require treatment by such measures as Plombière's colon irrigations, or an autogenous vaccine prepared from the streptococci found in the teeth and intestine.

Prophylaxis.

The early recognition of dental sepsis and its appropriate treatment would be one of the most important factors in greatly improving the health of the nation.

REFERENCES.

- ¹ *British Journ. Exptl. Path.*, March, 1922. ² *Lancet*, July 18th, 1914.
³ *Ibid.*, October 7th, 1921.

REMARKS ON THE VALUE OF BUTYN AS A LOCAL ANAESTHETIC.*

BY

W. M. BEAUMONT,

CONSULTING OPHTHALMIC SURGEON, S.W. REGION,
MINISTRY OF PENSIONS.

For some years the experts connected with the Abbott laboratories of Chicago experimented assiduously to find a synthetic substitute for cocaine, and in 1918, with the collaboration of Professors Roger Adams and Oliver Kamm of the University of Illinois, butyn was discovered; in their opinion it fulfils all the requirements they had in view. The next step was to refer butyn to a committee of the Section of Ophthalmology of the American Medical Association under the chairmanship of Dr. Albert Bulson, jun., of Indiana, and after prolonged clinical investigation a report was published¹ early in 1922. The conclusions are summarized as follows:

1. Butyn is more powerful than cocaine, a smaller quantity being required.
2. It acts more quickly than cocaine.
3. Its action is more prolonged than that of cocaine.
4. Butyn in the quantity required is less toxic than cocaine.
5. It produces no drying effect on tissues.
6. It produces no change in the size of the pupil.
7. It has no ischaemic effect and therefore causes no shrinking of tissues.
8. It can be boiled without impairing its anaesthetic efficiency.

Unlike cocaine, it does not deteriorate quickly by keeping—an advantage to those practitioners who wish to have a supply ready in case of emergency. Still more important, it has no attractions for the drug taker.

Professor Adams in a letter tells me that his first experiments on toxicity were disappointing because he found that with mice butyn was two or three times as toxic as cocaine. But, on the other hand, its anaesthetic power was also two or three times as great as cocaine. Further experiments showed him that the comparative degree of toxicity varied with the size of the animal. For instance, with guinea-pigs the two substances are about equally toxic. In cats butyn is about 15 per cent. less toxic, and in dogs from 25 to 30 per cent. less toxic, than cocaine. In monkeys the toxicity of butyn is probably as low as 50 per cent. compared with cocaine; but these latter experiments are not yet completed. Professor Adams considers that it may be concluded that in man it is still less toxic. This view is supported by the fact that no toxic symptoms have occurred in America although butyn has been used in many cases. The low toxicity of butyn was confirmed by the committee of the Section of Ophthalmology of the American Medical Association.² In the opinion of the manufacturers butyn is probably considerably less than half as toxic as cocaine.

Tests.

Dissolve 1 gram of butyn in 10 c.cm. of water. Separate portions of the solution yield a white precipitate with potassium mercuric iodide solution; a brown precipitate with iodine solution; a brown precipitate with gold chloride solution; and a yellow precipitate with picric acid solution. A portion to which barium chloride solution is added gives a white precipitate (distinction from procaine).

Dissolve about 0.1 gram of butyn in about 5 c.cm. of water, add 2 drops of dilute hydrochloric acid and 2 drops of sodium nitrate solution (10 per cent.) and mix with a solution of 0.2 gram of betanaphthol in 10 c.cm. of sodium hydroxide solution (10 per cent.). A scarlet-red precipitate is formed (distinction from holocaine, which gives a white precipitate).

To a solution of about 0.1 gram of butyn in 5 c.cm. of water add 3 drops of diluted sulphuric acid and mix with 5 drops of potassium permanganate solution. The violet colour of the latter disappears immediately (distinction from cocaine).

Dissolve about 0.1 gram of butyn in 1 c.cm. of sulphuric acid. The solution is colourless (organic impurities).

Dissolve 0.1 gram of the salt in 10 c.cm. of water and saturate with hydrogen sulphide. No coloration or precipitation occurs (salts of heavy metals).

Incinerate about 0.5 gram of butyn accurately weighed. There is not more than 0.2 per cent. residue.³

Early in 1922 I resolved to try butyn, but the impossibility of getting it in England caused some delay, and it was necessary to send to Chicago. Unlike some German substitutes, butyn, not being a derivative of cocaine, can be freely prescribed without restriction.

In Eye Work.

In ophthalmology butyn has been extensively used in the United States. Dr. H. S. Gradle, from an experience of more than 2,000 cases, finds it superior to cocaine and holocaine in eye surgery.⁴

My own experience is confined to about 60 cases, including operations for the extraction of cataract, dissection, iridectomy, removal of foreign bodies, and skin operations on the lids by infiltration. For operative work on the eye a 2 per cent. solution is used, but for profounder anaesthesia 4 or 5 per cent. Four applications should be made at intervals of two minutes. If a bloodless field is required, a drop or two of adrenaline solution (1 in 1,000) may be instilled after the last drop of butyn. The eye is then ready for operation. For operations on the skin of the lids 10 drops or more of a 0.5 per cent. solution may be injected subcutaneously with a hypodermic needle.

