touched with a magic wand. Before the lad left the hospital he had secured splendid movement. He could write with a Chinese pen and manipulate his chopsticks with celerity.

It is unnecessary to record similar cases or describe the many cases of tuberculous abscesses, ulcerated glands, skin ulcers, etc., which have all entirely healed under this treatment.

Our experience, after over six months' trial, is that, although iodine liniment acts well upon ulcers and sinuses of a mixed infection, the results are not quite so rapid or satisfactory as is its action upon tuberculous disease.

Our *modus operandi* is as follows: We operate or scrape as usual. Then we thoroughly swab the cavity with iodine liniment (B.P.). A piece of cotton-wool twisted around the end of a probe forms a good swab, and can be graduated according to the size of the sinus. The liniment is applied *every day*. The application does not cause pain, except a momentary sensation, when applied to some surfaces; neither does it destroy tissues, as does pure carbolic acid. Granulations do not become excessive. At the first application we insert a thin piece of gauze or pack lightly, but never at subsequent dressings. Gauze plugs and strips for drainage have undoubtedly been responsible for many chronic sinuses. From the first we give a mixture internally containing syrup. ferri iodi, 1 drachm, and potassium iodide, 5 grains, thrice a day.

In the case of large phagedaenic ulcers, which form so large a part of our clinics in China, we first of all either scrape or foment, so as to get access to the base of the ulcer. Then the iodine liniment is applied daily. One of the worst cases of this character that we have been called upon recently to treat involved the entire dorsum of the man's foot and toes, exposing the tendons and bones. It was scraped, and iodine liniment used from the first. To-day it has almost completely healed, and without any signs of the usual extensive granulations.

We happened to mention this method of treatment at a medical meeting, since when I have received several letters from those who have tried it. They all report satisfactory results, so I make no apology for publishing it.

So far, we have failed to discover any reference to this special form of treatment in any available medical literature. Perhaps it has been and is still being used by our more enlightened compeers; but to those who are prepared to persevere with this particular form of treatment we can wish them no higher joy or greater satisfaction than up to the present has been our reward.

THE CONTROL OF INFECTIOUS DISEASES IN AND OUT OF THE SCHOOLS.

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ONE of the most important results of the medical inspection of elementary schools will be probably the more effective control of infectious diseases in a community.

The control of epidemics by public health authorities has been developed on systematic lines until it has reached a high degree of efficiency, but inasmuch as the supervision of the schools has been partial only, it has been possible for an epidemic to gather force before it was dealt with seriously. Not infrequently it is found that over 70 per cent. of cases in an epidemic occur in children who have been attending elementary schools, and this fact makes it most desirable that the school in which the first few cases occurred should be put under as complete supervision as possible.

The spread of diphtheria in schools affords a good example of this. A child sickening for the disease may, whilst still attending the school, infect many of its classmates. Pencils are still used indiscriminately by different children in the same class, and the pencil used one day by a diphtheritic child is put into the common box, and the chances are all in favour of its being used by another child on the following day. Children, especially younger children, are continually putting their pencils into their mouths, and a more favourable condition for the spread of diphtheria cannot be imagined in practice. Whilst investigating the rapid spread of diphtheria in one class of a

school, I watched the children for a few minutes. In that short space of time many of the scholars put their pencils into their mouths. I collected all the pencils of the class, made stroke cultures in a few tubes, and the borough bacteriologist reported the presence of the Klebs-Loeffler bacillus in the growth. One diphtheritic child who put a pencil in its mouth would be a potent factor in the spread of the disease among its classmates, and a more powerful stimulus is always given to this spread by the presence in a class, firstly of unrecognized cases of diphtheria ("sore throats"), and secondly of children in whose throats also exists the *Bacillus diphtheriae* (Klebs-Loeffler), and who are sickening for the disease, and able to communicate it to others. In the class mentioned, I took swabs from seven throats, and found the Klebs-Loeffler bacillus in two of the children who were still in the class.

