

PHARMACEUTICAL HISTORY AND ITS SOURCES IN THE WELLCOME COLLECTIONS

III. FLUID MEDICINES, PRESCRIPTION REFORM AND POSOLOGY 1700–1900¹

by

J. K. CRELLIN AND J. R. SCOTT

DURING the nineteenth century prescribed medicines underwent considerable changes. Many new forms were introduced and, as will be related in this paper, the multidose mixture emerged as the most popular 'wet' medicine.² This study was prompted mainly by the large collection of sixteenth- to nineteenth-century vials and bottles in the Wellcome Institute of the History of Medicine which highlights the growing popularity of the multidose mixture at the expense of small-volume preparations, the draught and the drop. Not so apparent from the vials and bottles, however, is the demise (also linked with the growing popularity of the mixture) of such large-volume preparations as juleps, apozeams, and medicated ales and possets, medicines which mostly fell within the province of domestic medicine.

DOMESTIC MEDICINES AS 'EXTERNAL' VEHICLES

A characteristic feature of administering medicines around 1700 was that the medical practitioner often directed—as an *integral* part of his treatment—that water (medicated or plain), juleps, draughts, or possets, etc., were to be used as external vehicles, i.e. as aids for washing down powders, boluses, and electuaries.³ In other words, solid medicaments were not generally incorporated into the liquid vehicle as was to become common practice when the mixture gained greater popularity.⁴

The majority of such liquid 'external' vehicles were frequently looked upon as

¹ This paper is concerned primarily with the British scene, but provides some guidelines to developments on the Continent; these were similar to those in Britain, even if not exactly contemporary (cf. remarks by Cullen and by Gray p. 136 and fn. 15).

² During the period being reviewed medicines were commonly referred to as 'wet' or 'dry' and it is therefore appropriate to consider the two classes of medicines separately. Fluid medicines are perhaps of greater interest as they more readily underline problems of accurate dosage. (The story of dry medicines and their contribution to accurate dosage will be reserved for future studies in this series, though some of the material in this paper, especially on posology, is relevant to all medicines.)

The clear-cut separation of wet and dry medicines is well illustrated in an interesting autobiographical note by Peter Squire who was the first chemist (as distinct from apothecary) to hold a Royal Warrant. Writing about 1836 he said that after an apprenticeship to the first chemist in the City of Peterborough, 'I left . . . a few months after the termination of my time & filled a situation reserved for me in the house of Wilson Kinshell Ashmore & Hodgkinson, but was quickly promoted to the wet department (comprising all fluid medicines) and the management of the Laboratory, after three years I left them to enter the House of Hodgkinson & Co. where I was quickly placed at the head of the dry department'. (Wellcome A.L.S. file 305640).

³ Many examples of prescriptions, written for various patients in the 1670s and 1690s, are in a Wellcome manuscript prescription book (no. 1164). Occasionally, draughts and drops were recommended to be taken with juleps, etc.

⁴ Nevertheless it was early recognized that many medicines were more active in fluid form. For instance, W. Cockburn wrote (*Phil. Trans. R. Soc.*, 1708–9, 26, 47) that purgative 'medicines always purge best and most constantly in a liquid form.'

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supportive therapy.⁵ Many of them, too, were classed as ‘kitchen physic’, an area of medicine not commonly mentioned in dispensatories, apothecaries’ accounts, and prescription books, though its scope and importance can be judged readily from home recipe books of the seventeenth and eighteenth centuries.⁶

However, as the period under consideration progressed (particularly in the nineteenth century), less and less emphasis was placed on such traditional home fluid medicines as medicated beers and curdled milks. There are many reasons for this. One is the decreasing interest in traditional herbal remedies because of increasing reliance on the ‘orthodox’ remedies recommended and used by the medical establishment. This arose, after around 1750, partly through the growing popularity of commercially-produced medicine chests; by the nineteenth century, great emphasis was placed on their value for emergency illnesses: ‘in the midst of life we are in death’ was the stark reminder in one medicine chest booklet.⁷

Two of the more vigorous promoters of these chests in the second half of the eighteenth century were Hugh Smith and Alexander Dalmahoy. None of Smith’s chests has been located, but the companion booklet he published is informative as it lists items generally associated with domestic medicine (for example, barley water, rum caudle, and salop) alongside more potent remedies widely used by medical practitioners, such as sulphuric acid and preparations of cinchona bark.⁸

⁵ One of the most explicit statements on this was by John Quincy in his *Pharmacopoeia Officinalis & Extemporanea: or a Compleat English Dispensatory*, London, 1718, p. 481. He also made it clear that for urgent treatment, preparations such as boluses and draughts were more appropriate.

⁶ ‘Kitchen physic’ was the term covering such preparations as medicated wines, ales, meads, and wheys, which were often collectively referred to as diet drinks. Juleps—generally sweet, pleasant translucent liquids—were not looked upon as kitchen physic in the same way as diet drinks, though they had a similar role. John Locke, for instance, wrote on one occasion: ‘If he feels faint then refresh him with this julep: take two ounces of alexipharmac water of palmarius; 3 ounces of fumitory, benedict thistle and scabious; 1 ounce of water of borage and bugloss; $\frac{1}{2}$ ounce of juice of fresh lemons; 1 or 2 ounces of syrup of raspberry’ (quoted in K. Dewhurst, *John Locke (1632–1704), Physician and Philosopher*, London, 1963, p. 239). Cf. also the pint of cordial-julep prescribed for William Blundell in 1681 (R. M. S. McConaghey, ‘The history of rural medical practice’, in F. N. L. Poynter (ed.), *The Evolution of Medical Practice in Britain*, London, 1961, pp. 117–43).

Kitchen physic was mentioned in a few dispensatories such as Quincy’s (op. cit., fn. 5), Fuller’s *Pharmacopoeia Extemporanea: or a Body of Prescripts*, London, 1710 (first English version) and P. Morellus’s *The Expert Doctors Dispensatory*, London, 1657. Only two references have been found in eighteenth-century apothecaries’ accounts. One is the Pharmaceutical Society of Great Britain MS. 367 which lists the items prescribed by an apothecary for Sam Barrow in 1716, and paid for by the parish of St. Anne’s, Soho. The second is Wellcome MS. 1088, which notes Charles Heygate’s supply of ingredients for a diet drink to Mrs. Adam Newitt on 1 May 1752.

Nevertheless, such infrequent mention does not mean that kitchen physic was generally frowned upon by medical men, for such preparations could be prepared in the home on the advice of a doctor and did not need a prescription. In 1697 John Locke wrote: ‘purgings are a sort of violence of nature and should be used no more than necessity required and by intervals. If kitchen physic will do I will never use any other’ (quoted in K. Dewhurst, op. cit., p. 297). Liquid domestic medicines, too, were often used as ‘dilutents’, many examples appearing in, for instance, John Huxham’s celebrated *Essay on Fevers*, London, 1730. On pp. 8–9 Huxham stated that water did not mix well with blood and that it was necessary to add ‘something saponaceous with it, as sugar, syrup, jellies, or rob. of fruits, as currants, raspberries, cherries, or the like.’

⁷ *Butler’s Medicine Chest Directory, and Family Catalogue of Drugs, Chemicals, etc.*, Dublin, 1832 (3rd ed.), p.v. It is also of interest that Dalmahoy’s companion booklet to the medicine chest (cf. below) stated that the domestic chest was useful so that the physician could have remedies to hand when visiting.

⁸ *The Family Physician: being a collection of Useful Family Remedies*, London [n.d.] (8th ed.). This medicine chest companion was larger than most which were published, and with its comments on bleeding and diet it was akin to general books on domestic medicine. The 8th edition used here has the additional interest of added blank leaves for the owner’s annotations and recipes.

