

Oct. 4. She was evidently sinking; she was free from pain, but had occasional vomiting. The epigastrium was very tympanitic. An enema was tried, but the sphincter did not retain it. She expired, perfectly conscious, about 10.30 p.m.

Oct. 5, at 4 p.m., I made a *post mortem* examination. The abdomen was very tense. The dimensions of the tumour could be plainly seen, bounded by the distended stomach above and semicolon on the left side. I dissected, as carefully as I possibly could, through the abdominal walls; and, on opening the peritoneum (proceeding as in ovariectomy), there escaped in a jet about a gallon of perfectly clear limpid serum. I was doubtful now whether the fluid was ascitic, or that the cyst adhered to the abdominal walls. A probe was introduced, but no adhesions could be felt. On extending the incision upon a director, it seemed that the cavity containing the fluid filled the lower half of the abdomen from the rim of the pubes to about two inches above the umbilicus. There lay collapsed, at the bottom of this cavity, a large gelatinous cyst, floating in the fluid. It was perfectly white, and tore so readily as not to bear its own weight. It was formed of albuminous jelly-like layers, with a granular internal surface, and perfectly smooth exterior, and was as large as a child's head, and pyramidal in shape. It had evidently burst into the larger cavity, and floated loose, having no point of adhesion.

On further examination, the larger cavity was found to be a large cyst, everywhere adherent to the peritoneum, with numerous bands or bridles running in different directions from its posterior surface towards the mesentery, intestines, and other viscera. It was firmly adherent, and required the greatest care to dissect it from its connections; but here and there small patches of smooth unattached peritoneal membrane were traced with the corresponding peritoneal surface of the intestines facing, proving it to be an ovarian cyst. It had evidently started from the right ovary, forming attachments to the under surface of the fundus uteri, thence to the posterior surface of the bladder, extending upwards in contact with the abdominal walls, and pushing the intestines backward, and firmly adhering to them. It could admit of no further distension, owing to its connections, confining the uterus and bladder, so that they could not be raised above the pubes. The fundus of the bladder might be seen shining through an oval patch, of about the size of a crown-piece, where the cyst was perfectly transparent and very thin, as if it had expanded in this direction. The left ovary was free; the fimbriated extremity of each ovary was loose and highly congested. The uterus was hard, as large as an orange, filled with a coagulum of blood. The os was of a dark purple colour, soft and velvety; the cervix hard and enlarged, admitting a director with some difficulty. Had impregnation taken place, the uterus must have thrown off the ovum at an early period, for the uterus could not have risen above the pelvic brim. The bladder also, from the same cause, could not have contained an ordinary quantity of urine, and she was obliged throughout to pass it very often. All the other viscera were healthy. The cyst was decidedly unilocular, and no solid matter contributed to its size.

The above case shows how the subject of ovariectomy is beset with difficulties. No one will surely, after the *post mortem* disclosures, think that extirpation could have been practicable in this case. During life, the diagnosis of several gentlemen, admitted to be authorities on the question of ovarian disease, was, that the removal of the cyst by operation was favourable. On this point, all seemed agreed, and that the amount of solid matter was considerable. Mr. Wells only considered it to be multilocular. It seems that tapping and injection by iodine might have been practised with the greatest hope of success; and, owing to the complete adhesions, no fluid could have escaped into the

abdominal cavity, and the chances of peritoneal inflammation therefore were much diminished.

I have published the above case, not to discourage ovariectomists, but to show how great caution is needed before proceeding to extirpation. If the most experienced fail in the question of diagnosis, it surely behoves the humbler disciple to pause long before he undertakes an operation, the expediency of which is too broadly condemned by some, while it is, on the other hand, too indiscriminately adopted by others.

### THE GRANULATION OF MEDICINES.

By THOMAS SKINNER, M.D., Physician to the Liverpool Dispensaries; Fellow of the Obstetrical Society of London, etc.