Whatever be the origin of the first case—milk or drains—there is no doubt that the elementary schools play a most important part in the spread of diphtheria, first on account of the overcrowding and bad ventilation which still obtain to a greater or lesser extent in the elementary schools, and secondly on account of the use in common by the children of school materials. Of these, pencils are the most used, but in infants' classes plasticine is also handled in common by the scholars. This modelling material, excellent as it is for kindergarten work, and loved by the children as a substitute for clay, must be regarded as dangerous whenever a case of diphtheria has occurred in a class.

Measures taken to check the spread of infection may be classified as taken: (1) In the school; and (2) outside the school.

In the school itself, it is, of course, necessary to consider the possibility of drain defects as being the first cause of an outbreak, after which attention is given to those conditions whereby the infection is spread from one child to another.

The use in common by the children of school material should be controlled, also the use of drinking cups. The danger from pencils may be done away with by the provision of a small metal pencil box for each child. The box, bearing a small label for the child's name, can be obtained at a cost of one penny, and the children take a pride in seeing that they have their own pencils. When diphtheria has occurred in a class, the use of common materials should be stopped or controlled in a similar way.

The overcrowding in schools, always favourable to the spread of infection, will only gradually be done away with, but the new requirement by the Board of Education of a 9 ft. and 10 ft. basis for infants and older children respectively is a step in the right direction; the gradual replacement of the long desks by dual or even single desks, apart from their advantages in the way of back-support and comfort, and lessening of eye-strain, will aid to some extent the diminution of infection, as also will the routine disinfection of schools.

Not the least important matter to deal with in the schools is the presence in a class of children who have the *B. diphtheriae* in their throats, who are sickening for the disease or are suffering from it in a mild form ("sore throats"), and who are possible sources of infection to other children. And herein the aid of medical inspection to the public health should be at its greatest value.

When a case of diphtheria occurs in an elementary school child the school medical officer visits the class and examines the children's throats. The use of wooden spatulas, one for each child, the spatulas being destroyed after use, is necessary. All cases of sore throats are excluded from the class, swabs being taken at the time. In this way would be removed those children in whom there was diphtheria in a mild and unrecognized form.

By the term "*Bacillus diphtheriae*" is meant the true Klebs-Loeffler bacillus, possessing the accepted cultural and morphological characteristics. The variation in virulence of this true diphtheria bacillus is recognized; but even when the virulence is very low, provided the morphological type and such characteristics as the polar staining with Neisser's method are retained, it is regarded as the true bacillus of diphtheria (Klebs-Loeffler). As such, its presence is a reason for regarding a throat as a means of infection to others. The pseudo-diphtheria bacilli may or may not be convertible into the

true bacillus; the evidence is at present all in favour of this view, but the fact is not proven; and in the practical efforts to check the spread of the disease no more can be done than to obtain some control over those children in whose noses and throats are found the true diphtheria bacilli. This at least is possible in practice, and, inasmuch as such control is based upon facts proven and knowledge certain, it is both desirable and justifiable.

So widespread are the pseudo-diphtheria bacilli so frequently found in the "normal" throat that the control of each child harbouring the Hoffman bacillus in nose or throat is not within the range of practical administration. Even if it were proved beyond doubt that the Hoffman bacillus may become the true type bacillus—and this is possible at any time—it would be necessary still to show that the change occurred frequently or rapidly. If it were so proved, it is to be hoped that some indication and warning will be found more useful and more sure than the vague "lowering of resistance" so often referred to.

This outline has been confined to the methods of control in the school. The sanitation and drainage are found to be perfect, the school premises have been efficiently disinfected, sources of infection such as pencils and other common-use materials have been controlled, cases of suspicious throats have been excluded, and thus a fairly complete check is put on the infection in the school.

But what about the further control of these "sore-throat" children who have been excluded from school? They still remain possible sources of infection outside the school, and it is here that the Public Health and the Medical Inspection services should meet; there should be no gap through which these cases might escape, and, free from control, continue the infection.