Dalmahoy's guide to his chests is in marked contrast.⁹ It was a much smaller publication, omitting any reference to traditional herbal medicines while discussing a wider range of medicines used by orthodox medical practitioners.¹⁰ As such it was similar to many nineteenth-century medicine chest booklets, even to the inclusion of a number of proprietary remedies, such as Goulard's Lead Lotion, Huxham's Tincture of [Cinchona] Bark, and James's Fever Powder. Apart from these proprietaries, which achieved considerable respectability among physicians, there were hundreds of others undoubtedly contributing to the demise of traditional domestic remedies.¹¹ In the same way, the commercially-prepared invalid and infant foods which came to the fore in the nineteenth century (notably after the introduction of Liebig's meat extract in the 1840s)¹² contributed greatly to changes in home nursing practices.

Another reason for traditional domestic remedies losing ground was that, in general, medical practitioners placed decreasing emphasis on the use of external vehicles as an integral part of their treatment. There were exceptions, however; in Highgate during the 1830s vehicles like wormwood tea, white wine and brandy were occasionally prescribed as external vehicles.¹³ There is no doubt that some traditional remedies prospered throughout the nineteenth century (even though their use was left more and more to the whim of the patient and nurse), and the unpalatability of one preparation at least—castor oil—even encouraged their use.¹⁴

⁹ *Directions for Exhibiting the Medicines contained in the Chests Prepared and Sold by Dalmahoy, Chemist to Her Majesty*, London [n.d.].

¹⁰ Dalmahoy did, however, include notes on correct diet, more characteristic of larger books on domestic medicine. Also, his chests were designed to hold a number of crude drugs (e.g. senna, rhubarb, and manna) so that medicines could be prepared in the home. This feature is not found in later nineteenth-century chests, reflecting a developing reliance on commercial preparations. Evidence for this comes from an examination of the 250 English medicine chests in the Wellcome Institute of the History of Medicine. Three of these chests bear the label of Dalmahoy's successor, J. E. Stock (Dalmahoy died in 1783).

¹¹ Evidence for the popularity among medical practitioners of the celebrated preparations of Goulard, Huxham, and James—to which others such as Battley's preparations of opium and cinchona could be added (cf. fn. 42)—comes from a variety of sources, for instance, prescription books. There are many accounts of quack preparations, but virtually no study on the overall impact of proprietary preparations on society and on medicine and pharmacy. For useful introductions, however, see J. H. Young, *The Toadstool Millionaires*, Princeton, 1961, and M. N. G. Dukes, *Patent Medicines and Autotherapy in Society*, The Hague, 1963.

¹² For a brief account of Liebig's meat extract see W. A. Shenstone, *Justus von Liebig, his Life and Work*, London, 1895, p. 163 *et seq.* A small selection of obsolescent twentieth-century proprietary foods are in the Wellcome Institute. Also a black painted storage-box (50 x 24.6 x 34.5 cms.) inscribed **BARON LIEBIG'S FOOD FOR INFANTS/SAVORY & MOORE**.

¹³ A. E. Bailey, 'Early nineteenth-century pharmacy', *Pharm. J.*, 1960, 185, 208–12 (p. 210). Other prescription books of around the same period, which have been examined, do not mention external vehicles, although they reflect a wide diversity of prescribing habits. Those practitioners who did refer to domestic medicines as external vehicles may have been following some of the prescriptions in Jonathan Pereira's well-known *Selecta à Praescriptis*, London, 1824.

¹⁴ Castor oil came into popular use towards the end of the eighteenth century—it was introduced into the *London Pharmacopoeia* of 1788—and at that time Thomas Skeete was telling students at Guy's Hospital that it was 'used in medicine as a purgative only given in peppermint water or in brandy & water or in any other simple water' (see interleaved copy of J. Aikin, *A Manual of Materia Medica*, Yarmouth, 1785, in the Wellcome Institute of the History of Medicine. From internal evidence the manuscript notes written on the interleaves are taken from lectures by Skeete). In the nineteenth century physicians continued to advise on ways of taking castor oil and a few examples will give an idea of the popularity and deep concern with this unpalatable product.

Andrew Duncan in his 1803 revised edition of the *Edinburgh New Dispensatory*, p. 296, remarked that 'with many, the aversion to oil is so great, that this purgative cannot be taken without great reluctance; and accordingly different modes of taking it have been proposed. Some prefer taking it swimming on a glass of water or peppermint water, or in the form of an emulsion, or with the

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As will now be seen, a major explanation for the physician's lessening concern with external vehicles was that the more popular ones, such as juleps and barley water, commonly became the vehicles in multidose mixtures, thus making them superfluous as supernumerary preparations. Nevertheless, the transition into multidose mixtures was not uniform and a few juleps survived throughout the nineteenth century.¹⁵

PRESCRIPTION REFORM; THE DEVELOPMENT OF MULTIDOSE MIXTURES

In 1700 the multidose mixture had a comparatively lowly place in medical treatment. John Quincy, whose mention of the value of boluses and draughts for urgent treatment has been noted in fn. 5, defined a mixture as 'properly a julep with solid ingredients dissolv'd in it, or when oils are added to draughts without incorporation'.¹⁶ Quincy, in fact, frowned upon the use of mixtures, believing that juleps should remain as 'diluters' for washing down and diluting active ingredients formulated as boluses, etc.¹⁷

addition of a little rum'. Another suggestion was the use of coffee, as directed by the castor oil label of the pharmaceutical chemist J. F. Sims: 'to be taken floating on coffee, water or peppermint water' (Wellcome Institute of the History of Medicine label collection). S. Ringer (*A Handbook of Therapeutics*, London, 1876 (5th ed.), p. 251) promoted the more elaborate idea of taking it in 'beef tea highly peppered and well salted, or . . . beaten up with an equal quantity of the froth of porter, and tossed off before the constituents have separated'. But perhaps the most complicated suggestion was Whitla's cream 'sandwich':

Pour some *thick* cream into a very clean wine-glass, turn it round, so that the sides get smeared well over, pour in a tablespoonful of castor oil, and a little cream on the top. The patient, having taken a teaspoonful of cream into his mouth and caused it to come into contact with his palate by the movement of his tongue, is directed to swallow at a gulp the oil and the cream out of the wine-glass, throwing back his head, that they may the more readily pass over the tongue. (W. Whitla, *Elements of Pharmacy, Materia Medica and Therapeutics*, London, 1889, p. 496).

Apart from these liquid aids, there were mechanical ones such as Gibson's spoon introduced for giving medicine to fractious children, etc. (cf. A. L. Lothian, 'Mr. Gibson's Physic Spoon', *Chem. & Drugg.*, 1959, 172, 17–18). However, Gibson's spoon became associated with castor oil and is sometimes referred to as a castor oil spoon. S. Baring-Gould has provided a lively reminder of its use:

My grandmother was a very managing woman, systematic in all her proceedings, and possessed a store-room well furnished with drugs and plasters wherewith she doctored the villagers . . . There was one article in her cabinet of which I had frequent experience, and against which I harboured a lively hatred. This was a leaden [*sic*] spoon with a hinged cover and a tubular handle. The spoon was filled with castor oil, the thumb of my grandmother was applied to the open end of the handle, thus retaining the oil in suspense till the spoon itself had been rammed between my teeth on to my tongue and back into the depths of my throat. Then the thumb was withdrawn, and the contents of the spoon shot down my throat. Resistance was rendered impossible. (*Pharm. J. & Pharmacist*, 1924, 112, 119).

