the Select Committee on the Dental Companies Bill already alluded to. The General Medical Council had introduced a Bill the provisions of which certainly did not err on the side of over-stringency. They acted under advice in framing the Bill in a form thought likely to pass, though they would have gladly made it stronger. The British Dental Association was very much dissatisfied with the Bill as inadequate, and expressed its dissatisfaction with fully as much warmth as discretion. Yet the Bill was too strong for the Committee, which thought fit to make a recommendation which weakened it still more, and in the direction of leniency to the unqualified. The British Dental Association drew a series of conclusions from the facts which seem hardly justified. They reproached the General Medical Council with having introduced a Bill so drafted that it constituted a betrayal of the interests of the dental section of the profession which it was their duty to safeguard. But it might be urged with equal force that the issue showed that the Council were wise in not attempting a stronger measure, seeing that the Select Committee recommended that even as it stood it should be qualified in the sense of weakening it further; and this was in the House of Lords, where we might have expected a larger view to have prevailed.

A difficulty which we have to encounter is the tendency, even in quarters where it might least be expected, to believe in and run after various forms of quackery. This, of course, is no new thing. The brilliant Earl of Rochester, temporarily banished from the Court of Charles II on account of some escapade, amused himself by setting up in disguise as a quack doctor on Tower Hill, and issued a manifesto so specious and attractive that it might be the model on which quack announcements have ever since been framed. At all events, such was his success that several ladies of the Court went to consult him.

That this tendency has survived to our own days seems in great part, at all events, due to the defects of our secondary education. So long as the making of a false quantity in a classical quotation is regarded as a greater mark of want of culture than the most profound ignorance of the rudiments of the science of everyday matters, little else is to be expected. I remember hearing a member of the House of Commons, since translated to the Upper House, actually say that he attached little importance to the political views of another much more distinguished member, because the latter was well known as an author on scientific subjects. Is it, then, to be wondered at that Christian Science and the like find a field in our midst?

It, therefore, may be some time—maybe not until the elements of science have become an indispensable part of a liberal education—that the medical profession and its work will take their proper place in the opinion of the lay public and of Parliament. Till then we must try to educate public opinion so that it may see eye to eye with us, and may discover what to us seems obvious, that the interests of the public are identical with the interests of the medical profession. And until it is seen that the interest of the public is to have at its command a highly competent class of practitioners, and that it is not the way to secure this to allow indiscriminate incursions of the unqualified into the field of practice, we shall still meet with hostility, on the baseless ground that measures of medical reform are class measures, and as such to be viewed with jealousy, and that they smack of trade-unionism.

Almost unaided by the Legislature, we have for years been setting our house in order. We have improved medical education; we have increased the stringency of qualifying examinations; we have given to the public a medical practitioner of far higher average attainments than at any previous period, and both preventive and curative medicine now render service to the public such as only a few years ago was not even thought of. And, whilst alluding to examinations, it is very probable that if some one portal entrance to the medical profession could be established—a State examination, in fact—it would be easier to command the attention of the State to our requirements for further advance.

We may fairly say that medicine has deserved well of the State; is it too much to expect a more liberal recognition of its claims by the State?

THE LIMITED VALUE OF DIPHTHERIA ANTITOXIN AS A PROPHYLACTIC.

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THE employment of antitoxin as a prophylactic in diphtheria has met with a very favourable reception in modern medicine, if one is to judge by the accounts from time to time appearing in medical literature. Though it cannot be denied that a certain prophylactic value has been established, there has possibly been a tendency to go to the extreme in estimating the benefits and in pushing the application of this remedy. In view of these facts, it may not be out of place to give the details of an epidemic where its application was anything but a success, and to point out the strict limitations to the usefulness of this procedure.

