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REPORT



ON THE

PHYSIOLOGICAL EFFECTS OF THE BROMIDE  
OF AMMONIUM.

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BY

GEORGE D. GIBB, M.D., M.A., F.G.S., F.A.S.,

PHYSICIAN TO THE WEST LONDON HOSPITAL, AND ASSISTANT-PHYSICIAN AND MEDICAL  
REGISTRAR TO THE WESTMINSTER HOSPITAL, LONDON.

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BROMINE and its salts have been known for many years to possess considerable virtues, and some remarkable instances of their peculiar effects, physiological and medical, have been placed upon record. Amongst others, the power of absorbing hypertrophied structure has been observed, especially enlargements of the spleen and liver, lymphatic glands, and scirrhus growths.

In an excellent essay by Dr. R. M. Glover (at one time a resident in Newcastle and afterwards in London), published in the Edin. Med. and Surg. Journ. for October 1842, there is a list of the diseases in which either bromine or some one of its preparations has been employed, but among the latter the bromide of ammonium is not mentioned.

The salt hitherto, it may be said almost solely, in use has been the bromide of potassium, considered by many physiologists analogous in its effect to the iodide of the same base, only that it is slower in its action. The persons whose names are deserving of mention in relation to the potassium salt, are the late Dr. T. Williams of London, who found it of great benefit in enlarged spleen; Pourché, who treated bronchocèle and scrofula with success; and in a number of cases of pseudo-membranous disease, including a few of croup. M. Ozanam found it of especial value. Cancer is another disease successfully treated with it by Mr. Spencer Wells, in doses of five to ten grains three times a day, with cod-liver oil (Med. Times, July 1857, p. 31).

In the course of its use M. Huette observed that *anæsthesia of the fauces* was a result which its administration caused; and this circumstance, at first looked upon as objectionable, I have endeavoured to turn to account, as a physiological result of extreme value and importance in the practice of medicine, either in examinations of the throat and nostrils, or for the performance of operations upon either, or in the interior of the windpipe from above by means of the laryngeal mirror.

To effect this object the bromide of potassium was freely given internally in large doses, but it failed to bring about this result, unless in a very few instances, its action varying according to the idiosyncrasy possessed by the individuals experimented upon. Its local action, although perhaps a little more certain and decided, was not to be relied upon.

On looking through the other salts of bromine, none seemed likely to possess more of the anæsthetic power than that of potassium; having had some experience, nevertheless, of the reliable value of the preparation known as the iodide of ammonium, it struck me that the analogous substance (bromide of ammonium) might prove more efficacious than the potassium salt from the union of bromine with a base of great power, ready absorption exerting a decided influence upon the fluidity of the blood, and moreover the remedy for poisoning by bromine, as recommended by Mr. Alfred Smith, namely ammonium. I was not aware at the time that it was employed for photographic purposes, probably more or less impure, but had the salt carefully prepared for my experiments by Messrs. Fincham of Baker Street London.

The bromide of ammonium when pure is perfectly white and amorphous with a feeble odour of sea-weeds. Under the microscope the salt is clear and transparent, and not crystalline nor deliquescent. It can, however, be crystallized in cakes or quadrangular prisms. It possesses a slightly pungent saline taste, not so sharp as that of common salt, nor so acrid as the bromide of potassium.

Agreeably to the request of the General Committee, I have performed a large number of experiments since bringing the subject before the Association last year at Cambridge, but the present Report combines the whole of the more important of my experiments from the first use of the salt, and from which are deduced its physiological and therapeutical properties.

In pursuing this inquiry, the salt has been administered in small doses at intervals more or less long-continued, in large doses frequently repeated and given at intervals, and in single daily doses. A comparison is also instituted

between the relative effects of this salt and the bromide of potassium. It may be mentioned that in these different experiments healthy persons were selected; and according to the results obtained, so were certain diseases submitted to treatment to more fully bear out and confirm the physiological effects noticed.

*Effects of small Doses.*—About one hundred healthy persons, male and female, of various ages, were given small doses of the salt, ranging from one to five grains, three times or more a day, in water as a vehicle, and in some combined with a simple colouring agent, such as the tincture of alkanet root or other substance. The period of its continuance varied from three weeks to several months, and the results were carefully noted. All were in tolerably good health, or nearly so; or if affected with any particular ailment, it did not appear to be likely to interfere with the action of the drug.

Two striking results were soon noticed in the greater number; namely, increase in the power of the appetite, and improvement of the complexion. With regard to the former, its action was that of a decided tonic; for whilst the persons ate more food than had been their custom, they were able to digest it well; the drug appeared to impart a soothing and comfortable sensation. There never was any tormina nor the slightest tendency to intestinal relaxation; but the general functions appeared to be regularly and constantly performed. The tongue assumed a natural and clean appearance, and was moist; the skin and mucous membrane (presently to be noticed) performed their functions well; the circulation was not increased nor lessened; the heart's action continued regular, the pulse possessing good power and plume, and comfort was experienced after meals. If there were indications of indigestion or dyspepsia before the use of the salt, they yielded to the small doses given. In six or seven cases, a mild diuretic effect was observed. If the small doses were continued for some time these effects were not ways continuous, and in a few persons slight nausea was produced, with an impairment of the appetite; this was especially so if the drug was given in four- or five-grain doses. In three cases only was there a little headache, with giddiness and light-headedness, but the intellectual faculties were impaired.