¹⁵ Cf., for instance, *Pharmacopoeia in usum nosocomii a Thoma Guy Armigero*, London, 1851, and S. T. Anning, 'A hospital pharmacopoeia of the nineteenth century [1863]', *Med. Hist.*, 1966, 10, 70–75. The use of juleps in hospitals in the second half of the nineteenth century is a little surprising, for juleps had become something of a luxury and all hospitals were economy minded (cf. p. 141). It is striking that in 1815 *The Complete Medical Dictionary*, (London, vol. 2) wrote that juleps once 'served principally for a vehicle to other forms not so convenient to take alone, but modern practice disowns these refinements'. S. F. Gray, in 1823 (*The Elements of Pharmacy*, London, p. 293), also indicated that juleps were rarely used and added that 'the foreign apothecaries sell large quantities of [juleps] in summer, as agreeable beverages for sober persons; but our English apothecaries are at present so earnestly engaged in attempting to procure the monopoly of the practise of physic, or to become salaried parochial officers like the clergymen and vestry clerk, and thus to depend upon the contents of their purse, or their intrigues, rather than their professional qualifications; that they despise every branch of trade, where the competition of others hinders them from getting a larger profit than other tradesmen.'

¹⁶ Op. cit. (fn. 5), p. 527.

¹⁷ Ibid. See fn. 3 for reference to manuscript prescriptions illustrating the incorporation of solid ingredients in powders. Quincy specifically objected to formulae which appeared in T. Fuller, *Pharmacopoeia Extemporanea*, London, 1710.

But Quincy's objection to the transition of juleps into multidose mixtures was not widely heeded; a dispensatory published in 1748 indicated that the common julep was generally being used as a 'vehicle for powders, boles, &c'.¹⁸ Many prescriptions of the period demonstrate the transition which, by the 1740s, had been underway for many decades. The following, prescribed for 'Mr. Mould's man' on 16 July 1678, is an early example of a medicine requiring a 'Shake the Bottle' label.¹⁹

Aq. meliss, aq. cerass. nigr aa ℥ iv; aq. peon comp ℥ ii; tinct castor ℥ ii; spirit sal. armon ℥ i; margarit pp, pulv. de guttot aa ℥ ss; sacch cond ℥ ss; M.F. julap [julep] de quo capt cochlear 3 d vel 4 d; agitata phialâ tertia quag hora vel saepius in languoribus.

Yet, ironically, in spite of Quincy's dislike of the development of the julep into the mixture, his own attitudes on formulation were part of a movement aiding this development, namely the rationalizing of prescriptions in which the incorporation of powders into liquids was a valid part.

The reform of prescriptions through drastic simplification of formulae was one of the most conspicuous features of eighteenth-century medicine and pharmacy. Many factors contributed to the reform, a notable one being the recognition of the excess of seventeenth-century chemists in introducing too many chemical remedies, especially medicated waters.²⁰ Somewhat allied with this was increasing interest in classical preparations, which led to a critical eye being cast on any additions to the original formulae.²¹

There was, too, growing dissatisfaction with polypharmaceutical preparations on grounds of their inelegance and inefficacy, and because of the difficulties in detecting adulteration and inaccurate compounding. It is not improbable that such dissatisfaction owed something to the influence of chemistry which emphasized purity, and cautioned against possible incompatibilities; Cullen remarked that chemistry

has taught us a greater accuracy in preparing all its peculiar productions, and to lay aside many of those operations with which it had amused the physician, and had imposed much useless labour upon the apothecary. In particular, it has instructed us how to make the combinations of medicines with greater correctness and propriety; and in all these respects has rendered the whole of the pharmaceutical treatment of medicines more simple and accurate than it was before.

Chemistry has thus greatly improved the state of the materia medica and has led physicians to a discernment that should reject the luxuriency of composition formerly so prevalent . . . The reformation in this respect has not yet taken place in any remarkable degree, excepting in the Northern countries of Europe, in Britain, Sweden, Denmark and Russia.²²

Quincy used the term 'diluters', but does not appear to have employed it as it was commonly understood, namely as a preparation for thinning the blood (cf. Huxham, op. cit. (fn. 6)).

¹⁸ *Medulla Medicinae Universae: or a New Compendious Dispensatory*, London, 1748 (2nd ed.), p. 66.

¹⁹ Wellcome MS. 1164 (f. 18). This mixture is also interesting in that it contained pearl, one of the few solid medicaments generally accepted in juleps. Pearl julep survived well into the nineteenth century.

²⁰ Cf. H. Pemberton, *The Dispensatory of the Royal College of Physicians of London*, London, 1746, p. 36.

²¹ The 1721 *London Pharmacopoeia* commented: 'we have had a due regard to antiquity; but not so much as to retain anything purely on that account' (quoted in J. Quincy, *The Dispensatory of the Royal College of Physicians in London*, London, 1721, p. 6 of unnumbered preface). But for a better example of interest at this time in classical medicine, see C. Arbutnot, *Tables of Ancient Coins, Weights and Measures, Explain'd and Exemplify'd in Several Dissertations*, London, 1727.

²² *A Treatise of the Materia Medica*, Edinburgh, 1789, vol. 1, pp. 31–32. It is not entirely clear

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Allied with a growing preoccupation with inelegance and inefficacy was a deep concern with the amount of active ingredients in compounded preparations, a concern linked with administering appropriate-sized doses to patients (see below). In the 1740s, for instance, Henry Pemberton published a table giving the amount of mercury, opium, or purgative drugs in a range of preparations, and Robert James issued 'a calculation of the proportion of each ingredient in given quantities, of the principal compositions'.²³ In this James gave the amount(s) of active constituent(s) in generally-accepted doses of compound preparations, putting overt emphasis on accuracy by indicating proportions of active ingredients to four decimal places!

One of the more interesting guides to quantities of active ingredients in compounded preparations was John Ayrton Paris's 'Medicinal Dynameter and Scale of Equivalents' first issued in 1825.²⁴ This was designed to 'shew on bare inspection, the quantity of active matter contained in any given weight or measure (according as it is solid or liquid) of an officinal compound, and the dose of any preparation which will be equivalent in strength to any given quantity of any other of the same class'. The dynameter comprised a disc, pivoted at its centre, let into a circular logarithmic scale. The preparations were listed on the disc according to a colour code (e.g., red for opiates, blue for mercurials). If the name of a preparation was set up against the appropriate quantity on the scale, the amount of active ingredient could be read off easily.²⁵

Such intense concern with active ingredients was linked with emphasis on the quadripartite nature of prescription formulae. The four parts were the *basis* (the most important ingredient), the *adjuvans* (to promote and assist the action of the base), the *corrigens* (to remove unpleasant or noxious qualities of the ingredients without impairing their virtues), and the *constituens* (for preparing the ingredients into a presentable medicine).

This four-part classification of formulae was not new to the eighteenth century—it had, for instance, been used to rationalize polypharmaceutical preparations in the seventeenth century²⁶—but in the eighteenth century it was linked with emphasis on simplicity and elegance, thus ensuring that the utility and function of each ingredient was questioned and ascertained. It was in this area that John Quincy made valuable contributions, being one of the earliest writers to focus attention on these

just what Cullen had in mind, but it seems that he was referring to more than elegance of preparations and the growing interest in active principles of crude drugs. Perhaps he was thinking of improvements in preparing tinctures and infusions, etc. Certainly Peter Shaw in 1734 (*Chemical Lectures*, London, pp. 193–217) seemed to indicate that improvements along those lines would lead to a reduction in 'copious' pharmacy with its inherent dangers of incompatibilities.

