OBSERVATIONS

ON

THE CAUSES AND TREATMENT OF CHLOROSIS.

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MANY causes of chlorosis are enumerated by authors, chief among them being absence of light and fresh air, overwork, especially under unfavourable conditions, heated rooms, insufficient exercise, depressing emotions and unhealthy excitement, indigestion, constipation, insufficient food, and excessive or otherwise faulty menstruation, besides others which need not be here particularised. Most of these are probably predisposing rather than direct causes, and I hope to show in this paper that there are two great and direct causative factors in chlorosis, namely, blood-loss and an insufficient supply of iron by the food. If this be correct, then excessive menstruation or other blood-loss and insufficient supply of food from any cause, are the only two factors among those just mentioned which directly bring on the anæmia, the others doing so only in as far as they contribute to produce these two.

Virchow's view that chlorosis is dependent on congenital hypoplasia of the arterial system is apparently contradicted by the fact that it is a condition which lasts at most for a few years, and often only for some weeks or months, being completely and permanently recovered from, and hence the causes which produce it must also be transient and avoidable. It is possible, however, that such individuals may be congenitally deficient in blood-forming power, and thus readily tend to become anæmic when any strain is thrown on the blood.

The theory supported by the late Sir Andrew Clark¹ and others, that chlorosis results from constipation, with consequent absorption of ptomaines which break down the red blood corpuscles, is in no way supported by facts but rather the contrary. Many cases of chlorosis do not suffer from constipation, and, further, it has now been proved by trustworthy investigations that there is neither excessive formation of decomposition products in the intestinal canal, nor any excessive breaking down of the red corpuscles. As a matter of fact, fewer corpuscles break down in chlorosis than under normal conditions. The very pale colour of the urine, and frequently also of the fæces,² indicates that less colouring matter than usual is being furnished by the hæmoglobin, and hence that fewer red corpuscles are breaking down. When excessive decomposition is going on in the contents of the intestine, the products of this (compounds of skatol, phenol, etc.) become more abundant than usual in the urine, but Rethers³ and Möerner⁴ have found that in chlorosis these products are generally diminished in amount, thus conclusively proving that there is no excessive sepsis in the alimentary canal. These researches help further to disprove the truth of Hannon's and Bunge's theory, which also rests on the assumption of increased intestinal decomposition, whereby the sulphuretted hydrogen and ammonium sulphide supposed to be formed are said to separate the iron out of the food, and thus prevent its absorption. I have already shown,⁵ however, that both Sir Andrew Clark's and Bunge's theories are untenable on other grounds.

It may now be held as proved, therefore, that in chlorosis there is no excessive breaking down of red corpuscles, and hence the anæmia must result either from deficient formation or excessive loss of blood. What elements in the blood are specially affected? The blood serum seems to be very little or not at all deteriorated, for L. Beale found⁶ the specific gravity and solids to be practically the same in a girl before treatment and after recovery, while Quinquaud⁷ found the

solids to be 88 to 94 per 1,000 in chlorosis and 92 to 94 in health, the several constituents being practically unaltered. On the other hand the hæmoglobin is always deficient, and the number of red blood corpuscles is usually, but not invariably, so. In 63 cases of chlorosis which I have treated in hospital,⁸ the lowest estimate of hæmoglobin (on Gowers's hæmoglobinometer) was 20 per cent., the highest 66 per cent., while only 6 of these cases had over $4\frac{1}{2}$ million corpuscles per cubic millimetre, the others having from $4\frac{1}{2}$ down to slightly under 2 millions. Not only are the corpuscles deficient always in hæmoglobin and usually in number, but often many of them are ill-formed and small. The hæmoglobin, however, is invariably deficient whether the corpuscles be so or not, and the severity of the clinical symptoms depends chiefly on the extent of this diminution in hæmoglobin. Quinquaud found that in healthy women 100 c.cm. blood yielded 21 to 24 c.cm. oxygen, while in chlorotics the same amount of blood gave only 10 to 15 c.cm. It is the deficiency of hæmoglobin combined with the consequent deficiency of oxygen which gives rise to the pallor, debility, breathlessness, and impairment of functions generally which all go to form the clinical picture of chlorosis.

In discussing the etiology of chlorotic anæmia, as it is found in young girls at or not very long past the age of puberty, the chief points which attract attention are the sex, age, the condition of the digestive organs, the condition of the menstrual functions, and the frequent tendency to relapse. I shall consider these in the order named.