"By the application of art, it is intended that medicines should be rendered more agreeable, more convenient, more safe, and more efficacious than they are in their natural state. To obtain these ends is the intention of pharmacy." (*Duncan's Elements of Therapeutics*, 1773, volume i.)

In furtherance of the above elegant and forcibly expressed ideas of Duncan, I beg to submit the following as an addition, if not an improvement, to the *methodus medendi*: namely, the *Granulation of Medicines*.

In an admirable paper by Dr. Henry Kennedy, of Dublin, which appeared in the pages of the *Dublin Medical Press*, and an abstract of which appeared shortly afterwards in the first volume of this year's *JOURNAL* (p. 524), it is laid down by him as an axiom in therapeutics, that the form of powder "is the most efficacious in which a medicinal substance can be administered." Having always entertained the same opinion myself, I have frequently thought of some method which would render powders more easy of deglutition, and less offensive to the senses of taste and smell. It at once occurred to me that the granular form, with sugar or gum as the excipient, would suit the purpose; but how to obtain the granular form without having recourse to the art of the confectioner, or without the aid of an excessive amount of heat, sadly puzzled me. On explaining my difficulties to Mr. Samuel Banner, an enterprising chemist in this town, and at the same time informing him that the French pharmacologists had a form of medication which they call "poudres granulées," the process of preparing which consisted in enveloping the particles of medicines in syrup by means of heat and constant stirring, as in the art of making comfits, he at once suggested a very simple plan, by means of which almost every medicine capable of assuming the form of powder may be granulated of a firm consistence; a process which demands little or no aid from heat; which requires very little moisture, and which results in a granular powder that may be laid upon the tongue and washed over the throat by means of water, without leaving a trace of a medicinal substance, or the slightest sensation to indicate its recent proximity to the peripheral extremities of the gustatory and olfactory nerves. The process is a modification of the method of granulating gunpowder.

*Method of Preparing the Granules.* The first requisite is a thoroughly good material; to obtain which, it is necessary that all powders, previously to their being converted into granules, should be fresh and of the best quality. As regards pulverisation, it may be as well to observe, that in order to form granules it is not necessary that the powder should be impalpably fine; a coarsely ground powder being quite as easily granulated as an impalpable one, and the resulting granule being quite as efficacious, if not more so, for reasons which will hereafter appear.

1. *Making the Mass.* The powder is to be placed in a Wedgwood mortar, and sufficient mucilage of gum arabic, of the London or Edinburgh *Pharmacopœia*

strength, is to be gradually added until a mass is made, of such consistence that it will with difficulty keep together, and which will readily crumble; at the same time, it must be so unadhesive as not to stick to the meshes of the sieves aftermentioned. There are few practical chemists having experience in pill-making who will not understand the required consistence. Or the powder may be made into a mass of the consistence of a dry paste, with the mucilage, rolled into flat thin cakes, and dried in a water bath, at a low temperature, or in a current of dry air. The cakes are then to be coarsely powdered or bruised in a mortar, when they will be ready for the next part of the process. (The last method is always preferred where it can be adopted.)

2. *Granulating and Sifting.* Three sieves will be required, of different degrees of coarseness; namely, twelve, sixteen, and twenty meshes to the inch, which may be called respectively, Nos. 1, 2, and 3. They are to be so fitted together that No. 1, the coarsest, shall be at the top; Nos. 2 next, and No. 3, the finest, lowermost. The mass being ready, and of the required consistence, it is to be rubbed through the top sieve with the open hand; the sieves, still fitted together, are to be shaken about as in sifting. This part of the process being terminated, it will be found that granules of the largest size are between sieves No. 1 and 2; the smaller between Nos. 2 and 3; and the "waste" below No. 3, either on paper or on a leather or parchment "drum." This waste is to be redamped; reformed into a mass, and passed through the same process. If the mass have been formed into cakes and bruised, the *débris* is simply passed through the series of sieves as in ordinary sifting. The waste is redamped with simple water, reformed into thin cakes, dried, bruised and resifted.

N.B. The different sizes of granules are never mixed, but kept separate for dispensing.