For all operative work on the eye, in my experience, butyn is most satisfactory, the anaesthesia being more profound and prolonged than when cocaine is used, and there are no after-effects. I sum up my present position with regard to butyn by saying that neither in the consulting room nor in the operating theatre have I found it necessary to resort to cocaine during the last nine months.

Butyn in Ear, Nose, and Throat Work.

Some 200 operations have been done, including septum resection, tonsillectomy, adenectomy, opening accessory sinuses, etc. It can be used in a 2 per cent. solution and applied topically. It acts efficiently and is superior to a 5 per cent. solution of cocaine. For profounder anaesthesia for major operations on the throat and nose, 5 per cent. may be used, and adrenaline can be added for all intranasal operations. Dr. Bulson of Indiana reports that still stronger solutions can be used in throat operations.⁵ For intranasal work he employs a 5 per cent. solution of butyn, with epinephrin, swabbed over the operative field and beyond, if possible.

"Within two or three minutes following the first application, flattened pledgets of cotton soaked with the solution, but from which the surplus has been squeezed out, are applied over the operative field and when possible over the source of the sensory nerve supply. These pledgets are removed after the end of five to eight minutes. Five minutes later the operation may be commenced with the assurance that in practically all cases the patient will suffer no pain or even discomfort."

I can find no record of butyn having been used as a spray. Nevertheless there seems to be no contraindication.

Butyn in Dentistry.

In dentistry butyn is notably satisfactory. There are none of the after-symptoms which sometimes occur with other local anaesthetics. Ten drops or more of a 1/2 per cent. solution are injected on opposite sides of the tooth to be extracted, with or without adrenaline, and after sixty seconds the tooth is ready to be removed. I quote the following from a report issued by the Abbott laboratories.

"In March, 1921, the first (dental) extractions under butyn anaesthesia were performed by a Chicago dentist. Following about 100 such cases, quantities of butyn were sent to a considerable number of dental practitioners in all parts of the country. These men used butyn in various concentrations for all types of dental anaesthesia. As their reports began to come in it was apparent that it was producing results of a far more satisfactory nature than had at first been expected. The dentists who were co-operating with us in this research simply had to tell their friends of the unusually fine results they were getting with this new

* Read at a meeting of the Bath and Bristol Branch of the British Medical Association, November 29th, 1922.

anaesthetic, some of them actually demonstrating it at scientific meetings, and we received many inquiries from all over the country for more information. It was decided, however, not to recommend butyn for use in dentistry until we should have the evidence of many thousand cases to support the statements of its advantage reported to us by the various investigators. . . . Several hundred dentists have used butyn in probably more than 10,000 cases of dental operations. It has run the gamut of infiltration, nerve blocking, topical application, pressure anaesthesia, pulp anaesthesia, in fact, practically every use to which a dentist might put a local anaesthetic, and has come through with high honours. Now we feel justified in presenting butyn to the dental profession, strictly on its merits as evidenced by actual clinical experience."

Hitherto I have only been able to persuade one dental surgeon to give butyn a trial. His experience after three months has induced him to give up entirely the usual dental injections in favour of the new one.

Spinal Anaesthesia.

Butyn has not been used for producing anaesthesia preliminary to lumbar puncture. But as cocaine is not usually resorted to in these cases because of its toxicity, the question of butyn as a substitute does not arise; stovaine, novocain, etc., appear to be sufficiently effective for intraspinal anaesthesia. The only point to which I wish to draw attention is the displacement of cocaine by butyn in all cases in which the former is now used. If this can be done without disadvantage there seems to be no reason why cocaine should not be entirely eliminated from the pharmacopoeia.

For Genito-urinary Anaesthesia.

Butyn is recommended in cases in which the mucosa is so painful that any topical treatment seems impossible. Intra-urethral and endovesical examinations, including the introduction and use of sounds, bougies, etc., are said to be entirely painless when butyn is used. A 2 per cent. solution is usually employed; 4 c.cm. of the solution are injected with an ordinary blunt nozzle urethral syringe, allowing the solution to remain in the urethra for three minutes; it is then withdrawn, and in a few minutes the examination or clinical treatment is proceeded with. In operative work, such as internal urethrotomy, a 5 per cent. solution of butyn is preferable. It is applied for three minutes, and the operation is then painlessly conducted two minutes later. When the orifice of the urethra is so narrow as to require incision it is found that a pledget of cotton-wool soaked with a 5 per cent. solution of butyn applied for five minutes enables the operator to make the incision and suture it without infiltration anaesthesia.