Sex.—Chlorosis is infinitely most frequent in very young women, and this suggests the question as to what influence sex exercises on the composition of the blood. Women generally in health have about 10 per cent. fewer corpuscles than men, 8 to 10 per cent. less hæmoglobin, and 4 or 5 per cent. more water in the blood. Their blood is therefore less able to withstand any drain on it, and, as will be more particularly noticed immediately, it is well recognised that at puberty and for some time after, there is a greater drain than takes place in lads at the same age.

Age.—Leichtenstern⁹ found that from 18 to 25 the hæmoglobin is about 8 per cent. less than from 25 to 45 years of age, and Sörensen that from 15 to 28 in healthy women the number of corpuscles is less than at other ages, which he attributes to menstruation. Further, girls develop with extreme rapidity from 15 to 18, throwing a great strain on the organism, which suffers in various ways besides in blood forming. Out of my 63 cases of chlorosis previously cited no fewer than 41 were between the ages of 15 and 20, and the highest age at which a first attack occurred was 23. Owing to the strain of rapid growth at this age all the various functions of the body suffer, and not only is blood formation deficient in itself, but digestion is impaired and appetite poor, so that an inadequate amount of food, and consequently of iron, is consumed. The onset of menstruation at a time when mere growth is making such demands on the organism still further drains it of blood and of iron and tends to the production of anæmia.

The Condition of the Digestive Organs.—In growing girls and in chlorosis gastric digestion is very frequently impaired, and constipation is common, showing that the whole process of primary digestion is very ill-performed. Out of my 63 cases, 32 suffered from constipation, while 38 had marked dyspepsia, and in many cases where gastric dyspepsia was not complained of, it was found that the patient had learned by experience to be extremely careful in her diet. The dyspepsia and constipation lead to the consumption of a totally inadequate amount of food, and therefore of a totally inadequate amount of iron. I have recently analysed¹⁰ fifteen dietaries of healthy persons, taking in each case an exact duplicate of the cooked food and liquids consumed during one day, and it was found that, for persons with moderate appetite and not working very hard, the total amount of iron ingested was from a little over 6 to 8 milligrammes ($\frac{1}{10}$ to $\frac{1}{8}$ grain) per diem, while persons with larger appetite ingested from 8 to 11 milligrammes iron ($\frac{1}{8}$ to $\frac{1}{4}$ grain). Four analyses¹⁰ of the daily dietary of two girls suffering from chlorosis gave only 2.8, 3, 3.2, and 1.3 milligrammes iron (about $\frac{1}{20}$ to $\frac{1}{40}$ grain), while

¹ *Lancet*, ii, 1887, 1003.² Von Noorden, *Berlin. klin. Wochenschr.*, 1895.³ *Dissertation*, Berlin, 1891.⁴ *Ztschr. f. physiol. Chemie*, xviii, 1893.⁵ *BRITISH MEDICAL JOURNAL*, 1893, i.⁶ *Med. Times*, 1851, i, 618.*Chimie Pathologique*, 1880.⁸ *Edin. Med. Journal*, November, 1895.⁹ *Untersuchungen über den Hämoglobingehalt des Blutes*, 1878.¹⁰ *Journal of Physiology*, xviii, 1895.

the dietary of a third chlorotic girl who had lived for three months on a small quantity of bread and milk daily gave only 1.2 milligramme of iron per diem. It is difficult to reckon accurately the total daily excretion of iron from the body, and no doubt it varies within certain physiological limits, but it is probably somewhere about 6 milligrammes on an average. It is evident, however, that persons habitually ingesting a quantity of iron so much less than is excreted in health will gradually acquire a deficiency of hæmoglobin in their blood, owing to the new corpuscles which are constantly being formed not finding enough iron in the organism to furnish them with a sufficient supply of hæmoglobin.

An experiment which I made upon a dog illustrates this.¹¹ The animal, a collie, in its ordinary dietary consumed about 10 milligrammes iron per day, its red corpuscles equalling 6 millions per c.mm., and its hæmoglobin 90 per cent. It was then put on a dietary which maintained its weight, but from which the iron had been as far as possible extracted, so that it only got 2 to 3 milligrammes per day. In forty-six days the hæmoglobin had fallen to 64 per cent., although the corpuscles had slightly increased. When put back on its old diet the hæmoglobin very gradually rose again, while the corpuscles also increased in number very considerably. There was no lack of power to form hæmocytes, but simply a deficiency in them of hæmoglobin, resulting from long-continued deficiency of iron in the food. Many cases of chlorosis present a similar condition.