3. *Drying, Coating, and Waterproofing the Granules.* The two sizes of granules are to be kept apart; those prepared by the caking process require no drying; the others should be spread out on paper to enable them to dry spontaneously; or, if they contain no ingredient which might be volatilised or otherwise acted upon by heat, such as charcoal, etc., they may be placed in a hemispherical copper pan, which must be kept in constant motion over a gas stove until the granules are dry. They may also be speedily dried in a current of dry or hot air with occasional stirring. When perfectly dry, they are placed in a mortar of convenient size, and a sufficient quantity of a strong tincture of tolu, (ʒiij to ʒi) with or without musk, rose, etc., is added to them, until by constant stirring all the granules appear to be glossy and shining. They are then again put through the drying process, keeping them in constant motion.

Granules well prepared by the above process are very compact, and, to some extent, they are insoluble in cold water; a desideratum, as they may be conveniently administered in that, the best of all vehicles, without imparting to the water the slightest taste, smell, or colour. It may be well here to remark, that the quantity of gum in the average of granules is computed at one-sixteenth by weight; a quantity so small as not to affect the usual doses of powders. The quantity of balsam of tolu is so small as to be totally unworthy of notice.

*Method and Apparatus required for preparing small quantities of Granules.* For preparing small quantities, one wire sieve, about twelve meshes to the inch, eight inches in diameter (worth about eighteenpence), a little muslin, and an ordinary small brass pan, such as is to be found in every house, will be all the apparatus that is required. The foregoing directions on the large scale will be a sufficient guide.

*Pulverisation, etc.* In treating of the advantages of granulation, it is necessary to take into consideration certain objectionable practices which universally obtain

in the trade of drug-grinding. In the first place, I do not think that the trade is to blame in the matter; it is the fault of those, namely ourselves, who demand of the drug-grinder an impalpable powder, in almost every instance of the pulverisation of a drug. Now, an impalpable powder is all very well where charcoal and such like substances are concerned; but with cubebs, opium, rhubarb, spices, and a variety of similar medicinal substances, an impalpable powder cannot be obtained without considerable loss, as well as certain damage to their active principles. In order to obtain an impalpable powder, all drugs have first to go through the drying process, which is generally effected in a room heated to about 120° F., by means of a stove or steam pipe. (Mohr and Redwood's *Practical Pharmacy*, 1844, p. 238.)

The authorities whom I have just quoted state, that the principal, if not the only necessary cause of deterioration, in the product in the process of drug-grinding, is the long continued application of heat to which the drugs are exposed in the drying-room. "The strong smell which fills the drying-room when opium, or myrrh, or cinnamon, are under operation, affords sufficient evidence that some volatile matter besides water is escaping, and that the resulting powders cannot strictly represent the drugs from which they are made. Thus, myrrh, valerian, cardamoms, cinnamon, and spices generally, lose some of their efficacy in being reduced to fine powder." (*Op. cit.*, p. 241.)

Again, without taking into consideration the fact of the wholesale adulteration of drugs; of the errors of omission and commission which occur through mistakes in the botany of our materia medica, let me for one moment allude to the conventional practice of the trade, in reference to the allowance for loss of product during the process of drug-grinding; namely, the system of making a uniform allowance for loss of weight in grinding, whatever the nature or quality of the drug might be.