Those who would be interested to review the special literature of this subject will find a good summary of work done experimentally and practically in an article by Jump.¹ He quotes 6 instances in which prophylactic injections of serum were extensively applied in outbreaks occurring in institutions and elsewhere. Nothnagel² also gives a lengthy list of such records—15 in all. Other accounts are given by Ibrahim,³ Wesener,³ Cobbett,⁴ and Norton.⁵ These accounts represent a total of many thousand prophylactic injections of serum. A few of them are certainly very encouraging, but in the majority the inferences drawn are not as convincing as one could wish. They are all unsatisfactory in one particular, that they represent the results obtained by immunizing those who were only "exposed to infection." It is impossible to say how many or how few actually were or became infected with the specific bacillus. Further, it must be borne in mind that in nearly every instance some cases developed an attack in spite of the antitoxin administered.

I will now briefly give the details and contrast the methods used in two outbreaks of diphtheria at Nottingham during 1906.

In the first, beside bacteriological swabbing and isolation of persons found infected, prophylactic injections of antitoxin were used. In the second, bacteriological swabbing and isolation were the only methods employed. In both there was complete arrest of the epidemic.

The first outbreak occurred at the General Hospital. Eight cases having occurred in quick succession, most of them being members of the staff, it was resolved to deal with the trouble in a radical manner by wholesale bacteriological examination of throats and prophylactic injections of serum. The latter step was first proceeded with, and 500 units of unconcentrated serum recently obtained from a well-known wholesale house were given to each person—136 in all. As the result of swabbings repeated on at least three occasions, 21 of these—all young adults—were found harbouring the Klebs-Loeffler bacillus, but with no obvious throat affection. They were all promptly removed either to an isolation home or the isolation hospital. Of these, 7 developed the disease, in spite of the antitoxin, within the three weeks following its injection; the number of days intervening being two, five, five, twelve, fourteen, eighteen, and eighteen in the respective cases. The disease was moderately severe in one, but the others had developed only a small amount of membrane when discovered, one having nothing but redness and soreness of the throat. As they were promptly injected with antitoxin, the disease was not allowed to progress further. There was some doubt about the above-mentioned severe case, which remained unconfirmed bacteriologically after several test swabbings, although a large amount of quite typical membrane was present. In this particular case 1,000 units had been given eighteen days before the membrane appeared. As a result of these radical measures no other cases that could be attributed to the former infection occurred throughout the hospital.

The second outbreak occurred amongst the school children at Dunkirk, an isolated corner of the borough, where cases had been occurring from time to time, some of them being fatal. The throats of 2,000 children were examined, including 400 at Dunkirk School, which was the centre of infection. The latter were all tested by swabbing. The 1,600 other children belonged to two neighbouring schools, and while all were rapidly examined, only 200 were swabbed, these being selected according to the greater possibility of infection and the appearance of the throat. Altogether 20 children were found to harbour the bacillus, 13 of these attending Dunkirk School. The scholars were dismissed after examination, and the schools remained closed for a month. The "carriers" were removed to the isolation hospital, all but 8 who elected to return home. Notwithstanding this fact, only 1 more case occurred at Dunkirk, and 3 amongst the schools so arbitrarily

examined, in the next three weeks. After this time the whole district was free from diphtheria for nine weeks. If we are to ascribe this sudden cessation of the epidemic to the measures employed, it must be set down to the prompt weeding out and isolation of infected children. Although 8 "carriers" remained in the district, this fact seems to have been amply compensated for by the closure of the schools—in itself, as is well known, a powerful means of combating an epidemic. It will be interesting to follow up the behaviour of those "carriers" received into hospital. From 8 of these antitoxin was withheld and only 1 developed an attack, which, however, promptly yielded to antitoxin. To these 8 I might add a list of other such cases received from time to time into hospital with specifically infected but apparently healthy throats, making a total of 30. From all of these antitoxin was withheld, and only 3 developed an attack of diphtheria.