The observation has frequently been made that during starvation the corpuscles and hæmoglobin both rise, often very considerably, in a given bulk of blood, but this is due simply to less fluid being taken, and the blood becoming thereby more concentrated. The same increase has been observed in cases of phthisis and of diarrhoea where fluid is drained off by sweating or by the watery alvine discharges. The increase is only apparent, and there is abundant evidence to show that during partial or complete starvation both corpuscles and hæmoglobin are reduced. Reinert¹² states that during inanition the corpuscles fall from the beginning if fluids be given, and Vierordt during the hibernation of a squirrel observed its red corpuscles fall from 7,748,000 per c.mm. to 2,355,000. Quinquaud found a very large fall of hæmoglobin in lunatics who refused food, and Pierry relates the case of a man who committed suicide by eating less and less each day, dying ultimately after two months, during which time he developed all the symptoms of anæmia.

Quality, as well as quantity, of food is of importance as regards the supply of iron. Verdeil¹³ found that a dog fed for 18 days on flesh had 12.75 per cent. iron in its blood ash, while one fed on bread for 20 days had only 8.65 per cent., and Subbotin¹⁴ confirms this on different species of animals, as regards the amount of hæmoglobin.

My own analyses of iron¹⁵ in different articles of food showed that they contained very different amounts. Thus in two analyses of bread, one pound (undried) yielded 1.7 and 2.7 mg. ($\frac{3}{16}$ and $\frac{1}{4}$ gr.), one pint of milk 2.2 mg. (about $\frac{1}{16}$ gr.), and one pound of beefsteak 18 mg. (about $\frac{1}{4}$ gr.) iron.

There can be no doubt, therefore, that the quantity and kind of food consumed exercises an important influence on the amount of iron available for blood formation.

Menstruation or other Blood Loss.—The onset of menstruation while the body is actively growing makes a great demand on the blood. Gowers¹⁶ found that during a menstrual period in a chlorotic girl the corpuscles fell as much as 10 to 20 per cent. of their total number, and in one case during five days I found that they fell from 4,432,000 to 3,764,000 per c.mm. Hunt¹⁷ and Wilcocks¹⁸ also observed a diminution. The loss is easily borne by the vigorous and fully grown woman, who finds no difficulty in regenerating the corpuscles and hæmoglobin, hence the rarity of chlorosis after the age of 25. In chlorotics, however, the corpuscle-forming power is often lessened temporarily, but this seems to be due largely to lack of iron and

possibly also to general impairment of nutritional activity, for as soon as iron is given and the patient put under favourable hygienic conditions, new corpuscles are formed with great rapidity. Further, the healthy woman has sufficient reserves of iron at once available for use stored in the liver and spleen, but in girls ill-nourished from any cause, or who have been drained of this iron by hæmorrhage, there is little or no iron in the body to draw on for the manufacture of red corpuscles, and thus they become anæmic.

A fatal case of gastric ulcer which I had in a girl, aged 18, illustrates how completely the body may be deprived of its iron by hæmorrhage. During three days she had hæmatemesis to the extent of about 50 ounces, and then several smaller bleedings previous to death. The liver contained only 0.018 g. iron per 100 parts dried, and the spleen 0.041 g., calculated for 100 parts dried. It may give a better idea of the extreme poverty of these organs in iron when it is stated that the whole spleen only contained 5 mg. ($\frac{1}{4}$ gr.) of iron, and the whole liver 4 c.gr. ($\frac{1}{8}$ gr.), amounts which are probably fully accounted for by the blood which was unavoidably left in the organs. The iron usually stored in the liver and spleen cells had disappeared.

An experiment made on a dog proved the same thing. The animal, a large collie, at the beginning of the experiment had 8,000,000 corpuscles per c.mm. and 108 per cent. hæmoglobin, and during three weeks it was bled to the extent of 687 c.cm., when the corpuscles had fallen to 5,280,000 and the hæmoglobin to 48 per cent. In twenty-eight days afterwards the corpuscles had risen to their original number and continued to increase, but the hæmoglobin required ninety-seven days to reach 104 per cent. It was then killed, and only a mere trace of iron was found in the liver. During this time it had received no chalybeate treatment, and its food contained about 8 to 10 mg. iron daily.