Messrs. Mohr and Redwood, after quoting a table taken from the experience of Messrs S. and G. Allen, shewing the loss sustained in grinding forty-two different drugs, state,—“It appears from this table that the average loss in powdering drugs is more than four per cent. (the percentage returned in every instance by the London drug-grinders, except in grinding such substances as cream of tartar and sulphuret of antimony, where they only allow two per cent.) in nearly all cases, and that in some it is considerably more. Now, can it be reasonably supposed that, in these cases, the drug-grinder will supply good rhubarb or jalap, gentian or ginger, for the water which has been imbibed in a damp warehouse or cellar? He is required to make up a certain quantity of powder, evidently more than the crude drug produces, but how is he to do it? Does he keep a stock from which to supply deficiencies of all the drugs he grinds, and go to market and purchase more when his stock is exhausted; or is there some magical power in his mill?” (P. 246.) The same most excellent authorities inform us that,—“Instead of water, sawdust is used for cleansing the drug-mill. After grinding any drug, in order to remove the adhering particles from the mill, sawdust is ground until the mill is rendered sweet and clean. Sawdust, then, is indispensable at a drug-mill, as necessary as water is in a druggist's shop, and if the druggist sends damp jalap, containing fifteen per cent. of water, to be ground, and requires dry powder to be returned, with only four per cent. of deduction for loss, he adopts a conventional method of asking for some of the *rinsing of the mill*—a veritable 'powder of post.'” By this practice the weakest and most worthless of drugs are rendered still weaker; besides, as it sanctions the practice of admixture, and affords facilities for those, who are so disposed, to pursue a ruinous competition in price at the sacrifice of quality, any means

which will assist in removing so gross a system—a system which not only ruins our own reputations, but which is prejudicial to the advancement of our beloved science—must be hailed and welcomed. The granulation of powders I look upon as such a means.

*Advantages of Granulation.* As I have before stated, it is not at all necessary, except in the instance of charcoal and a few other substances, that the drug should be reduced to an impalpable powder; a coarse or moist powder being quite as easily granulated as an impalpable one, if not more easily; and I am quite convinced from experience, that the secretions of the alimentary canal act on and are reacted upon by the active principles of the granules made from a coarse powder, quite as effectually, and in the same amount of time, as when the granules are prepared from an impalpable one. This being the case, and as the process of granulation from the first requires very little or no heat during any stage of the process, I repeat that I think it bids fair to remove the four per cent. system; to lessen the amount of loss of the active ingredients of drugs caused by the present demand for impalpable powders; and to give us the crude material unaltered, in a form most easy of deglutition and always ready for infusion in nature's own digestive apparatus, the living human stomach.

By the process of granulation, the active principles of medicines are not only prevented from loss by evaporation or decomposition during their preparation, but, every particle being enveloped as it were in a pellicle of gum, and a number of these particles being aggregated together, when they become dry, powerful contraction takes place, rendering them very compact, and capable, if kept dry, of preserving their active principles for an almost indefinite period after they are prepared. The coating of tolu renders them inaccessible to the ordinary moisture of the atmosphere, and, to some extent, to any cold liquids in which they may be taken. With the exception of extracts, the form of granulation contains much more of the active ingredients of medicines, bulk for bulk, or weight for weight, than any of the other forms of medication. On this and on other accounts, most of the saline and irritating caustic remedies will necessarily be exceptions to the form of granulation, that of solution being their only legitimate form of administration.

Lastly, as all the various officinal and other pill-masses are capable of being as easily granulated as powders, it is not improbable that, to some extent at least, pills may become an all but obsolete form of administering medicines. By granulating pill-masses, they are much more certain and rapid in their action; the dose is much more easily apportioned, and still more readily dispensed. When it is considered how difficult it is to get children and young people to take a pill, and how next to impossible it is for some adults to swallow them, the granulating of pill-masses, whether officinal or not, will, I have little doubt, become a matter of imperative necessity.

Speaking of the *poudres granulées* of the French school of pharmacy, Sonbeiran has applied the epithet "*Citò, tutò, jucundè*;" which words, Bouchardat states, "Contiennent en germe toute une révolution dans la pharmaceutique. Cette révolution, il faut le dire, est déjà en partie accomplie." If so much can be said in favour of the *poudres granulées*, with equal justice, I think, the same may be said of the process of granulation so happily thought on, and so well carried out by Mr. Banner.

*Doses and Mode of Administering Granules, etc.* As the quantity of gum is only one-sixteenth, it has not hitherto been thought necessary to alter the ordinary officinal or recognised doses of powders. Unless they contain poisonous ingredients, there will be no necessity to alter the dose. As it stands, the mistake is certain to be on the safe side. Granules may be prescribed or dispensed by

weight in separate powders or in bulk. If in bulk, say by weight from one to four ounces; and the direction may be worded, a teaspoonful or a saltspoonful twice or thrice daily, before or after meals, as the case may be.