Coincident with the increase of appetite was a marked clearing of the complexion, particularly observable if the face was naturally florid or the skin in very red. This redness or floridity became paler, decidedly paler, and the skin assumed a fine transparent freshness, indicative of healthy function. Dullness, slight sallowness, or a heightened complexion became modified or altered, so that a more healthy, slightly pink colour was assumed. These effects were noticed sometimes when the salt had been taken but a few days; and the improvement in the skin was so apparent, that it has attracted the notice of the friends of the persons under experiment.

Applying this result pathologically, I found the salt very serviceable in a variety of cutaneous affections, the eruptions fading away reasonably fast, and the individuals looking as clean and as clear about the complexion as if they had just come out of a bath. The results were very striking, and positively beneficial upon the skin. They are produced also by the other salts of bromine, but perhaps not in the same degree; I therefore feel justified in designating the bromide of ammonium, amongst its other properties, as a purifier of the complexion and cleanser of the skin. It appears to act by directly stimulating the capillaries of both the skin and mucous membrane; a secretion is excited in both by small doses of the salt, independently of exercise and increased diet.

*Local and Constitutional Effects on the Mucous Membrane.*—If the mucous membrane of the mouth and throat has been dry, or secreted less than natural a healthy moisture is produced by small doses internally, which has proved very agreeable. In an instance wherein the taste was blunted and impaired so that the sapid character of the solution employed locally was not noticed it almost immediately improved, and became more sensitive to impressions. This is known to be the reverse with salts of iodine, which often produce disagreeably bitter taste, pervading in some instances almost everything swallowed.

Although it will improve sensation in small doses or single applications, its essential property is exerted upon the sensation of the minute nerves of the mucous membrane of the soft palate and pharynx, the former especially. When locally applied, dissolved in water, or glycerine and water, a remarkably tranquil soothing influence is brought about, which continues for certain period of time, and then passes off.

If the strength of the solution is increased, the perhaps heretofore dry membrane has its follicles stimulated; and whilst secretion is increased sensation is somewhat diminished; but this last property varies in different individuals. If now topical application be resorted to through the aid of a tolerably strong solution of the salt, say from two to eight drachms, or even more, in six ounces of water, used either as a gargle or a paint every half hour, the throat will become in a condition of mild local anæsthesia, that is to say, loss of sensation confined to the fauces, which will be more or less complete according to the susceptibilities of the individual and the period during which the solution is employed. I have seen it occur from the first to the ninth day; and the continuance of the anæsthesia will afterwards depend upon the amount of the salt locally absorbed, but generally diminishing after the first twenty-four hours, and not unfrequently continuing as long as three days.

Knowing that this anæsthetic property was attributed to the bromide of potassium by M. Huette, and applied by M. Gosselin in staphylopharyngitis\*, was prepared for its occurrence with the salt of ammonium, but the result of my experiments warrant me in saying that, whilst the anæsthesia is more complete and certain, it produces less inconvenience in relation to the sense of taste than does the bromide of potassium. The importance of this anæsthetic property cannot indeed be over-estimated in its application to a number of subjects connected with the throat especially, as modifying degrees of natural irritability, pain, sensation, secretion, mobility, and absorption.

*Effects of large Doses.*—It may be as well to mention here that the experiments of M. Huette with the sister salt, the bromide of potassium, were intended to show that headache was sometimes observed on the third day, but ordinarily occurred from the fourth to the seventh day, when the daily dose of the salt had reached from two to five drachms †.

According to its continuance in large doses, so were produced torpor and drowsiness, lowering of the pulse (40 to 48), vomiting and continued sleep and finally a form of peculiar intoxication, characterized by impaired sight and hearing, utter helplessness and insensibility. Weakness of the mind and torpor of the genitals were other effects noticed. Among the special effects of the salt, one of the most remarkable, even from a feeble dose, observed by M. Huette, is profound insensibility of the velum and pharynx, which persists throughout the duration of the treatment. How far the bromide of ammo

\* Gazette Médicale, April 14, 1860, p. 223.

† Annuaire de Thérapeutique, 1851, p. 216.

mium resembles the potassium salt, the following experiments will determine. Huette's experiments with the latter show well its influence upon various parts of the mucous tract, although he says nothing about the skin; M. Rames, however, observed an instance wherein the skin was so completely insensible that its puncture with a needle was not felt, and tickling of the conjunctiva or fauces with a feather produced neither winking nor desire to vomit\*.