It is certain, therefore, that loss of blood not only directly produces anæmia, but prevents speedy recovery from it by draining off the reserves of iron in the body.

Most cases of chlorosis, when fully developed, have amenorrhœa, which must be regarded as beneficial and protecting against further loss of blood. In many cases the loss of blood by menstruation has never been actually large, but only relatively so, when compared with what the organism is able to withstand at a time when a very heavy strain is being put upon it otherwise. Many cases, however, begin with very distinct menorrhagia, and date their illness from this.

In looking through my notes, I find a considerable number of cases in which the patient menstruated for five to seven days, sometimes every second or third week; there is one in which the period lasted nine to ten days every month, and there are two cases in which the bleeding continued for a month. Both these last suffered from typical chlorotic anæmia in consequence; in one of them a gynecological examination was made under chloroform, but nothing was found to account for the menorrhagia. One girl, aged 19, presenting all the most typical symptoms of chlorosis, had for some months been in the habit of passing blood daily when at stool, apparently from a bleeding polypus high up the rectum.

How important a loss of iron even moderate bleeding entails on the body can perhaps only be realised after calculation. Becquerel and Rodier reckon the iron in 100 g. blood as 0.0366 g., and Pelouze as 0.054 g., so that if we take the mean we have 45 mg. iron in 100 cc. of blood. Now, during menstruation, 3 to 6 ounces is the average loss of blood, and in this about 45 to 90 mg. iron is excreted, that is to say, about as much iron as a healthy person ingests as food during 5 to 10 days. If we reckon, however, that 5 or 6 mg.¹⁹ are excreted daily in other ways, it only leaves over 3 or 4 mg. per day to make good the loss of iron contained in the shed blood. In the intermenstrual periods the liver stores up from the food reserves of iron, which are immediately available for making new corpuscles, but if these reserves have been exhausted by menorrhagic or other bleeding, or have not been kept up owing to poverty of the food in iron, then the iron, even of a good dietary, is quite inadequate to meet the demand for hæmoglobin, and anæmia gradually results.

¹¹ *Journal of Pathology*, iii, 1895.

¹² *Die Zählung der Blutkörperchen*, 1891.

¹³ *Annales de Chim. et de Pharm.*, lxi, 89, 1849.

¹⁴ *Ztschr. f. Biol.*, vii, 185, 1871.

¹⁵ *Journal of Physiology*, loc. cit.

¹⁶ *Lancet*, 1878, i, 673.

¹⁷ *Lancet*, 1880, ii, 87.

¹⁸ *Practitioner*, xxxi, i, 1883.

¹⁹ *Journal of Physiol.*, loc. cit.

Tendency to Relapse.—The slighter cases of chlorosis do not very often seek medical advice, as they recover spontaneously on the iron of their food, while many even severe cases frequently have no recurrence after treatment, the conditions which induced the anæmia having been evidently temporary. Many cases, however, are never really well, under treatment they recover more or less from one attack, and in a few months have another, this going on sometimes for years. The explanation is that such patients habitually eat too little, or habitually lose too much blood by menstruation, or there is most often a combination of both. In some cases also, there is possibly a deficiency in blood-forming activity.

Gastric Ulcer.—It is well known that obstinate anæmia accompanies gastric ulcer, and this is not surprising, for here we have at work the two most potent factors in causing anæmia, namely, blood loss and an insufficient dietary as regards iron.

Summary.—All the causes of chlorosis, ordinarily enumerated, may be reduced to two, or possibly three:—

1. Excessive menstrual loss, or (much less frequently) other blood-loss. This may be relative, that is, too much for a weakly or rapidly-growing organism to bear, or it may be actually large.

2. Insufficient ingestion of iron with food. Anything which diminishes the appetite diminishes the consumption of iron, therefore dyspepsia, constipation, heated rooms, insufficient exercise, unhealthy atmosphere, mental depression, etc., all predispose to anæmia by lessening the amount of food consumed. It is probably owing to change of habits, confinement indoors, and want of fresh air—all leading to small consumption of food—that so many girls from the country become anæmic on coming into towns to live.