A modern teaspoon and saltspoon are useful and convenient measures for apportioning the doses of most granular powders. As a rule, a teaspoon holds double the quantity of a saltspoon, thus: one teaspoonful (unheaped), of charcoal granules equals fifty grains, while a saltspoon holds twenty-five grains. Granules of Gregory's powder (compound rhubarb powder), are seventy grains to the teaspoonful, or thirty-five grains to the saltspoonful. These two medicines may be looked upon as a very fair average of most granules formed of vegetable and other light powders. More active ingredients should be prescribed as separate powders.

Officinal or not, compound powders may be kept on stock, or they may be dispensed from the various individual granules of the same size as that of which the compound powder is made up; but they cannot, any more than extempore granular powders, be made at the time of dispensing without great inconvenience and loss of time to the dispenser, unless some simpler and more expeditious plan is found out. So far as Mr. Banner's establishment is concerned, no additional charge is made for granules over ordinary powders.

The following modes of administering granules have been adopted by my own patients, some preferring the one method and some the other, according to taste or fancy, I suppose.

1. Place the dose of granules on the tongue, take a little water into the mouth, and swallow them over with the water. Some prefer to moisten them with the water in the mouth, previous to swallowing; a very useful precaution, as it is extremely difficult to swallow anything that is dry. 2. Others put the granules into a wineglass, full or half full of water, quickly stir them round and swallow them while suspended, *secundum artem*. This latter method, I think, is the best; there is no taste, colour, nor smell, communicated to the water, if it be done quickly. In fact, this form of medication renders powders, hitherto the most unpleasant of all forms of medicine, the most elegant and agreeable.

In conclusion, I cannot resist the temptation to make a few remarks on two granular powders, namely, charcoal and ergot of rye. The former of these substances I look upon as a most invaluable medicine; but on account of its colour and the difficulty hitherto experienced of rendering it at all agreeable to swallow, it may be said to have become obsolete. In 1856, I remember a box of charcoal biscuits which used to be shown at the table of Professor Simpson, as the latest pharmaceutical curiosity, and which was sent to him from London as a specimen of an elegant form of administering charcoal in dyspepsia. The appearance of the biscuits may have produced the affection in some of the curious lookers on, but I am certain that they stood a poor chance of curing it, as I never saw any one who dared to venture beyond a nibble at the foul intruder. Granulated charcoal in doses of a saltspoonful or teaspoonful, at bedtime, or twice or thrice daily, after meals, will be found to be as readily taken as any medicine we possess.

As to ergot of rye, I do not think that we have any reliable preparation, particularly one that will keep. Moreover, I have long been convinced that the liquor, as prepared by the very best of chemists, does not contain all the active ingredients of the fresh powder, much less is one fluidrachm of the liquor equal to one drachm of the fresh powder, because I have often given at one dose as much as six drachms of the liquor as prepared by Messrs. Duncan & Flockhart, and Messrs. Clay and Abraham, the leading chemists in Edinburgh and Liverpool respectively, without producing uterine action or sickness or vomiting, the idiopathic symptoms of a full medicinal dose of ergot or its active principle, whilst I

have never given two drachms of the *fresh* powder without producing *nausea* or *sickness* and powerful uterine contraction, during or after labour, except where there existed complete *inertia uteri*, arising from disease, from innate weakness, from excessive loss of blood, or from dangerous exhaustion; under all of which circumstances I should never rely upon nor have recourse to the exhibition of ergot.