²³ H. Pemberton, *The Dispensatory of the Royal College of Physicians of London*, London, 1746, pp. ix–xxxi. Such tables, however, were by no means new. In 1688, for instance, 'Bate's Dispensatory' included a *tabula posologica*. This concentrated on giving the amount of active ingredients in round figures, ʒ v.gr. xii of diascordium contains gr. 1 of opium. Such tables as James's were more helpful in that they gave the amount of active constituents in a single dose or simple multiple of the usual dose.

²⁴ This was pasted into the 6th (and some later) editions of Paris's *Pharmacologia*, London, 1825.

²⁵ Other calculators were issued in the early years of the nineteenth century, such as Walker's 'A table for ascertaining, in any given or assumed quantity, in any pharmaceutical compositions the proportional parts of the various articles which enter into such compositions' (*Lond. med. phys. J.*, 1817, 3, 191).

²⁶ Cf. seventeenth-century works as G. W. Wedel, *De Medicamentorum Compositione Extemporanae*, Jena, 1675. Sometimes the prescription formulae were divided into five parts, allowing for a *dirigens*, which was to help the *basis* reach the appropriate site.

criteria. This was mainly through general critical attitudes in his influential *Pharmacopoeia Officinalis & Extemporanea: or a Compleat English Dispensatory*, London, 1718,²⁷ and in his less well-known *Praelectiones Pharmaceuticae; or a Course of Lectures in Pharmacy, Chymical and Galenical*, London, 1723.²⁸ In one of the lectures dealing with the characteristics of extemporaneous preparations, Quincy discussed some of the more desirable features:²⁹ the avoidance of incompatibilities via simplicity, and the need for palatability through elegance and smallness of dose—points which were incorporated into his *Dispensatory*.

Despite Quincy's importance, the influence of his work pales in comparison with H. D. Gaub's oft-quoted *De Methodo Concinnandi Formulas Medicamentorum Libellus* (Leyden, 1739). This work—appearing in many editions and translations—is entirely concerned with extemporaneous prescriptions.³⁰ It is simply and clearly written with each section numbered. Section 29, for instance, states that the 'judicious physician will aim at simplicity with efficacy, and not multitude and quantity of ingredients in his prescription; studying rather a concise brevity than a pompous and affected scroll.'

Simplicity of formulae remained the watchword throughout the remainder of the eighteenth century. In Britain, the movement towards it was led by the Edinburgh and London Pharmacopoeias, and by influential medical teachers and writers such as William Cullen, George Fordyce, William Lewis and Charles Alston. The last criticized even the four-part division of the prescription on the grounds that it was not always appropriate: the corrigens and adjuvans being 'frequently useless, and often prejudicial'.³¹

Such emphasis on simplicity undoubtedly led to revisions in formulae and it is no surprise that powders were incorporated more frequently into liquids to give multidose mixtures—thus making one preparation out of two. Apart from greater convenience, this development had the advantage of reducing the use of boluses and

²⁷ The influence of Quincy's *Dispensatory* was continued in a long line of successors, the 'family' of dispensatories meriting a brief note: the original Quincy *Dispensatory* underwent little alteration up to 1742 despite twelve editions (the last nine with an anonymous editor), but under a new anonymous editor a radically-altered '12th' edition appeared in 1749. The anonymous editor of this edition was possibly Robert Dossie, for much of the chemical sections of this *Dispensatory* appeared in his *Institutes of Experimental Chemistry*, London, 1759. (Fuller details of this assertion will be published elsewhere.)

This 'Dossie' version went through three further editions up to 1782. In 1753 a similar work appeared, *The New Dispensatory*. This (after five editions) became the basis of the *Edinburgh New Dispensatory* (1786) which after six editions was, in turn, revised under another editor (1802), giving it life for another twelve editions up to 1830. A table of this rather complex history of Quincy's *Dispensatory*, which also gave rise to R. Christison's *Dispensatory* (two editions) and A. T. Thomson's *The London Dispensatory* (eleven editions) appears in N. Howard-Jones, 'John Quincy, M.D. (d. 1722), apothecary and iatrophysical writer', *J. Hist. Med. All. Sci.*, 1951, 6, 149–75.

²⁸ This was published posthumously under the editorship of Peter Shaw. Some of Shaw's introductory comments emphasized that the movement for reform had been under way for some time: 'Our shops, likewise, are, in some measure, eased of that unwieldy lumber, under the load of which they have long groaned; Salmon no longer keeps his high swoln character, and even Fuller and Bates will hardly pass for perfect patterns in the extemporaneous way of recipe-writing' (p. viii).

²⁹ *Ibid.*, pp. 107–9.

³⁰ One translation was into English: *A Complete Extemporaneous Dispensatory; or the Method of Prescribing, Compounding, and Exhibiting Extemporaneous Medicines*, London, 1741. Quotations are taken from this source. Gaub was generally latinized as Gaubius, a form henceforth used in this paper.

³¹ C. Alston, *Lectures on the Materia Medica*, London, 1770, vol. 2, p. 573.

electuaries.³³ These putty-like preparations were often good examples of polypharmaceutical practice, sometimes coming in for special criticism by eighteenth-century writers: in 1774 George Fordyce commented that they were the ‘remains of the immense farrago which used to be employed in old dispensatories’.³³

Apart from the incorporation of powders into such vehicles as juleps, the latter themselves were also being streamlined, thus leading to many of the comparatively simple mixtures found in prescription books of the eighteenth and nineteenth centuries. Juleps were generally simplified by reducing the number of component aromatic waters,³⁴ a reduction coinciding with the growing popularity of cinnamon and peppermint waters, and the gradual disappearance of the once widely-popular pennyroyal water.

The demise of pennyroyal water undoubtedly owed much to disenchantment with its alleged therapeutic value, though perhaps also relevant was a change in fashionable prescribing, which possibly contributed to other changes in the materia medica. For instance, such mild purgatives as ‘potio purgans’ or manna were replaced largely by the more drastic castor oil,³⁵ while decoctions for promoting diuresis tended to disappear during the nineteenth century.³⁶

The nineteenth century also saw the growing popularity of water as a vehicle. This, however, was not only due to concern with simplicity, but also to the increasing use of pure chemicals (e.g., lead salts and alkaloids) which produced precipitates with the decoctions and infusions commonly used as vehicles.³⁷

REACTION TO SIMPLIFICATION

The intensity of the eighteenth-century pressure to simplify—at least in Britain³⁸—is reflected in the reactionary movement that developed. A key figure in this change of direction was J. A. Paris, who devoted considerable space to the theory and art of prescribing in his *Pharmacologia* (from the 3rd edition, 1819, onwards).³⁹ This became a standard work, and in 1876 W. H. Griffiths advised students to obtain secondhand copies, for it ‘is intelligible to the most junior student as it is pregnant

³³ The most celebrated of this type of medicament were preparations of theriac and mithridatum which bowed to the attack of simplicity when omitted from the *London Pharmacopoeia* of 1788. Not that this ended their use; in 1796, for instance, the eminent quaker chemist and druggist William Allen prepared considerable quantities of Theriaca Andromachi and Mithridatum (Pharmaceutical Society of Great Britain MS. 22010).

³⁴ Wellcome MS. 536 (unpaginated, under *electuary*).

³⁵ Seventeenth-century formulae for juleps often included three or four waters, e.g., those derived from aniseed, cinnamon, pennyroyal, peppermint and marjoram.

³⁶ ‘Potio purgans’ often featured in eighteenth-century prescriptions and generally referred to an infusion of senna. The change to the more drastic castor oil seems to have reflected the heroic medicine of the early nineteenth century.

³⁷ Decoctions taken in large quantities (such as 2 pints per day) for their diuretic effect (e.g., *decoct. diuret.* containing fennel, asparagus and marshmallow) became less widely used without suffering any widespread criticism. On the other hand, decoctions and infusions of the ‘tonic’ variety (e.g., decoction of sarsaparilla) were achieving wide popularity. Great trouble was taken in the nineteenth century to improve and standardize infusions, apozems, and similar remedies. Details of this will be published elsewhere.