The "sore-throat" cases, of which many may be mild diphtheria, recover and return to school, still harbouring the bacilli in their throats and noses. When a child is certified to be suffering from diphtheria and is taken to the sanitary hospital, it is not allowed to leave the hospital until two negative swabs have been taken from the nose and throat. The London County Council has an excellent regulation that *during the prevalence of diphtheria* in a district, no children excluded from school on account of diphtheria or *sore throat* may return to school until they have obtained a medical certificate, based on a *bacteriological examination*, that they are free from diphtheria.

The phrase "*during the prevalence of diphtheria in a district*" gives the key to the situation. A sore throat occurring in a child may or may not be a serious matter, but a sore throat in a child who is in a district where diphtheria is prevalent, and who has been in contact with diphtheria cases, must be regarded seriously. The child is a "contact" case, and it is a most desirable thing that cases of "sore throat" excluded from school should be followed up. Where the medical inspection branch is administered from the Public Health Department this can be done by a health visitor, part of whose duties would consist in visiting and obtaining information concerning these excluded cases. Such a health visitor would be a trained nurse, having experience of fever hospital work, and possessing the Royal Sanitary Institute's certificate for health visitors; and it is a matter of great importance that she should be possessed of such tact and patience as would enable her to carry on her work quietly and unobtrusively and yet thoroughly. A child who had been excluded from school on account of a "sore throat" with the coincident circumstance of being a "contact" case, might or might not have diphtheria. The health visitor, on her visit to the home, explains things to the parents, advising them to consult a doctor, and a form is given to them for the doctor. The following form would be suitable:

Date

To the Medical Attendant.

Dear Sir,

I have examined, a scholar at the School, and have excluded (him) (her) on account of a condition of Sore Throat.

At the time of exclusion, a throat swab was taken, which on Bacteriological examination gave a {positive} result for the Klebs-Loeffer bacillus. {negative}

Yours faithfully,

.....
School Medical Officer.

The medical man whom the parent consulted could then

take charge of the case, and, if it was diphtheria, would notify in the ordinary way. By these means these excluded "sore throats," diphtheria or not, would come under medical supervision, they would not be free to continue the spread of the disease.

The methods described for diphtheria would be applicable in a modified form to the cases of scarlet fever, and also, to a slighter extent, to the non-notifiable diseases. There is no doubt that scarlet fever is spread to a great degree in schools by the very slight and unrecognized cases, which are sometimes not noticed at all, and often noticed only when the child begins to peel. The rapid examination of a class in which scarlet fever had occurred would enable the school medical officer to exclude promptly these unrecognized cases. Teachers can be educated to recognize suspicious cases. Sore throats, and even a rash in the case of scarlet fever, weeping eyes and nasal catarrh at the onset of measles, are signs which should enable an intelligent teacher to exclude the child.

The teachers are often able to give information to the medical officer concerning children away from school on account of the non-notifiable infectious diseases. Accurate information concerning the spread of the non-notifiable diseases is difficult to obtain, but a fair indication can be obtained by the system whereby the school attendance officers send a form to the school medical officer. When an attendance officer visiting the home of an absentee finds that the child is suffering from measles, whooping-cough, varicella, or other non-notifiable infectious disease, he fills in a form and posts it to the medical officer. The form is on a card which can be used in a card index system. The disadvantage of this system is that the information may come a few days after the child has fallen ill, but it at least gives information concerning the spread of the non-notifiable diseases; and it can be supplemented by a card sent by the teacher on the occurrence of the *first* case of each disease occurring in the school. This would be early information, and information concerning the first case of an infectious disease occurring in a school is often of great value to the school medical officer in his efforts to check the spread of infection in the schools.