It was soon apparent in my own experiments with the bromide of ammonium that the entire mucous tract could be greatly influenced for good or for evil, according to the desire of the physiologist. And yet with proper care and judgment, we are furnished with an agent in this salt that promises to be of immense benefit to suffering humanity in many obscure and heretofore intractable diseases.

*Experiment 1.*—A man aged 27, in robust health, was given half a drachm of the bromide of ammonium in an ounce of water, with a little syrup, every four hours. The first dose was given at eight, the next at twelve, the third at four, and the fourth at eight P.M. Nothing unusual was observed at night beyond an alteration in the sense of taste. Next day the dose was continued, and the taste gradually diminished until, at night, there was complete loss of it, and insensibility of the throat and fauces. The application of metallic or other substances was not felt, and apparently anything could have been done with the individual. The sense of smell was affected; the nose, however, did possess some sensation, and also the conjunctivæ. The mucous membrane was pale, watery, and not congested. Although taste was gone, he felt he had a tongue, and could swallow as usual, for the muscles retained their contractile power. Nothing else was specially observed, and in three days all the natural functions were restored, and sensation was quite regained.

*Exp. 2.*—The same experiment was repeated with the bromide of potassium in another man aged 32; and beyond some amount of nausea, slight headache, and very slight impairment of sensation and taste, nothing further was observed.

*Exp. 3.*—A man aged 37, in good health, with the exception of chronic parseness, was ordered half a drachm of the bromide of ammonium three times a day; this was regularly taken for three days, in all nine doses, equal to four and a half drachms. On the fourth day, although sensation was wanting, it was not absent, for the man had had a bilious attack just before commencing the salt, followed by vomiting. I now gave him thirty grains on the spot, and ordered two other similar quantities during the afternoon. The next day he did not take; nevertheless I succeeded in passing a little instrument into his windpipe with comparatively little or no sensation until it touched the epiglottis, when it was at once rejected. I now ordered him three doses of half a drachm each for the next day, beginning at three P.M., so that on the morning after he would have just swallowed the fourth before coming to me. This he did most punctually; and when he was examined, there was complete anæsthesia of the mucous membrane of the fauces, nose, throat, and eyelids. He had little or no taste, and no sensation in swallowing food, impaired smell, looked a little pale, but otherwise said he was well. Several times were instruments passed into the larynx without sensation, until they touched the epiglottis, and reflex action compelled their withdrawal. He was now given chloroform to insensibility; and on recovering from it, the anæsthesia of the mucous membrane still remained, so that the

\* Journ. de Pharm., Dec. 1849.

whole of the eye could be touched with perfect impunity without winking. Two days after this most of these effects had disappeared, a previously haggard look had gone, and he felt all right again. Four days later he was perfectly well. He had taken altogether seven drachms of the salt.

*Exp. 4.*—Male, aged 42, health good. For three weeks the salt was given in doses of from four to eight grains thrice a day, which diminished the sensibility of the fauces. In the next two days half-drachm doses were given thrice a day; and as insensibility was not complete, a scruple was given every three hours for two days more. The result of this was complete anæsthesia, so that bodies could be introduced into the larynx; but, as in the previous experiment, when coming into contact with the epiglottis, they had to be withdrawn from the excitation of reflex action. In from five to seven days sensation was quite regained, and all the functions restored without any inconvenience.

*Exp. 5.*—Male, aged 51, health good, excepting a laryngeal voice. For fifteen days he was given at first  $2\frac{1}{2}$  and then 5 grains of the salt twice a day, with no noticeable effect beyond improving the appetite, voice, and complexion. He was then given twenty grains of the bromide four times a day for four days; and on the morning of the fifth day there was anæsthesia of the fauces, nose, mouth, and tongue; and all the special senses were somewhat affected. The stomach likewise, for he had no desire for food, although feeling well in health; and he had little or no sensation in micturition. The countenance was paler than usual, the skin very clear, and the tongue clean. Differing from previous cases, the epiglottis was almost completely insensible, and but feebly influenced by the contact of instruments passed into the trachea. Next day he felt a little giddy and stupid; but in the three following days the senses of taste and smell were returning, appetite indifferent, tongue much furred, intestinal and renal secretions regular and normal in quantity and sensation restored to the urethra.

Eight days later he was sleepless, and had no desire for food nor for sleep. A bitter taste was present in the mouth, with an odour of ptyalism; the primæ viæ were disordered: throat was now sensitive. In a few days all these symptoms disappeared; but it must be stated that they were partly due to an attack of cold from which he was then suffering.

*Exp. 6.*—As in the first experiment, half a drachm of the salt was given to a man aged 35, in good health, every two hours, using chiefly a tea and bread diet. During the first day he took four drachms, the second the same quantity, and the third a similar quantity, when it had to be stopped. The symptoms the first day were very much like those in *Exp. 1*; on the second there was some giddiness and stupor, with impairment of sensation both in the skin and mucous membrane, but not amounting to complete anæsthesia; on the third day he had passed a restless night, and toward evening he was like a man intoxicated; he felt light-headed and drowsy, speech, hearing, and sight were materially affected; he had no sense of smell nor taste, nor any sensation in the mucous membrane of the throat, nose, ears, eyelids, and alimentary canal. Pressure was scarcely felt over the stomach and bowels; there was no sensation in the urethra, and but little in the rectum; and the bladder would have been distended if he had not been requested to empty it; its contractile power was unimpaired. The sensibility of the skin was blunted, but not gone.