Believing, as I have stated, that no liquid preparation hitherto introduced is really equal to the fresh powder made by one's own self in its medicinal effects, and, knowing by experience, that the powder does not keep well, I venture to affirm, that the granules of a fresh specimen of any good season's ergot will be found to be the best preparation of the drug, as regards keeping, ease of administration, and certainty of effect; I shall only add, that as the powder of ergot is subject to the same mishaps from the *rinsings of the mill* as other powders, I would strongly recommend those of my professional brethren who desire to possess a reliable form of this important and useful drug, to get the present season's ergot from Butler in Covent Garden Market, powder it themselves and make it into granules as directed, or order the same through any respectable chemist. If this advice is followed, I feel confident there will be less fault to be found with ergot and fewer cases of its failure recorded, in cases where such an agent is at all likely to act with effect.

In administering ergot in granules, the smallest size is preferable, as they are more quickly dissolved in the stomach. The dose is a saltspoonful or more.

## British Medical Journal.

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### GRATUITOUS MEDICAL SERVICES.

OUR esteemed correspondent, Dr. P. H. Williams, has, we believe, stated in his letter (given at another page), as honestly and fully as can be stated, the arguments—we fancy, the only arguments—which can be adduced in favour of gratuitous medical services. We sincerely trust that the subject may now excite the serious consideration of the profession. Long reflection on it has fully satisfied us of the deep injury inflicted on our profession by the system so universally adopted amongst us; and well convinced are we that, the more the subject is discussed, the more anomalous and unreasonable will the system appear in the eyes of the profession. It is not our intention on the present occasion again to enter upon the injurious influences which it exercises upon the position and the income of the medical man. We wish only now to suggest one or two important data which have been omitted in Dr. Williams's letter, and which, as we venture to think, entirely destroy the value of his arguments in favour of gratuitous medical services.

There is perhaps some confusion in the meaning of the term gratuitous medical services, as used by Dr. Williams and by ourselves. Dr. Williams greatly mistakes our views, if he thinks that, in denouncing

the system of gratuitous medical services, we are denouncing the system of giving gratuitous medical services to those of our poorer brethren who are unable to provide themselves with the blessing. On the contrary, we go quite as far as Dr. Williams does, in the desire that the poor should have all these things gratis. Let this be fully admitted.

Then, taking the very grounds upon which Dr. Williams assumes that the poor have a title to gratuitous medical services; using the very argument used by him—viz., that those who benefit by the experience obtained by medical men in hospitals and medical schools should thus requite the poor,—admitting all this, we are led, and by inevitable logic, as it seems to us, to a very different conclusion from that adopted by Dr. Williams. Yes; let those who obtain the benefits of that knowledge, thus gained at the expense of the poor, abundantly requite the poor. But who are they who do thus benefit? Why manifestly the community at large, not the medical profession merely. Why, then, should not the real debtor—the community at large—pay for the benefit? Why is the whole burthen of the debt to fall upon the man of medicine alone? Let him, assuredly, pay his share of the account, like the rest of the world. Why, one of the ordinary bribes, so often used by governors of hospitals to catch subscribers, is this very one; viz., the benefit which they, as members of the community, indirectly derive from hospitals, through the extra medical knowledge there acquired by the doctors. Surely, then, they get benefit out of the poor; and why are they not to pay for it?

The other argument used by Dr. Williams is as clearly untenable. He says: "There is another and a higher plea for our benevolence, as a profession, to the poor; namely, our claim to *unite with other classes in the work of charity.*" The answer to this is plain. We do unite with other classes in the work of charity, and quite independently of this gift of advice gratis. There is, in truth, no class of society which, in the mere money gift and other acts of charity, is more benevolent than our profession. We do all that "the lawyer, the butcher, the brewer, the coal-merchant," and the rest of the community do in finding "*abundant aid in the pecuniary department of the various institutions in which we labour.*" We are as free with our money as they are with theirs in all this. Our guineas fall as abundantly as theirs into the lap of charity. But mark the immense difference between their charity and ours: in addition, we give our labours and advice gratis.

Here, then, stands the matter, as argued by Dr. Williams, and as answered by us:—The medical knowledge gained at the expense of the poor is a boon to the whole community. Medical men, as members of the community, sustain medical chari-