It is probable that as the system of school medical inspection becomes fully developed, the closure of schools on account of epidemics will become less frequent. The leading public health authorities agree that closure of elementary schools is of doubtful value in checking the spread of measles, except in country districts where the school is the one and only meeting place of children. In town, the children meet and mingle in many places and on many occasions. Usually schools are closed only after a large proportion of children have developed measles, and this fact may contribute to the non-success of the measure, but there is one method of closure for measles, recommended by the Local Government Board, which is of particular value in safeguarding the children under 5 years of age. The attendance of these children at school is not compulsory, but large numbers of them are sent to school, and under certain economic conditions, when they cannot be looked after and cared for properly at home, it would be an advantage for these children to attend school if the school premises were efficiently ventilated and the general conditions were good, and the young children were allowed to sleep in comfortable positions when they wanted to. Any one who has visited a babies' class in the afternoon will have seen many of the children sleeping with their heads on their desks. The report made to the Board of Education recently by its special committee recommended that for children 3 to 5 years old school nurseries should be provided, isolated from the main building in order to reduce the risk of infection.

But under present conditions something can be done to protect these younger children, to bring them to the age of 5 or 6 without contracting measles—a desirable end, for the measles mortality among children under 5 years old is very great. If early information is obtained concerning the *first* case of measles in an infants' school, the school can be closed from the ninth to the fifteenth day with good effect. The first measles child may have infected others in the school, but those children who have caught measles will not be infectious until about the ninth or tenth day. As the school is closed on the ninth day these children will not spread the disease in the school; also,

all the children who have caught measles from the first case will sicken between the tenth and the fifteenth day—that is, during the time the school is closed. The advantage of the short closure of six days will be apparent to educationalists.

It is evident that full co-operation between the public health and the medical inspector's departments is necessary in order that these methods be carried out thoroughly, and such co-operation will surely lead to the strengthening of the weak points in our defence against the infectious diseases of childhood.

THE MEDICAL ASPECT OF DENTISTRY AND THE NECESSITY OF DENTAL INSTRUCTION FOR MEDICAL STUDENTS.*

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THE historical associations between medicine and dentistry date from very early times. Hippocrates, besides studying medicine, devoted some attention to dentistry. He invented forceps for the extraction of teeth, observed the necessity for the proper cleansing of the teeth, and for this purpose prescribed the following dentifrice:

A charmed rabbit's head and three charmed mice ground into a powder.

He also recognized the fact that destruction of the bone of the jaws might follow affections of the teeth—and might even end fatally. Celsus also practised dentistry, and in his *Re de Medica* he advocates filling carious teeth with pieces of slate wrapped in cotton. Galen differentiated between inflammation of the pulps of teeth and inflammation of the root membrane, and prescribed a number of tooth-powders and mouth washes. To come down to more modern times, that famous surgeon, Ambroise Paré, in the sixteenth century devoted considerable attention to the treatment of teeth, and invented a splint for holding loose teeth in position, as well as several forms of forceps. The great John Hunter did not omit the teeth in his multifarious researches, and wrote a most accurate treatise upon the *Natural History of the Human Teeth*. But here comes a hiatus. Since the time of John Hunter until quite recent times medical practitioners have taken but little interest in dental diseases, probably because dental practitioners began to spring up and the matter was left to them, but also, alas! I am afraid, because the practice of dentistry was associated for a long time with a certain element of shamefacedness, if not of quackery, and medical men passed it by on the other side. This position is now, however, no longer tenable, because it is now recognized that dental, medical, and surgical diseases are so intimately related that a proper conception and therefore treatment of one is impossible without some knowledge of the other. In order to substantiate the statement I will proceed to give definite instances of the intimate cause and relationship existing between dental and medical lesions.

Quite a lengthy list of ailments, from appendicitis to glaucoma, have been ascribed to the direct or indirect influence of the teeth, but I shall confine myself to those which have been well established, and in which I can to some extent speak from personal experience. These may be classified as being due to:

- (1) Reflex irritation;
- (2) Direct extension of morbid process; or
- (3) Septic absorption.

LESIONS DUE TO REFLEX IRRITATION.