Percentage Table for the Use of Butyn.

	Surface Anaesthesia.	Infiltration.	Operations.
Eye	1 per cent.	0.50-1 per cent.	2 per cent.
Dentistry	—	0.50-1 per cent. (minimum 10-20)	—
Nose and throat ...	2 per cent.	—	5 per cent.
Minor surgery ...	—	1 per cent.	—
Genito-urinary, ure- throtomy, etc. ...	2 per cent.	—	5 per cent.

Conclusion.

There is no need to emphasize the benefit which would follow the passing of cocaine, the time for which I believe has arrived. If it can be firmly established that butyn possesses the good qualities of cocaine without the bad ones it should be recognized and acted on by surgeons.

I do not advocate a hurried and ill-considered edict of outlawry against a drug which has served a useful purpose for forty or fifty years, but it seems to me that the time is ripe for the consideration of a substitute. An investigation should come from the profession voluntarily and not be forced upon us by public opinion.

In conclusion I recommend surgeons to try butyn—first because cocaine is a national danger, and secondly, because I believe that butyn is a superior local anaesthetic.

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¹Journ. Amer. Med. Assoc., February 4th, 1922, pp. 343, 345. ²Ibid., p. 344. ³Ibid., February 11th, 1922, p. 431. ⁴Illinois Med. Journ., November, 1921. ⁵Annals of Otolaryngology, Rhinology and Laryngology, March, 1922.

STANDARDS OF VISION FOR SCHOLARS AND TEACHERS IN COUNCIL SCHOOLS.*

BY

N. BISHOP HARMAN, M.A., M.B., F.R.C.S.,
OPHTHALMIC SURGEON, WEST LONDON HOSPITAL, AND BELGRAVE
HOSPITAL FOR CHILDREN.

WHEN the student sat at the feet of Gamaliel it may be supposed that defect of eyesight troubled him not at all, for he learnt by listening to and discussing the precepts of his master. And Gamaliel was probably as little troubled, for his book was one, and that so large as to be decipherable by even venerable eyes. To-day the student must read much, and for many hours for weeks on end, both in daylight and at night; the work entails no mean output of nervous energy even to good eyes, and the energy expended is progressively increased out of all proportion when the eyes are defective.

In the recent past, when similar conditions of work brought about such difficulty as to require the cessation of the student's work, the stoppage entailed no more than a rearrangement of a projected career. To-day it may mean the surrender of a bursary or scholarship gained by hard work and much prized. The disturbance is greater, and it is the more severe, with each step which the student has gained in his career. The teacher's life is also more strenuous; short hours and sufficient holidays do not ensure against risks of strain to normal eyes, and the risks are increased with defective sight. The modern teacher's work is not begun and ended in the classroom; much of it must be done out of school hours. Preparation is as imperative for the conscientious and efficient teacher as for the pupil. Moreover, schools worth the name are social communities, and in elementary schools the burden of securing and shaping this social life falls upon the teachers and not upon prefects or sixth form pupils; the energy spent in this regard by teachers is a material draft upon their resources.

Scholarships and College Training.

This paper deals solely with the State-provided educational scheme. This includes elementary schools, secondary schools, and the technical institute, training college, or university. The provision of bursaries, scholarships, and college training by the community for the purpose of advancing the scheme of education meets with universal approval. But beneficent as are these provisions, they introduce certain difficulties—it may be said that they in a sense aggravate or accentuate the disabilities of those who suffer some physical handicap. It is a corollary of this educational provision by the community that there shall be required of those who are to be permitted to enjoy these advantages a physique sufficiently good to allow them to make full use of the provision. It may be said that in providing the opportunity the community assumes a responsibility for those whom it permits to accept it. Again, the provision is costly; lack of care in the selection of bodies will cause wastage of the educational provision. Every failure during student and teaching life is so much loss of this costly provision. It means also that some other candidate who might have made better use of the provision is kept out by a failure. It may seem also that the gift of the community to the failure was ill judged; the gift entailed a course of work which in the end proved injurious to the recipient—he would have been better and happier if he had not had that gift.

Physical Fitness and Sight Tests.

There are many points of physical condition in which a candidate may be required to pass, and these will vary with the educational course in prospect. We are only concerned with eyesight, and in that respect visual acuity is not the only test; we are concerned with the actual condition of the eyes, for the test has to certify fitness not only at the moment, but for a future career of years. We are all familiar with visual standards for certain purposes—for example, navy, mercantile marine, railway, etc. There is evidence that some such standards are desirable for educational purposes before admission to scholarships, to college course, and to the ranks of teachers. As I have sought to show, these standards are necessary in the interests of the candidates themselves, and they become the more necessary immediately we subject the candidate to any sort of physical test, for by the institution of any test we in fact

*A paper read before the Royal Society of Medicine, Section of Ophthalmology, October 13th, 1922.