³⁸ Throughout the period being considered, the ‘simplicity’ of water attracted attention as a solvent and through the widespread enthusiasm for mineral waters. That A. T. Thomson devoted fourteen pages to water in his *London Dispensary*, London, 1811, is one example of this wide interest. In some instances the use of water in prescriptions was probably linked with the temperance movement.

³⁹ Cullen’s comment quoted on p. 136 indicates national differences which require detailed study.

⁴⁰ The last (9th) edition appeared in 1843. It was a thoroughly revised version, and all quotations in this paper are taken from it.

with interest to the veteran practitioner, every page of it teeming with fact, observation and suggestion.⁴⁰

Paris made it clear that his work was a reaction to over-emphasis on simplicity. He quoted Alexander Crichton's remark that 'to those who think that the science of medicine is improved by an affected simplicity in prescribing, I would remark that modern pharmacopoeias are shorn so much of old and improved receipts, on account of their being extraordinary compounds as to be almost useless in some cases'.⁴¹ Paris supported his views on drug combinations by arguing that 'nature' provided many examples of complex combinations, an opinion shared by other writers. Fifty years earlier, Thomas Percival, the influential Manchester physician, wrote: 'for as the virtues of the [cinchona] bark are strongest in its native state, they depend in all probability on its composition as a *mixt*; and must of course be impaired by the disuniting of its constituent principles.'⁴²

Paris, undoubtedly a follower of Gaubius's ordered outlook and approach,⁴³ analysed sixteen artificial ways of 'medicinal combinations' under five headings: (1) to promote the action of the basis; (2) to correct the operation of the base; (3) to obtain the joint operation of two or more medicines; (4) to obtain a new and active remedy; (5) to afford an eligible form. He backed his lengthy discussion by a detailed analysis of 173 examples of prescriptions.

In practice, Paris's prescriptions are not unduly complex and it was mainly his attempts to promote the 'action of the basis or principal medicine' that led to over-elaborate formulae or the inclusion of superfluous ingredients. For instance, he mixed the decoction, infusion, or extract of a drug with its tincture when it was felt that all the active principles had not been dissolved either in the aqueous or spiritous extract. A further method Paris considered for bringing about enhanced activity owed much to a paper by Fordyce,⁴⁴ which argued that substances of similar therapeutic activity were more effective when administered together (e.g., the purgatives, aloes and sodium sulphate). Such an idea became popular during the nineteenth century, Griffiths even elevating it to the 'Law of Fordyce'.⁴⁵ Paris's third suggestion for promoting the action of the basis was to combine substances of a different nature so as to render the body more susceptible to the pharmacological action of one of them. For instance, he stated that alkalis were beneficial when added to infusion of

⁴⁰ *Lessons on Prescriptions and the Art of Prescribing*, London, 1876, p. 20. For the other comments on its importance cf. W. Munk, *A Memoir of the Life and Writings of John Ayrton Paris*, London, 1857, pp. 24–26. See also H. C. Wood, *A Treatise on Therapeutics*, London, 1876, p. 644.

⁴¹ *Op. cit.* (fn. 39), p. 368.

⁴² T. Percival, 'Experiments and observation on astringents and bitters', in *Essays, Medical and Experimental*, London, 1772 (2nd ed.), p. 69.

Many of Paris's contemporaries held this line of thought. In the 1820s and 1830s it occasioned much opposition to the use of pure alkaloids, encouraging the use of galenical preparations (infusions, decoctions, tinctures and extracts). One staunch opponent of alkaloids, worthy of mention, was Richard Battley, for his galenical preparations (*liq. opii* and *liq. cinchonae*) were used widely on their own, and as ingredients in mixtures. Battley wrote: 'The materia medica is presented to the physician by the hand of the pharmaceutical chemist, both in its natural and its artificial state. The natural takes precedence over the artificial, being the medicine which a merciful Providence gives us to heal our sickness.' (*Observations on the Preparation of Yellow Bark and other Medicines. Addressed to and read at the Royal College of Physicians, 7 May 1838*, n.p., 1838, p. 4.)

⁴³ Praise for Gaubius can be discerned in much of Paris's writings.

⁴⁴ 'Some observations upon the combination of medicines', *Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge*, 1800, 2, 314–43.

⁴⁵ *Op. cit.* (fn. 40), p. 21.

Fluid Medicines, Prescription Reform and Posology, 1700–1900

gentian, and that quinine sulphate accelerated the action of mercurials.⁴⁶

Even if Paris's work was something of a reaction to the school of thought expressing extreme simplification, it was nevertheless in the same genre, for it focused critical attention on the ingredients of a prescription and thereby introduced caution in the formulation of fluid medicines. Paris concluded: 'such are the objects which may be obtained by combining several medicinal substances in one *single formula*; and such are the principles which are to direct and regulate the combinations; but, once for all, let it be distinctly and unequivocally understood that, unless a physician can satisfactorily explain the operation of each element in his prescription by a reference to one or more of the principles above enumerated, SIMPLICITY should ever be regarded as the greatest desideratum.'⁴⁷

THE DRAUGHT; STANDARDIZING THE VOLUME OF MIXTURES

The multidose mixture really came to the fore as the most popular form of liquid medicine in the second half of the nineteenth century, finally eclipsing the draught which, according to Cooley, had become the province of the rich by the 1860s.⁴⁸ Yet the draught had at least two advantages which were repeatedly stressed by writers, namely that the patient took the entire contents of the vial and hence had an accurate dose, and that the medicine was taken before decomposition or deterioration could take place.⁴⁹

Economic reasons seem to have been the main factor behind the growing popularity of the mixture as revealed by Cooley's comment that the draught was a medicine for the rich. Undoubtedly for the growing numbers of middle-class patients, the significantly higher cost of draughts over a multidose mixture must have been a financial consideration.⁵⁰ In hospitals and dispensaries, too, there were tremendous financial pressures. Cheaper formulations of medicines were sometimes introduced,⁵¹ and patients commonly had to take their own bottles, many of which were certainly not suitable for single-dose draughts.⁵²

⁴⁶ Cf. *op. cit.* (fn. 39), pp. 387–99.

⁴⁷ *Ibid.*, p. 448.

⁴⁸ Cooley wrote 'draughts have now been very generally superseded among all but the higher classes' *Cyclopaedia of Practical Receipts*, London, 1864, p. 524.

⁴⁹ Cf., for instance, A. J. Cooley, *The Mixture-Book: or Mixtures, Pharmaceutical, Hospital, and Magistral*, London, 1867, p. 118. Other references could be given, but this book has the merit of emphasizing the growing popularity of the mixture.

Draughts had other minor advantages sometimes relevant, such as their use for preparations with volatile constituents, and the avoidance of metal spoons (cf. W. H. Griffiths, *Lessons on Prescriptions and the Art of Prescribing*, London, 1876, p. 55.)

⁵⁰ The greater cost is well illustrated in a price list for prescriptions in a manuscript prescription book covering the years 1855 to 1859 (Wellcome MS. 9372). In this a dispensing fee for a single draught was 6d. and for 6 draughts (a common regimen on one prescription) 2s. 9d., while a 12 ounce mixture cost only 1s. 6d. The cost of bottles was also significant. Prices in S. Maw & Son's Catalogue of 1866 were 3.4d. for 6 x 1 oz. vials and 0.9d. for a 6 oz. mixture bottle. (*A Catalogue of Surgeons' Instruments & Appliances; also of the Apparatus, Implements, Utensils . . . employed in Pharmacy*, London.) See also D. Hanbury, *Science Papers*, London, 1876, p. 449.