The facts of these two outbreaks do not by any means afford sufficient material to establish the truth of the arguments advanced, but they will serve to give point to the following remarks, and certainly demand some satisfactory explanation. At any rate, they provide something definite by which to judge the value of prophylactic injections of antitoxin. For 7 developed an attack, in spite of the serum, out of 21 whose throats were *certainly known* to be infected with the bacillus. In referring above to the voluminous literature on the subject, it was found to be seriously lacking in information as to the definite amount of infection in the cases mentioned. In estimating the true value of such instances there are many errors to be avoided. In the incidental introduction of serum injections amongst the other methods in dealing with an epidemic, we must be careful that the success achieved is not wrongfully wrested to the demonstration of the benefits of antitoxin. Had serum injections been administered to the whole 2,000 children in and around Dunkirk at the time the swabbing was carried out, one can readily imagine how easily the sudden cessation of the epidemic might have been attributed to it. Again, epidemics are sometimes large, sometimes small, and are susceptible of natural recovery, just as with a disease. In spite of the isolation of "carriers" and closure of schools, I am inclined to think that the Dunkirk epidemic was spent and already dying when swabbing was commenced. The General Hospital outbreak, on the other hand, was caught in the nascent stage. This will probably explain why a larger percentage of "carriers" developed the disease in the latter outbreak; for there is little doubt that many so-called "carriers" are those who have had a mild attack of diphtheria which has passed undetected, and these are comparatively numerous at the end of an epidemic, especially amongst children. I found four children at Dunkirk with definite remnants of diphtherial membrane who had attended school throughout without complaint. Again, it is necessary to understand that a large part of the population are apparently immune from attack with ordinary exposure to infection. In a year of epidemic prevalence at Nottingham, only 10 per cent. of cases represented more than one member of each household affected. Furthermore, it has been shown what a large proportion of persons may carry the bacillus in their throats without developing the disease. Bearing all these facts in mind, the alleged beneficial results of immunization by antitoxin in a given instance will be seriously discounted if we have nothing more to go upon than the bald statement that the persons in question had been merely "exposed to infection."

Since antitoxin is rapidly excreted in the urine, there is a limit to the duration of the immunity conferred. At first this was placed at four weeks; now three weeks is the period more generally set down, and this should doubtless be further reduced. Jump and Herringham⁶ both believe that the dose should be repeated after twenty-one days, should exposure to infection continue. The dose is given by the former as 250 units for a child and 500 units for an adult; the latter recommends from 300 to 500 units. Increasing the dose would probably not increase to any extent the duration of immunity. Larger doses, as far as experimental evidence goes, would seem to disappear just as quickly from the blood. One of the cases mentioned above probably developed the disease eighteen days after 1,000 units. This rapid disappearance of antitoxin from the blood has been shown by Ransom⁷ to depend largely upon the species of animal from which it is prepared. Where the species is the same, the immunity lasts much longer—perhaps as long as when "actively"

produced. This suggests that serum prepared from monkeys would be most effective for the immunization of man. A discussion of this subject opens the question of the different degree of reaction to serum injections in different individuals. Again, the varying amounts of immunity of different individuals must have some bearing on the question, along with the observations of Wasserman⁸ and Orłowsky,⁹ who found considerable quantities of diphtheria antitoxin in the blood of 50 per cent. of children and 83 per cent. of adults examined without special selection. Whatever bearing these facts may have upon the results of practical immunization, there is certainly some explanation needed for the number of cases that occur, not only at the end of the three or four weeks' period, but at such intermediate times as five and ten days, in spite of the antitoxin. There was no doubt whatever that the two cases occurring at the five-day period in the General Hospital outbreak were genuine attacks. Again, since just as many cases seem to occur within the twenty-one days' period as beyond it, it is difficult to see why this should be the limit chosen. A fortnight would certainly have been safer in the outbreak above referred to. This uncertainty as to the success of the procedure and the inconveniently short duration of immunity when successfully conferred seriously discount its usefulness, apart from the other considerations that follow below.

As regards the practical application of prophylactic injections of antitoxin in dealing with outbreaks of diphtheria, it is clearly not employed as a measure for stamping out the epidemic, but as a secondary aid in guarding against the consequence of attack. In fact, it has been pointed out that there is rather a danger of increasing the epidemic infection where injections of serum are the only means employed. For where the attack is suppressed the infection passes unnoticed, and the "carrier" continues to spread the disease amongst the general population, whereas otherwise he would have been carefully isolated. It has been generally agreed that the injection of antitoxin has no influence in hastening the disappearance of the specific bacillus from the throat either after an attack or otherwise. Though perhaps infection may be more likely to ensue from a membranous throat than a healthy "carrier," yet the alternative danger is certainly one that should be carefully avoided.