Epilepsy.—Attacks of this disease are undoubtedly set up by peripheral irritation, not the least of which is dental caries; many cases have been reported, and one case is recorded in which the patient always developed an attack of *petit mal* when visiting his dentist. I have had one definite case in which the patient, a little girl, did not

show any marked improvement despite excellent medical treatment until her teeth were treated. The attacks then subsided. Some twelve months afterwards a recurrence of dental pain in another tooth was followed by a further attack of epilepsy, and this did not recur after the tooth was filled. Hysteria has also been said to be due to dental irritation, but I am more inclined to think that odontalgia is more usually a symptom of hysteria.

Neuralgia.—Neuralgia of the fifth nerve and tic douloureux are too often associated with dental troubles to need any verification. Brachial neuralgia may be due to irritation arising from the teeth. I have myself seen three such cases. In all three the pain was confined to the region of the circumflex and cutaneous branch of the musculospiral nerves. It was associated with exposed pulps in lower premolars, twice on the right side and once on the left; in each case pain started in the tooth, and then leaving the tooth became as it were transferred to the shoulder and arm, and only yielded to the devitalization of the affected dental pulps. In one case the pain ceased within half an hour of treatment, despite the fact that the patient had been unable to sleep all night on account of the pain in the shoulder. A considerable number of cases have been recorded of facial paralysis due to dental lesions; this in many cases is undoubtedly due to the close association between the fifth and seventh nerve through Meckel's, the otic, and submaxillary ganglia.

"Spurious" Tetanus.—Many cases of this condition, which is quite common, were formerly supposed to be due to the teeth. It is now known as trismus, and in some cases may be due to irritation of the branch of the fifth nerve supplying the masseter, but is more frequently due to a local cellulitis about the angle of the mandible caused by the suppuration at the apex of a lower third molar.

Cardiac Irregularity.—Sir R. Douglas Powell¹ records a case of "excessive" cardiac irregularity and spasmodic heart pains "which a course of Naubheim baths and resistance exercises only slightly relieved," but was completely cured by attention to the teeth, which were "extensively decayed and surrounded by tartar."

Pelvic Pain, etc.—Instances of leucorrhoea and uterine pain synchronizing with dental pain and ceasing on the removal of the tooth have been recorded. Conversely, dental pain is often associated with uterine disturbance; several such cases have come under my notice, one quite recently, in which the severe dental pain occurred every month at the menstrual period in quite healthy teeth (second upper molars), and was not relieved by any dental treatment, not even by extraction, but was "transferred" to the first molars.

Ear Disorders.—Affections of the ear are frequently associated with dental irritation. Neuralgia of the ear is very frequently merely referred pain from a carious tooth; many of us must have had subjective experience of this, especially if we have had the misfortune to bite suddenly upon an exposed pulp. Hilton, in *Rest and Pain*, mentions a case of persistent purulent discharge from one ear which only yielded to treatment after removal of a carious molar, and he suggests that "the reflex irritation had led to interference with nutritive function of the nerves supplying the external meatus."

Eye Disorders.—This interference with the neurotrophic function is undoubtedly present in many obstinate cases of conjunctivitis; I have seen several such cases. Many cases of spasm and paresis of the ocular muscles have been recorded as being due to dental irritation.

Local Cellulitis.—Among diseases due to direct extension of the morbid condition of the teeth may be mentioned cellulitis of the face and neck, of which I have seen two fatal cases, one in a man aged 40, another in a woman aged 35, both arising from lower third molars. In another similar case the patient barely escaped with his life owing to the exceedingly high temperature, septic absorption, and inability to take sufficient nourishment on account of the severe trismus present. I remember Mr. Levason, with whom I was associated for some years, treating a case in which an abscess arising from a mandibular molar had tracked down beneath the cervical fascia, and was eventually opened in the axilla. Empyema of the antrum occurring through dental infection is too well known to need any verification. The *Streptothrix actinomycetes* occasionally finds a way into the jawbone through

* Read at the Otago Section, New Zealand Branch, of the British Medical Association. For many references in this paper I am indebted to Messrs. Smale and Colver's excellent work on *Diseases and Injuries of the Teeth*, chapter xix of which I would suggest might be published as a separate pamphlet for the use of medical students.