⁵¹ An example of this occurred at St. George's Hospital, London, when in 1812, lard was used to reduce the amount of oil required for plasters (cf. Court Minutes, 8 July 1812 and 30 December 1812).

An early dispensary Pharmacopoeia (*Pharmacopoeia Valetudinarii Gippovicensis*, Ipswich, 1814) included the dispensary rules enacted in 1812, one of which was 'that a new book of formulae be composed without delay, in which simplicity, usefulness, and economy shall be consulted, and by which the medical attendants shall be governed in their prescribing as much as possible.'

⁵² In 1870 the *Pharmaceutical Journal* (1870–71, 1, (3), 149) stated:

There is unquestionably a good deal of carelessness about bottles, and labels too, at a great many

Yet, ironically, at the same time that the precise doses of draughts were becoming less widely prescribed, concern with accuracy of dosage remained as acute as ever, if not more so. This has already been indicated through mentioning the worry with the amount of active ingredients in compound preparations, but the value placed on single-dose draughts (as well as single-dose boluses and powders) can be underlined by reference to posological tables which give the proportional doses for children, young adults, and the aged. Although for many medicines small variations of dosage were of little consequence, intense interest in dosage was encouraged by the wide usage of opium, antimonials, mercurials, arsenicals and, in the nineteenth century, by alkaloids, notably morphine and strychnine.⁵³

While posology has been of perennial concern to medicine since antiquity, there was renewed interest by iatromechanists in the early eighteenth century. Physicians such as W. Cockburn, E. Strother, and C. Balguy⁵⁴ believed that doses could be calculated from such factors as thickness of blood, and the weight and shape of drug particles.⁵⁵

The influence of the results obtained by these iatromechanists seems to have been short lived,⁵⁶ for the posology table which came to the fore was the one published by Gaubius in his *De Methodo Concinnandi* (1739). This gave proportional doses for ages 1, 2, 3, 4, 5–7, 8–14, 15–21, 60–69, 70–79, and 80 years onwards.⁵⁷ Repeated reference was made to this table during the nineteenth century, not only in important medical texts (e.g., Paris's *Pharmacologia*) and pocket or desk formularies (e.g., H. Beasley's *The Book of Prescriptions*, London, 1847), but also in a host of small booklets designed to accompany home medicine chests. For instance, *Cox's Companion to the Family Medicine Chest*, which went through at least fifty-five editions, changed from publishing Graves's table (see below) to Gaubius's some time between

hospitals. The patients usually find their own bottles and jars, and many poisonous compounds find their way into harmless and familiar vessels, the customary receptacles of various household drinks and domestic dainties. Very strong and potent confections find their way into old jam-pots. Hemlock and the deadly nightshade are passed into vessels long identified with British wine and stronger drinks; and the same bottle may be seen making alternate pilgrimages to the public house and the dispensary at the best regulated hospitals.

⁵³ A good example of this interest is seen in the work of Thomas Fowler whose *Medical Reports of the Effects of Arsenic, in the Cure of Agues, Remitting Fevers and Periodic Headaches*, London, 1786, was concerned with the introduction of a 'poison to the public as a general medicine'. Fowler took extreme care over dosage (cf. especially pp. 84–96). His arsenical solution was prepared so that one drachm contained half a grain of arsenic. His doses were administered in the form of drops and he computed that a drachm of solution was equivalent to 80 drops: 'I have found by repeated trials of dropping the solution, from a two ounce vial (with a broad margin) little more than half full, that each dram, by a two ounce graduated glass measure, contains about eighty drops' (p. 82). (For the problem of accuracy of drops see p. 144 *et seq.*)

⁵⁴ W. Cockburn, 'The practice of purging and vomiting medicine according to Dr. Cockburn's solution of his problem', *Phil. Trans. R. Soc.*, 1708–9, 26, 46–52; E. Strother, *Praelectiones Pharmacologicae & Medico-practicae: or Lectures on the Rationale of Medicine*, London, 1732, vol. 2, pp. 835–61; C. Balguy, 'An essay towards ascertaining doses of vomiting and purging medicines', *Medical Essays and Observations*, 1737, 4, 33–36.

⁵⁵ Many other writers considered the pharmacological action of drugs from the particle viewpoint, and the whole subject merits detailed study. Cf. M. P. Earles, 'Early theories of the mode of action of drugs and poisons', *Ann. Sci.*, 1961, 17, 97–110; W. Coleman, 'Mechanical philosophy and hypothetical physiology', *Texas Quarterly*, 1967, 10, 259–69.

⁵⁶ This is not to say that the mathematical approach to the subject did not have any general value in creating a more critical outlook, even perhaps contributing to the favourable attitude towards simplifying remedies noted above.

⁵⁷ *Op. cit.* (fn. 30), p. 26. Gaubius, however, as did most writers on posology, recognized that age alone should not determine dosage, body size, etc., being important.

1832 and 1840.⁵⁸

In view of the almost universal credit given to Gaubius it is surprising to find that the table had already appeared in Juncker's *Conspectus Formularum Medicarum* (Halle-Marburg, 1730).⁵⁹ Like Gaubius, Juncker gave no clue as to how the table was derived, but there is no doubt that (unless a precursor is found) Juncker, not Gaubius, deserves credit for one of the most popular posological tables of all time.⁶⁰ Nevertheless, despite this popularity, other tables were not without influence. Robert Graves published his table in *A Conspectus of the London and Edinburgh Pharmacopoeias* (London, 1796) which, in contrast with Gaubius's table, subdivided doses for children under the age of one year. Graves's table appeared in at least fifteen editions of *Cox's Companion to the Family Medicine Chest* (see above) as well as in early editions of R. Hooper's *The Physician's Vade-Mecum* (e.g., London, 1823). Graves gave no indication as to how his figures were derived, nor did Thomas Young explain the rationale behind his brief but influential statement that 'for children under 12 years old, the doses of most medicines must be diminished in the proportion of the age increased by 12: for example, at two years old to $\frac{1}{7} = \frac{2}{2 + 12}$. At 21 the full dose may be given.'⁶¹

Other tables and opinions on posology were rife, but enough has been said to indicate that the growing popularity of multidose mixtures brought problems to the conscientious practitioner who doubted the patient's ability to administer his own medicine accurately, problems which will be considered below (see p. 146). But concern with dosage also seems to have raised the question of standardizing the volume of mixtures, for rarely, until around 1840 when mixtures started to become widely popular, were medicines made up to an easily divisible final volume of say six or eight ounces. A final volume could be, for instance, 2 ounces 1 drachm and 40 drops; by 1900 such examples were exceptional, though it was some decades later before the practice disappeared completely.⁶²

The reasons for the persistence of odd-volume mixtures are not altogether clear, but they are linked with the multiplication (generally by 6 or by 8) of quantities given in formulae originally intended as draughts.⁶³ There was, too, the influence of Gaubius whose prescriptions commonly listed the vehicle before the other ingredients, an order which he recommended for compounding.⁶⁴ This, the reverse of modern practice,

⁵⁸ The 15th edition of 1832 (with Graves's table) and the 28th edition of 1840 (with Gaubius's table) have been located, but no intermediate editions have been found. Other medicine chest booklets containing Gaubius's tables were D. Coxe's *New Medical Compendium*, Gloucester, 1810, and J. Savory's *A Companion to the Medicine Chest*, London, 1836. (Later, enlarged editions of the latter work were entitled *A Compendium of Domestic Medicine and Companion to the Medicine Chest*.)

⁵⁹ This reference is to the 2nd edition. A copy of the first edition (1723) has not been located.