The procedures, then, of real importance in dealing with an outbreak of diphtheria are two in number, namely (1) bacteriological examination of throats, and (2) isolation of "carriers" of infection under proper medical supervision. Where both of these measures can be systematically carried out, as is possible in most large towns, there is really no necessity for prophylactic injections of antitoxin, the latter procedure being in this case naturally confined to the few whose throats are found to contain the specific bacillus. Even in these "carriers" there is no need to go to the expense and trouble where there is proper medical supervision, that is to say, a daily inspection of throats; for, in the first place, it has been pointed out that nearly all records will show a few cases where membrane developed in spite of antitoxin, the general hospital "carriers" showing a third of such exceptions. Thus the conscientious medical man feels he is in no way relieved from the duty of careful inspection of throats. In the second place, we have such an efficient remedy in antitoxin that there is practically no danger to the patient if the remedy is administered when the disease first declares itself; this view has also been put forward by Variot.¹⁰

What may be called fulminating cases of diphtheria are occasionally met with, in which it is possible for the disease to get a good hold in twenty-four hours. Here there must be a great virulence of the bacillus or a great susceptibility of the patient. But one can hardly imagine such cases arising in "carriers," in whose throats the bacillus has already been known to have resided for several days without visible effect.

Where, then, the methods of bacteriological swabbing and proper isolation can be applied, prophylactic injections of serum may be dispensed with. In exceptional circumstances, as when one or both of the above methods are not available, it may be resorted to, for example, in a small outbreak, as a means of mitigating the danger of attack, and of lasting it out by injections repeated every two

or three weeks. It has been urged, and probably with truth, that if an attack develops in spite of antitoxin, the symptoms are milder. Again, where there is a small circle of infection and there is no guarantee of constant medical supervision, as in a poor family, the giving of serum is a justifiable precaution. It must be understood that the writer is discussing the question from the practical rather than the ideal side. Of course, whatever remedy presents any likelihood of doing good should be, ideally speaking, applied. But practically speaking, in dealing with an outbreak, it generally comes to a question of trusting to one measure and one alone, and in such a case it should clearly be understood that prophylactic injection of serum should not be the one to be chosen. Again, the swabbing of a family or of a day school generally means considerably less trouble than prophylactic injections of antitoxin with proper antiseptic precautions. Of course the conditions where serum injections are least of all warranted are where it is proposed to apply them in a wholesale manner to many hundreds who have been no more than exposed in an ordinary way to the likelihood of infection. Here the trouble and expense are generally too great and the results too meagre to justify the procedure.

Beside the trouble and expense of serum injections, it is well not to forget the annoyance and occasional danger associated with their use. This matter is really of some importance where adults are concerned. Healthy adults seem particularly susceptible to the "serum disease," and it will be prudent always to give due weight to this practical consideration. One can readily imagine the inward misgivings of the uninitiated practitioner who beholds the harried and questioning countenance of his patient, a busy City man, after a whole day of misery and two sleepless, irritating nights—all for a mere suspicion of infection. He will doubtless resolve speedily and irrevocably that in future he will prefer to take risks of another kind. The degree of liability to this trouble varies greatly in different individuals, and runs to some extent in families. Repeated doses of calcium chloride¹ are recommended as a prophylactic against this prophylactic as regards its irritating effects; but this very much complicates the matter, especially if we wish to deal with large numbers. I have been particularly unfortunate with the nursing staff, who have been injected on several occasions after tracheotomy operations. On each occasion at least one was temporarily incapacitated for duty, and that just when an extra nurse was urgently required. Apart from this, the risk in such cases under constant medical supervision is practically non-existent and the procedure unwarranted. Fatal results following administration of serum are, indeed, so rare as to be almost negligible, although in Allbutt's *System of Medicine*² five possible cases are collected, and another case³ is quoted from abroad where a lawsuit was instituted in connexion with the sudden death of a healthy child occurring a quarter of an hour after the prophylactic injection. But more often very dangerous symptoms have been produced by the repetition of the serum injection, owing to the greatly increased susceptibility to the foreign serum thus induced. Goodall⁴ and Rolleston⁵ mention such instances. On the whole, the question of the use of serum prophylaxis depends to a great extent upon the age. We must distinguish between, first, those of tender age, under 4 years, and, secondly, the older children and adults. In the first class the use of prophylactic antitoxin is relatively more important from the fact that on such the action of the toxin is more severe, and the diagnosis of an attack is a more difficult matter, with greater risk if there is laryngeal development.

