopper which has passing through it a capillary tube. The tube is filled quite full of the medium, and on pushing in the stopper this rises into the capillary, which is immediately sealed off, thus affording a strictly anaërobic culture medium. At 37° C. the growth appears in a few days as a faint cloud above the sterile tissue in the tube. Usually this affords a great preponderance of fusiform bacilli; a very foul odour is given off from the medium, closely resembling that exhaled from the mouths of those affected. Starch-ascitic fluid cultures, prepared according to Rosenow's method of deep tubes, are also successful. In fact any ordinary culture medium containing serum or ascitic fluid will afford growths of the organisms under anaërobic conditions.

Thus far inoculations into the lower animals have been wholly unsuccessful in reproducing the disease, and so not only is the question of the identity of the two organisms still undecided, but also, as Koch's postulates have not been fulfilled, we lack the crucial demonstration that these organisms are the essential cause of the conditions here described. This much, however, is to be noted—that they are present locally in enormous number in all the conditions here described, and that with the disappearance of these organisms the conditions undergo healing. This last fact alone may be taken as adequate proof that if they are not the only, they certainly are an essential factor in the causation of these states.

Treatment.

In pyorrhoea alveolaris, where the amoeba is demonstrable, local treatment with emetine, as already noted, frequently brings about cure, but emetine is of no value in the more widespread conditions of ulcero-membranous stomatitis and gingivitis and Vincent's angina. For these conditions many forms of treatment have been recommended. Trichloro-acetic acid, carbolic acid, silver nitrate, iodine, and hydrogen peroxide have all been used with some success. As a spirochaete is present, arsenic in some form, from its well-known effect upon spirochaetes, would appear to be the ideal application. Of all arsenical compounds salvarsan is the least toxic, and, as a matter of fact, salvarsan has a marked effect upon the condition, even if used merely as a mouth wash, and would thus seem to be indicated. Its use among troops, however, is prohibited, both from its cost and on account of the instability of its solutions. This close association between pyorrhoea, with its amoebae, and ulcero-membranous stomatitis, suggested a combination of ipecacuanha or its alkaloid and Fowler's solution. These are compatible, and the following treatment has been found to have remarkably rapid and favourable results.

Vinum ipecacuanhae ...	...	...	3 ss
Glycerinum ...	...	...	5 j
Liquor arsenicalis ...	...	...	ad 3 j

M.; fiat mist. Sig.: To be used as a mouth wash; do not swallow. Label "Poison."

Where the gums only are affected the solution can be carefully applied to the gums and pockets around the teeth, after cleansing away the pus. A small applicator should be used. Where there is ulceration elsewhere in the mouth or throat, the ulcer should be thoroughly wiped out twice every day with the above solution. All patients, whether or not the gums be infected, are instructed to drop ten or fifteen drops of the mixture on to a tooth-brush twice a day and to brush the teeth and gums vigorously.

Employing this treatment the condition clears up with remarkable rapidity. Even in advanced cases, in my experience, the alteration in the state of the mouth is obvious in three days. The ulcers are seen to be healing; the foul odour of the breath disappears; the teeth cease to be tender. The general depression clears up, and within a week patients who before treatment could not masticate solid food, can eat such food without discomfort and with enjoyment. Swabs from the affected areas now no longer yield the fusiform bacilli and spirochaetes.

The diagnosis and treatment are both so simple and the results obtained thus far so satisfactory that I can confidently direct the attention of medical officers in charge of troops to the existence of this condition and to this

means of bringing about cure. I shall be grateful if they will give me information of each case under the following heads:

(1) Name. (2) Unit. (3) Regimental number. (4) Date (approximate) of onset of disease. (5) Date when first examined. (6) Location of trouble. (7) Symptoms, local and constitutional. (8) Results of treatment.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

TRENCH FOOT AT HOME.

"POOR MAN'S GOUT" and "podagra" are complaints the conditions of which might be reconsidered beside those of trench foot. Here is a man with a swollen and a painful foot who has had abundant colchicum in the last three weeks, with little or no advantage. His past inebriety he admits, and he has had rheumatic affections before. A scrutiny of his leg, however, reveals the cicatrix of an injury of forty years ago, when the leg was broken, and it is legitimate to infer that nervous and circulatory functions in the limb are still obnoxious to that old injury. What recent happenings have been brought to bear? The patient has the explanation: He had been working on concrete and in cold and wet; the men had asked for big boots to protect themselves, but none were provided. In the case of this patient his sound leg had withstood the exposure; his weaker leg and foot had suffered; hence the pain, the oedema, and the other symptoms, which we call gout.

Those who look narrowly into the ways of the workman will be able to find an excuse, here and there, for his alcoholic habits. Hugh Millar has said that his fellow masons washed down the dust of their trade with deep draughts of ale. The miner, who turns to drink when he has left the shaft, wants something to counter the mephitic effect of carbon monoxide; and in many another case the inebriety of the labourer may plead the unmitigated rigours of his toil. My particular desire at the moment is not an exacter pathology of gout, but a sympathetic interest in any of its determinants in industrial life. Wellington boots, indeed, and rubber boots in the trenches; and for those who are working at home a proper equipment, too. The tools of the workman have from of old been put beyond the clutches of the creditor (Deut. xxiv, 6), but a greater loss to the workman is the power to use them; and so far as arthritis, in any form, is an industrial disease, its prevention is required.

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THE CONTROL OF "DIPHTHERIA BACILLUS CARRYING."

RECENT papers in the BRITISH MEDICAL JOURNAL on diphtheria carriers prompts me to describe a simple method of ridding a carrier of the diphtheria bacillus.

I employed it in an outbreak of diphtheria which occurred recently at a military hospital in the Malta command. Eight carriers were discovered bacteriologically by Mr. Mitchell (sanitary officer of the hospital) and Captain Crofton (bacteriological specialist). The throats and noses were cleaned with gargles and douches of potassium permanganate. As the carriers did not seem to decrease, further measures were adopted.

In Peking I meet a good many cases of acute follicular tonsillitis, and, as the Chinese demand quick cures, I have been accustomed to paint the tonsils with 50 per cent. silver nitrate, whilst I have painted several of my colleagues' throats with 90 per cent. silver nitrate. One application of the latter and two of the former suffice to cure the tonsillitis clinically. I adopted this method in the diphtheria carriers. The pharynx, tonsils, and posterior nares were cocaineized with 20 per cent. cocaine hydrochloride, using a forehead mirror, and these parts were then painted with 50 per cent. silver nitrate. The nostrils were plugged with gauze, soaked in 1 in 10 ichthyol in glycerine, the latter being the dressing I have found useful in ozaena, which is not uncommon in China, and as a dressing after submucous resection of the septum, done in the presence of ethmoidal suppuration. Swabs were