⁶⁰ The only British writer to mention Juncker was Charles Alston (*Lectures on the Materia Medica*, London, 1870, vol. 2, p. 568) but he does not make it clear that Gaubius's table is identical with Juncker's.

⁶¹ T. Young, *An Introduction to Medical Literature*, London, 1823 (2nd ed.), p. 453. A number of works considered Young's table. Paris, for instance, introduced it into the 5th edition of his *Pharmacologia* (1822) with the statement: 'the popular scheme of Gaubius for graduating the doses of medicine to different ages, which was published in the former edition of this work, is now omitted as being less easy of application, than the following simple formula by Dr. Young.'

⁶² This information is taken from the Wellcome MS. prescription books.

⁶³ Cooley, op. cit. (fn. 49), p. 118, looked upon mixtures as 'several draughts dispensed in one bottle.'

⁶⁴ Op. cit. (fn. 30), p. 219. A manuscript prescription book of a Dublin apothecary for the 1750s (Wellcome MS. 1737) features many prescriptions written in this manner. The majority of nineteenth-century writers, however, advocated writing the vehicle last, and also adding it last when dispensing.

tended to preclude 'making up to volume'.⁶⁵ It has also to be remembered that odd volumes were not altogether inconvenient, for it was fairly common practice for a mixture to be divided into parts (4 or 6), each part representing one dose. The parts were indicated by the use of calibrated bottles (cf. fig. 1K) or by a strip of paper (notched or marked) stuck on to the bottle. The use of odd volumes was, therefore, not universally looked upon as inconvenient, while, if necessary, draughts could still be given.⁶⁶

Factors that brought about the demise of odd-volume mixtures are not easy to discern, though there is no doubt that emphasis on accuracy was a significant factor. Beasley, explaining his method of formulation in his *The Pocket Formulary*, wrote: 'Minute fractions have been disregarded as of no practical importance, but as rather tending to occasion mistakes; and confound recollection; and in a few instances slight deviations have been purposely made, in order to attain a definite proportion of the active ingredients.'⁶⁷

Slowly, too, pharmacopoeias standardized volumes. For instance, the 1898 *British Pharmacopoeia* included a new formula for chalk mixture giving eight ounces, contrasting with the 8½ ounces which resulted from the formula in the 1885 *Pharmacopoeia*.⁶⁸

But almost certainly as significant, if not more so, was the view that medicines should fill a bottle, as a partially-filled bottle created an unfavourable impression in the patient's mind. Griffiths wrote in 1876:

Nothing looks so bad and is so likely to create misgivings in the mind of a patient, as to receive a bottle of medicine incompletely filled.

It will be well, therefore, for the prescriber always to order such a quantity of a fluid remedy, whether for internal or external use, as will accurately fill one of the bottles of generally recognized capacity. For instance, we might order, two, three, four, six or eight ounces of a mixture, not five or seven ounces.⁶⁹

The absence of 5 and 7 ounce medicine bottles at this time (1870s) is of interest, for no evidence has been found that they were made by glass manufacturers and it may be that this was one reason for the growing popularity of 6 and 8 ounce mixtures.⁷⁰

DROPS AND MEASUREMENT OF DOSES

The concern with dosage, as reflected in posology and standardization of the volume

⁶⁵ It is relevant to note the influence of books on prescription writing, such as Jonathan Pereira's *Selecta e Praescriptis, Selections from Physicians' Prescriptions*. First published in 1824, with odd-volume mixtures, it went through 18 largely unrevised editions until 1890.

⁶⁶ M. Donovan, 'On a new chemical combination of arsenic, mercury and iodine; and on its employment as a therapeutic agent', *Dublin J. med. Sci.*, 1840, 16, 277–82, formulated his new preparation in draughts saying 'the division into draughts is here necessary: first, to insure accuracy of the dose, so essential in the case of this active medicine: and next, to prevent injury to the ingredients by the use of a metallic spoon as a measure—the general way in which, unfortunately, the dose of a medicine is determined' (p. 282).

⁶⁷ See 4th edition (1848), preface.

⁶⁸ The gradual change to convenient volumes at this time is also reflected in the appearance of *ad* in lists of 'terms and phrases' employed in prescriptions. For instance, *ad* was not included in T. Redwood, *A Supplement to the Pharmacopoeia*, London, 1857 (3rd ed.), but was mentioned by W. W. Will, in *Prescription Reading*, London, 1898.

⁶⁹ Op. cit. (fn. 49), p. 54. Mohr and Redwood, in *Practical Pharmacy*, London, 1848, p. 338, made the same point.

⁷⁰ F. Mohr, and T. Redwood, *ibid.*, p. 338 wrote 'the bottles used for putting medicines into are made of certain definite sizes, such as ʒvi, ʒviii, ʒx and ʒxii &c., and physicians generally regulate the quantities of ingredients arranged in mixtures so as to correspond with the common-sized bottles.'