For permission to publish hospital records and other official matter I am indebted to the kindness of Dr. Philip Boobyer, Medical Officer of Health and Superintendent of Isolation Hospitals, Nottingham.

REFERENCES.

- ¹ Jump, *Phila. Med. Journ.*, p. 69, 1902. ² Nothnagel's *Encyclopaedia of Practical Medicine*, Diphtheria, 1902. ³ *Lancet*, p. 1285, vol. i, 1906. ⁴ Cobbett, *Journ. of Hygiene*, p. 228, vol. i, 1901. ⁵ Norton, *Lancet*, p. 85, vol. ii, 1907. ⁶ Allbutt's *System of Medicine*, Diphtheria, vol. i, 1906. ⁷ Ransom, *Journ. of Path. and Bact.*, p. 180, 1900. ⁸ Wasserman, quoted by Orlovsky, loc. cit. ⁹ Orlovsky, *Deut. med. Woch.*, S. 400, 1895. ¹⁰ Variot, quoted by Jump, loc. cit. ¹¹ Wright, *Clinical Journal*, p. 72, May 16th, 1906. ¹² *Lancet*, p. 1739, vol. ii, 1905. ¹³ Goodall, Report of the Committee on the Antitoxin of Diphtheria, 1898. ¹⁴ Rolleston, *Practitioner*, p. 794, vol. ii, 1904.

TWO CASES OF HEREDITARY DYSTROPHY.

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THE following cases of dystrophy of the muscles of the shoulder girdle in father and son present some points of interest:

The father, a Punjabi Mussulman, aged 45, states that he first noticed weakness in the shoulders some twenty years ago, that is, when he was 25 years old. His father, he states, was quite strong and healthy. He could not attribute the weakness to any cause, and says that he had no fever at the time. The condition has progressed steadily ever since, unaccompanied by any symptoms whatsoever, except the increasing loss of power in both shoulders and the gradual shrinking of the muscles in the neighbourhood. He had a well-marked "swaggering" gait, the shoulders being thrown back and the abdomen

Fig. 1.

Fig. 2.

protruded. Looking at him from the front, the shoulders and upper part of the chest seemed to be nothing but skin and bones. We had no battery with which to test the muscles, but, so far as we could judge, the following were almost, if not quite, atrophied—sterno-mastoids, pectorales major and minor, and deltoids.

The view from behind was very striking (Fig. 1); the vertebral borders of the scapulae were directed straight backwards, and resembled sprouting wings. The muscles between the scapulae and the vertebral column were so wasted that the ribs protruded. The muscles atrophied in this region were: On each side, trapezius, supraspinatus and infraspinatus, serratus magnus, both rhomboids, the latissimus dorsi, and the muscles of the spinal column. The atrophy of the muscles on the left side appeared less complete than that on the right. There was no atrophy of the muscles of the upper arms, forearms, or hands, and the muscles of the lower extremities seemed quite normal, nor did the patient complain of any weakness in the legs.

The second picture (Fig. 2), that of the man standing at ease, shows the marked lordosis and peculiar tilt of the scapula. The son of the above, aged 25, stated that two years ago he first began to notice weakness of the shoulders, which came on without any cause, and, except for a slowly progressive weakness, he has experienced no symptom of any kind. On examination, the pectorals and deltoids of both sides were seen to be quite atrophied