In a very large number of cases there is a combination of 1 and 2.

3. It is possible that certain persons are born inherently weak in blood-forming power, and tend to become anæmic under very slight provocation. Such a constitution does not directly cause anæmia, but simply predisposes to it. This would account for cases in which the consumption of food is fairly satisfactory, and there is no particular blood loss so far as can be made out. In such people, however, nutrition is never very active.

Chlorosis in Boys and in Non-menstruated Girls.—This can be explained by the strain thrown on the body by rapid growth and by the conditions mentioned under paragraph 2 above. The anæmia of the menopause, in which the blood condition and symptoms are similar to what is seen in young girls is palpably due to dyspepsia, insufficient food, and excessive blood loss.

TREATMENT.

Iron.—When a fully developed case of chlorosis presents itself for treatment, clinical experience has abundantly shown that the chief remedial measure is the administration of iron. Whether given by the mouth, by the rectum, or subcutaneously, it is absorbed and utilised for the formation of new corpuscles.²⁰ There has been much discussion regarding this, but Macallum²¹ has recently demonstrated its direct absorption from the intestine. It appears to be stored in the liver, and is there converted into an albuminous compound which is the predecessor of hæmoglobin, but exact details regarding the steps of the process are wanting. Treatment by iron ought to be continued for eight or ten weeks, because comparatively little is absorbed, and the corpuscles which have been formed during the anæmic state are poor in hæmoglobin; they disappear slowly from the circulation, and are only gradually replaced by others rich in iron.

Any one of the ordinary Pharmacopœial preparations suffices as they can all be absorbed, and no one preparation in the present state of our knowledge can be definitely said to be much better than another merely as regards iron. The choice of the particular preparation to be used should be guided to a very large extent by the condition of the stomach. If, as is so often the case, the stomach is irritable, it is best to use the least irritating preparations such as reduced iron, ferrous carbonate in its various pharmaceutical forms, or one of the scale preparations, and these will be found most generally suitable. Hayem strongly recommends the oxalate, while

lactate of iron is also much used in France. The protochloride and sulphate are distinctly more irritating, and the ferric salts still more so. Large doses are generally given, and are held to be most efficacious and rapid in action, probably because more iron becomes absorbed, but many cases recover well in which comparatively small doses, such as 1 g. of reduced iron twice or thrice daily, are administered.

Manganese and arsenic given along with the iron are supposed to increase its efficacy. The former is certainly of no use, and the latter is unnecessary. It is supposed to stimulate the formation of red corpuscles, but in chlorotic anæmia such stimulation seems to be rarely required, for as soon as iron in sufficient quantity is supplied, the manufacture of hæmocytes goes on with great rapidity, generally leaving the hæmoglobin lagging behind.

Diet.—No specific dietetic rules can be laid down for all cases, as the diet must be regulated by the condition of digestion. The most easily absorbed and utilised diet is the best, although, as has been previously pointed out, farinaceous foods contain less iron than flesh. If gastric digestion is good, then an ordinary full mixed dietary is most suitable; on the other hand, if there be severe dyspepsia or gastric ulcer, the diet must be regulated accordingly, so as to give the patient most comfort and the food which can be digested most easily, and with most benefit to general nutrition.

Once a patient is markedly anæmic the amount of iron furnished by an ordinary diet can go only a very little way towards providing the iron necessary for recovery. Say that the blood is deficient in iron to the extent of 20 gr., it is evident from what has been previously stated, that it will be a very long time indeed before this can be made up from the small amount of surplus iron in an ordinary dietary.

Nasse²² states that fat hastens blood formation, which is confirmed by Cutler and Bradford,²³ and Ebstein²⁴ recommends the treatment of corpulent anæmics by means of fatty and albuminous food.

Rest in Bed.—Many patients who are severely anæmic do best when kept in bed, and some few recover only after this is enjoined. The explanation seems to be that the most distressing symptoms arise from lack of oxygen and debility of the heart and muscles, so that when complete rest is obtained there is less fatigue, and less oxygen is required for muscular exertion. The supply can therefore be used almost exclusively for purposes of nutrition, and thereby the digestion and general health are improved, so that the food and iron can be better absorbed and utilised. Slighter cases do best with an open-air life and a very moderate amount of exercise (taking care not to overstrain the heart) as the appetite and general nutrition are thereby stimulated.