General anæsthesia of the entire mucous tract, more or less, had been here produced, and it was deemed prudent not to carry out the administration of the salt further; the pulse was slow and regular, and forty-four per-

minuto; the breathing quiet and tranquil; the membrano of the fauces was serotting a transparent fluid, and there was no congestion. The symptoms were allowed to subside *sua sponte*. The salt was readily detected in the urine the first and subsequent days, and also in the saliva. In four days sensation had returned in the upper mucous tract, and then in the lower. Some nausea and anorexia remained for a week or ten days, and he regained his normal condition. All his powers were wholly unimpaired.

*Exp. 7.*—Precisely similar steps were followed out with the bromide of potassium in a man aged 42 in good health, but the general results were by no means similar as affecting sensation. It was impaired, and slight anæsthesia was produced in the fauces. Yet the stupor was not so great, but headache was a prominent symptom, subsequently followed by giddiness and derangement of the digestive organs.

Estimating the power of the two agents, the ammonium salt appeared to be more active, and produced the peculiar effects of bromine quicker than the potassium salt.

In Experiments 6 and 7, four drachms of the respective salts were taken each day for three days, equivalent to  $1\frac{1}{2}$  ounce. In the following the quantity was increased.

*Exp. 8.*—A young man, aged 23, ruddy complexion, health good, voice weak, was given half a drachm every hour for twelve hours, beginning at seven in the morning. It was regularly taken with a drachm of the tincture of cardamoms to each dose. By the seventh dose, nausea and headache were produced; these were lessened by the ninth, and at the tenth stupidity and drowsiness were manifest. When the twelfth was taken, intoxication seemed to be present, with incoherency of speech. It was difficult to say whether there was complete anæsthesia from the man's condition, but he seemed to feel nothing, and the conjunctivæ could be touched with the end of the finger without winking. Pricking of the skin was not felt each time it was done. Breathing was slow, and the pulso fifty-two, quite regular. He slept very sound that night, and the next few days he felt giddy and confused, with impaired sensation of the mucous membrane of the fauces for two or three days, but recovered well. The quantity taken in twelve hours was six drachms.

*Exp. 9.*—The same experiment was repeated in a female of 32, in fair average health. Nothing particular was observed whilst taking the drug beyond a little pallor, and reduction of the pulso from eighty to sixty-four. At night she felt more drowsy than usual, and faucial sensibility was diminished. After a sound sleep of some hours during the night, she awoke with a furred tongue and offensive breath, and some nausea. On the third day the catamenia set in very profusely, and continued for some days. In the foregoing experiment, and also in *Exp. 8*, the bromide was readily detected in the urine.

*Exp. 10.*—Male, aged 78, in good general health, but seldom sleeping at night, was given ten grains twice a day for four days, then fifteen grains for six days, and then twenty grains for twelve days. The digestive functions continued good throughout, and the pulse remained constantly at seventy-six, regular, and with the hardness of old age. His strength was considerably increased, but no other change occurred deserving of note. He was a thin spare man.

*Exp. 11.*—Twenty grains were given to a female aged 27 twice a day for fourteen days, without any inconvenience beyond losing flesh, and impaired sensibility of the throat.

*Exp. 12.*—The same quantity was given three times a day to a man of 35, and persisted in for five weeks. At the end of that time he had anorexia and chronic anæsthesia of the throat, *i. e.* impaired sensibility, which had been present for ten days. It was also diminished in the conjunctivæ and nostrils; rhinoscopy was very easy.

*Exp. 13.*—Thirty grains were given to a woman twice a day for a fortnight, and the symptoms produced were not unlike those in the previous experiment.

*Exp. 14.*—A similar quantity, three times a day, was given to a young man of 26. He took it well for six days, when it had to be stopped, for he felt light-headed and queer, with some restlessness of the limbs. The mucous membrane of the fauces was feebly sensible, and could be freely touched without any inconvenience or resistance.

*Exp. 15.*—In another person, thirty grains given three times a day for ten days produced no decided change whatever beyond altering the complexion.

*Exp. 16.*—Half a drachm was injected into the rectum of a male aged 31 every four hours for two days. It was readily detected in the urine, and exerted its influence chiefly in diminishing sensation in the genito-urinary tract of mucous membrane and lower part of the alimentary canal, which felt numb. It seemed also as if sensation was diminished in the fauces.

*Exp. 17.*—The same experiment, repeated upon another man, caused a slight attack of diarrhœa, but sensation was nevertheless sensibly impaired.

*Exp. 18.*—A scruple in half an ounce of water was injected into the male bladder, and repeated twice at intervals of two hours. It was quickly absorbed, for reagents indicated the presence of but a small quantity in the urine voided before each recurrence of the injection. Very slight anæsthesia was experienced at the neck of the bladder; and in seven hours from the first injection there was copious diuresis.