Improvement of Appetite and Digestion.—Good general surroundings and personal hygiene, treatment of dyspepsia and of constipation are of the utmost importance, as thereby the appetite becomes larger, and the patient gets into the habit of taking sufficient quantities of food. The same is true of country air, spa treatment, hydrotherapy, and massage,²⁵ all of which may be useful adjuncts to more direct methods of cure. If the patient be not placed under favourable conditions, or remain under the influence of the causes which originally produced the anæmia, then treatment may be inefficacious or very prolonged. For instance, in many factories the girls employed often take Bland's pills as regularly as their meals, and yet they remain more or less anæmic chronically.

Prophylaxis.—Seeing that undue menstrual losses and insufficient food are the two great, if not the only, immediate causes of chlorosis, prevention seems simple enough. If the menstruation is relatively or absolutely too abundant, it can be held in check by giving ergot. In two severe cases of menorrhagia, where ergot did not control the bleeding, I have ordered hot douching with successful results.

More important still is the cultivation of a habitually good appetite and vigorous health, because sufficient iron is thereby ingested, and, as has been previously pointed out, healthy women bear menstrual blood-loss without serious deterioration of the blood. Leichtenstern found that when he lived generously and put on weight his hæmoglobin also

²² Cbl. f. med. Wiss., 1877.

²³ Amer. Journ. Med. Sci., lxxv, 1878.

²⁴ Corpulence and its Treatment, London, 1884.

²⁵ Mitchell, Amer. Journ. Med. Sci., 1894.

²⁰ Stockman, BRITISH MEDICAL JOURNAL, 1893, i.

²¹ Journal of Physiology, xvi, 268, 1894.

increased in amount, and it is obvious that abundance of food means a sufficiency of iron.

Good general surroundings, fresh air and exercise, are essential to a healthy appetite and digestion, and are of the utmost importance in preventing anaemia. Tea has often been blamed for causing chlorosis, but if taken at proper times it can scarcely exercise any deleterious effect. Many women, however, use it as a substitute for food, or take it before their meals, thus diminishing appetite and bringing on dyspepsia, both of which interfere with the ingestion of a normal amount of iron by means of the food.

A DISCUSSION ON THE REQUIREMENTS OF THE PROFESSION WITH REFERENCE TO THE REVISION OF THE BRITISH PHARMACOPOEIA.¹

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THE discussion which I have the honour of opening to-day is for the purpose of eliciting the views of members of the British Medical Association as to the changes which may be advantageously made in the forthcoming edition of the *British Pharmacopoeia*, with the view of adapting it to the present requirements of the medical profession. It may be well, however, if at the commencement I point out that, whilst the *Pharmacopoeia* is specially issued for use by the medical profession, and should, therefore, be in accord with its needs, it is, in its legal relations, concerned chiefly with the protection of the public and with the guidance of pharmacists, for whom its provisions are laws, the infringement of which is punishable. Hence, the effect any changes made in the *Pharmacopoeia* will have on the interests of the public and of pharmacists have to receive due consideration.

Furthermore, it must be remembered that the *Pharmacopoeia* is published by the General Medical Council according to Act of Parliament, and the Council can make no alterations unless they be in keeping with this Act.

Fortunately, however, the instructions given by Parliament relating to the *Pharmacopoeia* are very simple. By the Medical Act of 1858, Section 54, it has to contain (1) a list of medicines and compounds and the manner of preparing them, together with the true weights and measures by which they are prepared and made; (2) such other matter relating to them as the General Medical Council shall think fit.

No direction is given as to the nature or comprehensiveness of the list to be drawn up; but as in a subsequent Act, that of 1862, it is directed that the *Pharmacopoeia* published by the Council shall take the place of the *Pharmacopoeias* of London, Edinburgh, and Ireland, it is manifestly intended that the list shall be of the same kind as those published by these Colleges—that is, it shall refer to medicines used by members of the medical profession. It is clear, too, that though no mention is made of methods for determining the purity of drugs other than those furnished by a description of the method of preparation, the Act is intended to ensure uniformity in composition and the purity of drugs on the list set forth, for the benefit alike of the profession and the public.