*Exp. 19.*—An eight-ounce mixture, containing half a drachm of each of the iodide and bromide of ammonium, was ordered in tablespoonful-doses twice a day to a healthy female aged 22. The first dose caused severe sickness and vomiting, with great prostration and syncope; severe abdominal pain but no diarrhœa. She remained very poorly the remainder of the day.

*Exp. 20.*—A similar mixture, containing a drachm each of the two salts was ordered for a female aged 28, with aphonia—on the same day as in the preceding experiment. The first dose was swallowed at the chemist's, and on her way home she was seized with sickness and vomiting, great pain in the bowels, prostration and diarrhœa. Next day she was well again.

Although the symptoms were the same in each experiment, excepting the presence in one and absence in the other of diarrhœa, yet they clearly proved that the salts of iodine and bromine are incompatible. I did not like to repeat the experiment. In *Exp. 19* the quantity of each salt taken was about two grains, whilst in *Exp. 20* it was about four grains. The general symptoms were certainly severer in the latter, which may account for the presence of the diarrhœa.

I have performed several experiments upon animals with bromide of ammonium, and have given various quantities by the stomach, with comparatively no inconvenience, and they rather go to prove that tolerably large doses may be given even to very young children without any ill effect; indeed I have administered pretty large doses to infants and children for whooping-cough and other diseases, with the most satisfactory results.

I have not injected solutions of the salt into the circulation in animals. for the reason that no valuable or practicable inferences would have been fur-



nished, beyond the mere fact that death would have ensued from almost any quantity, as in Dr. Glover's experiments with the sister salt, the bromide of potassium. Nor have I destroyed one single life, nor caused a pang of misery to any dumb creature,—not that I disapprove of such experiments if imperatively demanded by the exigencies of science.

In some of the foregoing experiments it will be observed that whilst large doses, frequently repeated, produced certain specific results in the majority of persons, in some these were comparatively slight, depending most probably upon some idiosyncrasy, antagonistic to the bromine salt.

The skin is seldom devoid of sensation, unless large and poisonous doses are persisted in; the same may be said of the gastro-intestinal tract of mucous membrane, which I infer to be equally in a state of anæsthesia from insensibility to pressure over the abdomen, and the presence of anorexia. Two sets of nerves are evidently influenced, those of special sensation, and some of the branches of the sympathetic supplying the intestinal mucous tract; why this should be so I shall not undertake to explain, but the fact is patent that the entire mucous tract of the body is more or less affected in sensation by large and continuous doses. The respiratory tract I also infer to be included in this, from the subsidence of any irritation giving rise to cough or spasm; no impediment to breathing has ever been noticed.

It may not be out of place to mention here that the sister salt, bromide of potassium, is given at the hospital for epilepsy and paralysis in London, in from ten to twenty, and sometimes thirty grains, three times a day, as I learn from Dr. Jackson, one of the physicians. He further informs me that the patients there have not been observed to get notably thinner, nor has he noticed any special symptoms after the use of the salt, beyond the alleviation of their maladies.

*Effects on Atheroma, Cholesterine, and Fat in the general economy.*—Whether given in small, frequently repeated (two to five grains thrice a day), or in moderately large, less frequent doses (five to ten or fifteen grains once to three times a day), a distinct influence was noticed upon the various agents which more or less constitute the adipose element throughout the body—a result that at first was quite unexpected upon my part.

Various degrees of rotundity, increasing to positive corpulence or polysarcia, in persons otherwise in good health, yet in whom there was a decided and positive indication of excess of atheroma and cholesterine in the system as manifested by the presence of the atheromatous expression\*, were sensibly affected according to the period of administration, the dose, or the combination of the drug with a certain moderate dietetic regimen.

Of some five-and-thirty cases, in which corpulence may be said to have been present in various degrees, in all, with some five or six exceptions, did the bromide of ammonium exert a decided effect in diminishing weight and improving the general comfort. That is to say, when this agent was persisted in for some months, and in doses of three or four grains twice or three times a day, several pounds in weight were gradually lost, and the individuals seemed to get thinner; nevertheless the general health continued unimpaired, or improved still further under its use, the adipose development became decidedly less, the secretion from the oily sudoriferous glands, seen in a shining face, was modified and diminished, and altogether there was an improved appearance in the countenance, which the persons themselves were fully sensible of. But when the diet was moderately regulated, and the drug given in the mornings only before breakfast, the reduction in weight was more speedy, more decided and

\* For a description of this, see a paper by the author in 'The Lancet' of May 12, 1860.

permanent, and the general health continued excellent. In most of my earlier experiments the pure bromide of ammonium was used to bring about these various results. I am now in the habit, however, of directing from one to three (or more) teaspoonfuls of the effervescent bromide, an elegant and most agreeable salt prepared by Messrs. Fincham, of Baker Street, London, to be taken before breakfast, in water, to neutralize or combine with the various fatty agents in the economy, which so materially aid in shortening the period of human existence. It may be here mentioned that a drachm of the effervescent bromide contains two grains of the salt, and that this quantity is equivalent to a teaspoonful. If it is desired to give this agent but once daily; no better form could be chosen, as four or six grains of the pure salt may be thus administered with great comfort and certainty. It does not undergo decomposition in the stomach, but is absorbed or acts in its condition of bromide.

Before giving a few illustrative cases, it may be further mentioned that the general use of this agent in many hundreds of different individuals demonstrated some remarkable and striking facts, which an experience of some years, pathologically, will determine the value of, and they are as follows:—When the atheromatous or calcareo-atheromatous expressions have been present, not necessarily associated with corpulence, but where the proneness to adipose changes or development was apparent; and in examples of persons undergoing atheromatous conversions, besides the changes last mentioned, there was noticed a marked clearness in the fatty eye, the areus or annulus adiposus vel senilis, if present, became less yellow and oily-looking, the face was brighter, the integument not being so greasy, the mental faculties seemed to become more active and the mind sharper, and the bodily energy was certainly greater.

The foregoing changes were significant of others not less important going on within; for although the general health was good, it was quite evident in some that the expression already referred to was an index of atheromatous deposits, and a preponderance of cholesteroline in the great blood-vessels springing from the heart, and also in the smaller vessels at the base of the brain. In some there could be no doubt of the coexistence of a large and flabby heart, with true fatty degeneration of its muscular structure, indicated by physical signs which it is not necessary to enter into here.

If the effects of this salt were so manifest in its external aspects, it is but reasonable to assume that the internal were not the less positive and certain. And this seemed to me powerfully confirmed by the increased vigour of the intellect, the increased power in the rhythm of the heart, the soundness in breathing, and the softness of the pulse, with an apparent decrease of the rigidity and hardness of the coats of the blood-vessels at the wrist and some other places.

*Exp. 21.*—J. F., aged 43, health good, moderately polysarcous, atheromatous expression well marked, annulus adiposus, appetite indifferent weight 173 lbs. Took three grains bromide of ammonium for seven months. For the first thirteen weeks lost a pound a week, and afterwards from half to three-quarter pound per week, until his weight was reduced to 157 lbs., when it appeared to be stationary. His health continued excellent, and his appetite was better, although he ate a smaller quantity of food.

*Exp. 22.*—A. D. K., aged 57, a stout corpulent person, weighing 227 lbs. a good example of polysarcia. Health moderate; face red and greasy; eye congested and fatty, with no areus; cracked voice from deposit of atheroma in the vocal chords; sweet taste in the mouth constant; no glucosuria; faucial mucous membrane congested, red and oily-looking; appetite at times inordi-

nate. Five grains bromide administered twice a day, and his diet regulated. No change for the first fortnight; in third week 3 lbs. were lost, and then the diminution went on pretty regularly for about four months, averaging about a pound a week; at this time he weighed 208 lbs. The bromide was given in ten-grain doses every morning before breakfast for six weeks, and the decrease in that period was 11 pounds; it now caused a little nausea, and was intermitted for a short time, and yet diminution still went on, and the health became very good. It was resumed in four-grain doses in the morning, and after the lapse of ten months from the commencement he had lost 53 pounds, which brought him, he said, to something like his normal standard. He has latterly been taking the effervescing bromide, which he finds exceedingly grateful to the stomach, but with no very sensible diminution in his weight now. All the other symptoms improved, as in Exp. 21. This person had previously given a long trial to the *Fucus vesiculosus*, until "his vitals turned against it," and without the slightest benefit.

*Exp. 23.*—Major J., aged 44, very corpulent, with reddish face and stout limbs. Palpitation of the heart and feeling of fulness in the chest, very fond of puddings and port wine, which he said he digested well. Weight 198 lbs., which was uncomfortable, as he was a short man. Eight grains of bromide given twice a day: the puddings were stopped and the port wine changed. In five months there was a loss of 23 lbs., and in another three months 8½ lbs. more, so that he was reduced to 166½ lbs.

*Exp. 24.*—Mrs. St——, aged 47, moderately stout, but with all the expression of great deposit of atheroma and cholesterine in the vessels. Weight 182 lbs. The bromide was given in the mornings before breakfast only, in doses of six grains. One of the first effects noticed was the subsidence of a most irritable temper, and improvement in the facial expression; this was followed by slow and gradual loss of weight, until in five months she was reduced to 163 lbs. The diet was regulated here as well.

*Exp. 25.*—Rev. P. J., aged 64, getting so stout that it was a constant source of discomfort; weight 213 lbs. The bromide was given pretty regularly, at first in small doses, then in larger, without any appreciable benefit. An effort was at the same time made to regulate the diet, but great difficulty was experienced in effecting this. The diminution therefore was comparatively slight, more especially as milk was freely indulged in.