The *Pharmacopoeia* of 1864, in which, owing to the exertions of Sir Richard Quain, the best parts of the formularies of the three Colleges were so admirably welded, and that of 1885, have carried out the manifest intentions of the Act. Each of them has contained lists of drugs and compounds such as the existing state of medical practice required at the time of publication, with the means for establishing the uniformity and purity of the remedies named, an account of the weights and measures used in preparing them and accessory information, as, for example, with regard to dosage.

The advances made in chemistry, pharmacy, and botany, the changes in medical practice, and other circumstances now render another edition necessary; and we have to consider to-day what alterations and additions can be suggested which will add to its value, so far as the medical profession is concerned, without interfering with the value of the book in its legal aspects.

It seems to me that in this discussion it will be well if we avoid details which have no direct bearing on the use of the *Pharmacopoeia* by medical men, as, for example, modifications of tests and alterations in the description of drugs or their botanical origin. It will, I think, be sufficient if we only deal with (1) the nature and extent of the list of remedies, (2) the mode of preparation of compounds so far as regards their medical use, (3) weights and measures, (4) the amount and extent of accessory information which should be given.

In alluding to such possible changes I propose for the most part only to introduce them for consideration. As a member of the General Medical Council, I am here to-day rather to learn the opinions of the members of this Association than to express definite opinions of my own.

List of Official Medicines.—Is the present list of official drugs and compounds satisfactory? If not, how can it be improved? A considerable number of drugs and preparations, both old and new, which are not now in the *Pharmacopoeia* are used more or less frequently by practitioners. To include them all and give tests for their purity would mean the production of a *Pharmacopoeia* three or four times as large as the present one, containing remedies of which a very small portion would be in general use. On the other hand, as is well known, there are a large number of substances in the present *Pharmacopoeia* which the majority of practitioners never use. From the investigation made by the Therapeutic Committee of this Association, which has been published in the JOURNAL, it appears that out of 135 of the drugs which seem to the Committee least used, 54 were never employed at all by above 5,000 out of 5,609 who returned the circular forwarded to all members of the Association in England, Ireland, and Scotland, and of those who do use them the majority give them rarely. Many strongly urge that there should be a wholesale exclusion of little used drugs on the ground that they must be of small value. It has to be remembered, however, that every drug in the *Pharmacopoeia* seemed to be prized by some practitioners out of the 5,609 who returned the circular. Of drugs, for example, nitrate of lead is often used by 80 out of this number, matico leaves by 67, sulphate of berberine by 48, lupulin by 39, and nitrate of copper by 22. Of preparations, confection of opium is often used by 56, confection of scammony by 34, confection of turpentine by 59, and ethereal extract of mezereum by 8. It would be interesting were it possible to determine why a small number used these and many other drugs often whilst 3,000 entirely discarded them.

We must not assume too hastily that the drugs and compounds which have not maintained their popularity are therefore without the utility entitling them to a place in the *Pharmacopoeia*; several remedies of great value have in times past been excluded from the *Pharmacopoeia* because the real purpose for which they ought to be employed was not at first fully known, and they were therefore little used. Bromide of potassium is an example of this. But if drugs cannot be shown on careful inquiry to possess the value formerly attributed to them they are better out of the *Pharmacopoeia*, for the fact that drugs and preparations are in it gives a kind of official recognition of their utility. The retention of useless drugs seriously injures the *Pharmacopoeia* in an educational point of view. The contents of the *Pharmacopoeia* should be the basis of a student's work in materia medica in order that it may be the basis of his therapeutic work afterwards; but it is absurd to require men to acquire knowledge concerning substances which will be of no service to them in after-life.

As pointed out in the memorandum of the Therapeutic Committee on the *Pharmacopoeia* the omission of a drug in no way prevents a practitioner ordering and obtaining it for his patients. It only takes away the guarantee for purity which arises from the fact that every drug on the official list sold or used by a pharmacist must conform to the pharmacopoeial description and tests. Hitherto the General Medical Council have followed the example of the compilers of former *Pharmacopoeias* in excluding a few of the least used remedies on the issue of a new edition, and adding others of which the value seemed proved. Whether the process of exclusion may with advantage to the profession be more fully carried out, or whether it would be well to deal as gently with remedies almost obsolete as heretofore, are points on which this meeting's opinion will doubtless be expressed,

¹ In the Section of Pharmacology and Therapeutics at the Annual Meeting of the British Medical Association, held in London, July-August, 1895.