*Exp. 26.*—Mary P——, aged 36, inclined to be stout, with a large flabby heart, and from the facial expression and general appearance, the subject most probably of disease of the large blood-vessels at the heart and base of the brain, taken together with a family history which seemed strongly to confirm it. Weight 162 lbs. The bromide here was most invaluable, for a marked improvement followed, and the weight was reduced sensibly and comfortably, although not more than 11 lbs.

*Exp. 27.*—Julia D., aged 28, with the atheromatous expression, slight dyspnoea, fair *embonpoint*, good digestion and excellent health. Three-grain doses of the bromide twice a day, taken for many weeks, most sensibly acted on the first three, and she became a little thinner, which was shown by the general loosening of her garments.

*Expts. 28, 29, 30.*—Three males, aged 27, 32, and 41, who were moderately stout, and in whom from 7 to 14 lbs. were reduced in weight by five grains of the bromide twice a day for seven months.

*Expts. 31 and 32.*—Two females, aged 39 and 43, also moderately stout, whose weight was likewise diminished in the same ratio, by a similar quantity of the salt taken for six months.

*Exp. 33.*—Man, aged 37, inclined to become very stout, and an imbiber of much malt liquor, reduced himself in weight 15 lbs. in eight months, by small doses of the salt, almost constantly taken.

Of the remaining dozen cases the diminution in weight was mostly a few pounds, but they were not good examples of polysarcia as in some of the first experiments related. Moderate corpulence or inclination to stoutness were the prevailing features, and the quantity of adipose or other matter therefore to be got rid of was necessarily not large. In some the weight was increased instead of being diminished, which I attributed to increased appetite and the consumption of more food.

The foregoing experiments prove that some peculiar property is possessed by the ammonium salt, through the agency of the blood, in resolving some of the constituents of the adipose element. Whether this is of a chemical nature or otherwise I am not prepared to say, but am disposed to favour the former, for the potassium salt does not appear to possess this property, else it would have attracted attention ere this. And although the ammonium salt alone will in some persons absorb fat as an abnormal element, it is ably assisted by regulating the diet, and prohibiting such articles of food as keep up the tendency to its deposition. Dr. Glover has asserted that the bromides of potassium and sodium have little action of a corrosive character, but I will say of the bromide of ammonium that it has none at all, and assimilates better than either, seldom or never disagreeing even with the food when taken immediately before or after meals. Its influence upon the disease of the inner coats of the blood-vessels I attribute more to its direct chemical agency than to its absorbent powers. Nevertheless, whatever may be the rationale of its operation, it is an agent calculated to prolong life to a good old age, from the remarkable properties it possesses in this respect.

It does not cause atrophy of healthy organs, and curiously enough when given to thin people in small doses, its tonic properties increase the appetite, and thus adds to the weight of the body, which some might consider a physiological paradox, but the circumstance readily explains itself.

*The use of the Bromide of Ammonium in Medicine.*—The length of the present Report will permit of a brief notice only of the value of the salt in the treatment of disease.

As is the case with the salts of iodine in absorbing hypertrophied structure, so is it with those of bromine, and the bromide of ammonium is not inferior to any other preparation in its powers in this respect. The iodide and bromide of ammonium possess this property, and possibly the chloride of ammonium hereafter may be found also to possess it; for it is well known that between chlorine, bromine, and iodine and their compounds, exact and, as it has been said, beautiful chemical relations subsist. With regard to chlorine, the fact is deserving of remembrance, that persons employed in bleaching-factories lose their fat or other hypertrophied tissues, and become thin without impairment of their general health.

As an absorbent and resolvent, the bromide of ammonium has been used in hypertrophy of the tongue, liver, spleen, heart, thyroid and other glands, and other parts of the body with fair results, and it is strongly recommended for trial, more especially in hypertrophy of the spleen, heart, and early bronchocele.

In various cerebral or nervous affections, such as epilepsy, some forms of mild paralysis, neuralgia, especially of the uterine organs, nervousness, and tremors, and mild forms of cervical neuralgia, it will be found to possess

various degrees of usefulness. It here seems to act as an antispasmodic, for it calms irritation and allays nervous excitability.

Fatty disease of the heart and diseases of the blood-vessels are amenable to it.

Bronchitis, asthma, pertussis, affections of the trachea, throat, antrum, and nose, in fact wherever the mucous membrane is implicated will the salt be found to possess some degree of usefulness.

Some forms of chronic rheumatism and diseases of the skin are benefited by it. And amongst other properties it occasionally possesses that of an emmenagogue, and has proved useful in amenorrhœa.

Administered in certain ways, it may be found hereafter valuable in diseases of the genito-urinary mucous membrane.

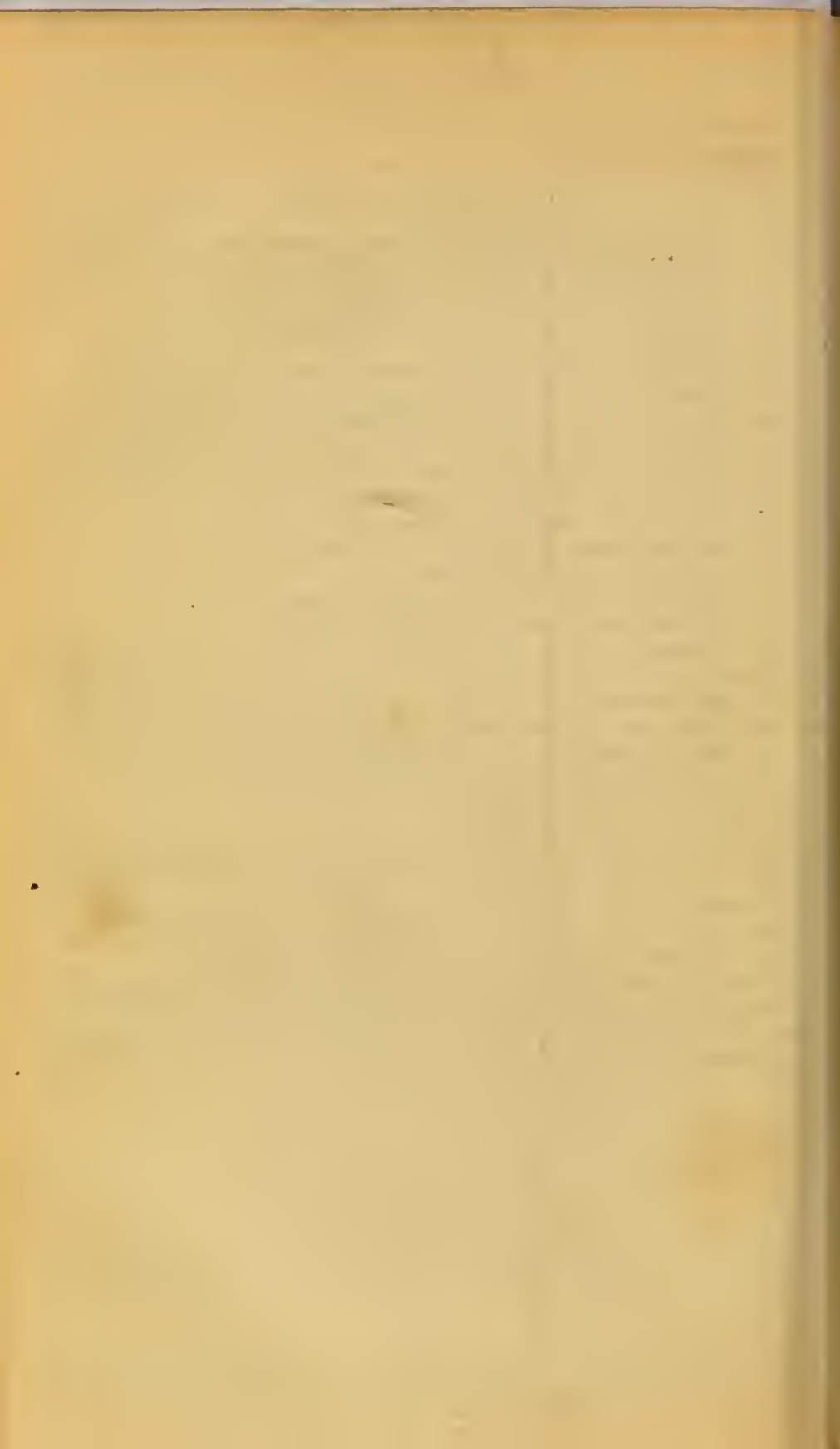
In these few remarks I prefer to point out the direction in which the agent may be made useful, than to say much at present upon the subject.

To obtain its good effects it should be given with comparatively few combinations, for the union of its constituents, although by no means readily broken, is at any rate influenced by certain substances which negative its properties. Incompatible substances must especially be avoided, and the antagonism between it and salts of iodine must not be forgotten.

Not the least of its advantages is, that it can be given in those constitutions wherein the preparations of iodine disagree.

*General conclusions.*—These may be stated as follows:—

1. In small doses, more or less long continued, bromide of ammonium acts as a tonic and absorbent, and exerts its peculiar properties upon the skin and mucous membrane.
2. It diminishes the weight of the body in polysarcia, causing the absorption of fat, cholesterine, and atheroma, when combined with a regulated diet; and this is effected with greater certainty than by any other known substance.
3. It improves the intellectual powers, increases the bodily capacity, and promotes healthy function.
4. Locally it possesses a soothing influence on the mucous membrane, and according to the strength and mode of its application, so does it diminish sensibility.
5. In large, frequently repeated doses, or given at intervals, it influences the entire mucous tract; it affects all the special senses, and produces æsthesia or impaired sensibility of the various mucous outlets.
6. All the poisonous effects are produced by very large doses as from the bromide of potassium, but in smaller doses it is more certain and reliable, causes no diarrhœa or diuresis, nor anaphrodisiasis, and its special properties are exerted sooner and with less inconvenience.



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