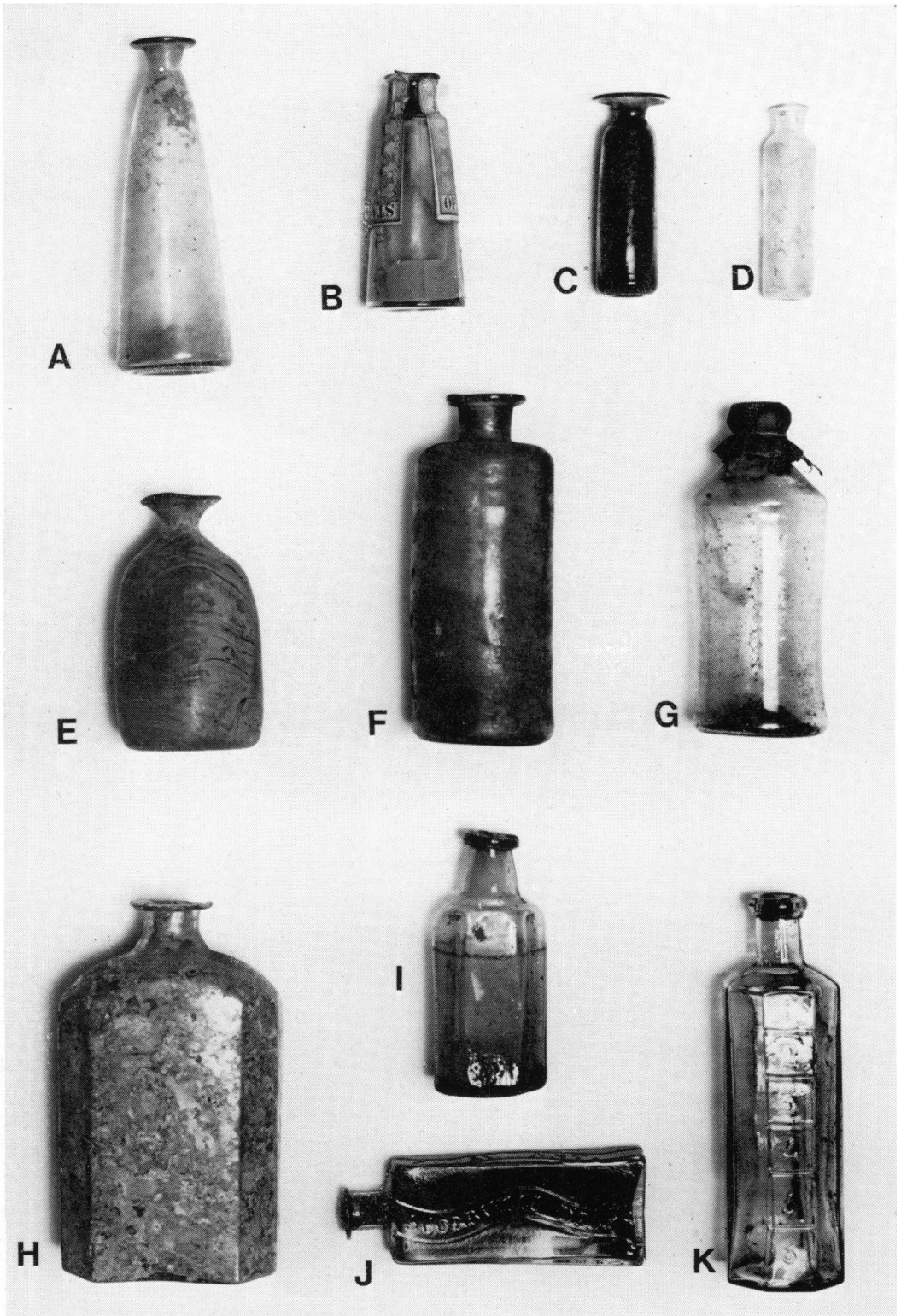


Figure 1—details overleaf

Figure 1

Seventeenth- to nineteenth-century medicine vials and bottles illustrating some of the types mentioned in the text. All except items B and J, are from the Wellcome Collections.

- A. Steeple-shaped, greenish, 4-ounce vial with well-finished neck and mouth. Base has pontil mark and moderate sized kick-up. A type of vial commonly used for proprietary medicines. (Cf. fn. 111 and fig. 1 B). Ht. 13.5 cms.
- B. Steeple-shaped, moulded, bluish-green vial. Base has pontil mark. GELL'S DALBY'S/CARMINATIVE is embossed on the side. The affixed medicine stamp indicates a c. 1850 date. (Cf. fn. 111 and fig. 1 A). Ht. 9.7 cms. By courtesy of the Pharmaceutical Society of Great Britain).
- C. Straight-sided, green vial. Base has pontil mark and slight kick-up. This eighteenth-century, 2-ounce vial for draughts is unusually well finished. (Cf. fn. 112). Ht. 8.2 cms.
- D. Straight-sided, water white, flint glass vial. Base has pontil mark. 2-ounce vial for draughts from first half of nineteenth century. Ht. 8.1 cms.
- E. Green vial of 4-ounce capacity featuring slight ballooning characteristic of many seventeenth-century vials. Base has pontil mark and moderate kick-up. (Cf. fn. 97). Ht. 8.3 cms.
- F. Straight-sided, square shouldered, green bottle. Base has pontil mark and moderate kick-up. 7-ounce bottle, probably for mixtures. Eighteenth century. Ht. 14.5 cms.
- G. Straight-sided, sloping-shouldered, green-tinted bottle. Base has pontil mark and slight kick-up. Cork closure capped with thick paper tied on with twine. 7-ounce bottle for mixtures. Probably eighteenth century. Ht. 13.5 cms.
- H. Flat, octagonal, water white (discoloured by remains of contents), moulded, 16-ounce bottle. Mould marks running from base to neck. Base shows pontil mark and slight kick-up (neck hand finished). 1st half nineteenth century. Ht. 15.2 cms.
- I. Flat, octagonal, green, 3-oz. bottle (N.B. corner sides slightly incurved). Base has pontil mark, but no kick-up. Eighteenth- to nineteenth-century bottle. Ht. 11 cms.
- J. Flat, rectangular (but slight truncated) water-white, bottle. All four sides bear moulded, wavy banners with lettering: G. GILBERT ONLY/ PROPRIETOR OF THE / ROYAL ANTI / SCORBUTIC DROPS. c. 1836-1864. Ht. 12.2 cms. (By courtesy of the Pharmaceutical Society of Great Britain).
- K. Regular shaped octagonal, bluish green, 6-ounce bottle. Mould marks on shoulders. Base without pontil mark or kick-up. Capacity marked into six parts by moulded horizontal lines, designated 1, 2, 3, 4, 5, 6. Probably 2nd half nineteenth century. Ht. 16.2 cms.

of mixtures, is also mirrored in the important problem of the measurement of 'drops'. Throughout the period under consideration (though particularly in the eighteenth century) certain liquid medicines were formulated to be taken in drops. Such preparations were generally spirituous—tinctures and essences, etc.—and were considered to be therapeutically more active than watery infusions or decoctions. While doses of such preparations were commonly given in the order of 12 drops in a wine glass,⁷¹ they were sometimes administered in doses of as much as a teaspoonful, which was one way to overcome the difficulty of measuring drops accurately.⁷² Another way was to administer medicines in solid rather than in fluid form. Quincy wrote in 1718: 'There is a hazard in ascertaining the dose of liquid laudanum from the number of drops, which few are appriz'd of; and that is, the shape of the bottle from whence it is dropp'd, will make the quantity more or less, because the drops will form larger or smaller, according to the fashion of the phial, as may be demonstrated by experiment, weighing such a number of drops from phials of different forms and magnitudes. For this reason many physicians now chuse the solid laudanum which may be ascertain'd by weight.'⁷³

This problem of accurate measurement of drops (stalagmometry) was widely recognized throughout the eighteenth century and it might be imagined that the difficulty was overcome by the appearance of the 'minim' (1/60th fl. drachm) as an appropriate unit for small volumes. This was introduced into the *London Pharmacopoeia* of 1809 by a pharmacopoeial revision subcommittee comprising of W. H. Wollaston, W. Heberden and R. Powell, who coined the term 'minim'.⁷⁴

Support for the use of the minim grew rapidly as indicated by the introduction of a considerable number of tubular minim measures for dispensing purposes,⁷⁵ the

⁷¹ This example is taken from Wellcome MS. 1737. Apart from being administered directly to the patient, drops were often incorporated into extemporaneous preparations. This was the main reason for the introduction of minim measures for dispensing (cf. fn. 75).

⁷² In 1848 Redwood wrote: 'If a medicine consist of tinctures, spirits, or other similar preparations, the dose of which is a teaspoonful or less, if it be diluted when administered, and the intended application of it be similar to that of a mixture, it is generally distinguished by the name of drops'. F. Mohr, and T. Redwood, *op. cit.* (fn. 69), p. 340. Teaspoonful doses of 'concentrated' medicines became common during the second half of the nineteenth century.

⁷³ *The Compleat English Dispensatory*, London, 1718, p. 534.

⁷⁴ Royal College of Physicians of London MS. 254, ff. 228–29. The term minim replaced 'fluid grains' which was first suggested. The Committee was influenced by Thomas Lane, whose work in accurately graduating glass vessels (British Patent 2501 (1801)) lay behind his recognition that 1 wine gallon (231 cu. in.) contained 61,440 fluid grains (cf. Royal College of Physicians MS. 254, ff. 13–18).

⁷⁵ The earliest illustration of such a measure appears to be in A. T. Thomson's *The London Dispensatory*, London, 1811, plate 3; this shows a straight tube open at both ends. In the early 1830s Robert Alsop introduced a tubular measure with a plunger so that volumes other than 5, 10 and 15 minims (provided for by the open tube) could be measured accurately. Because of 5, 10 and 15 minim measures 'intermediate doses of the more potent medicines, such as hydrocyanic acid, solutions of morphia, &c. are necessarily apportioned in the common measure by guess, with a variable quantity of the fluid adhering to the sides of the glass: or perhaps more frequently, by the expeditious, but very uncertain mode of dropping; from the idea that the drop, especially in aqueous fluids, does not vary materially from the minim' (quoted from a broadsheet issued by Robert Alsop dated 1834, and entitled 'To the medical profession'; cf. also *Pharm. J. & Trans.*, 1841–42, 1, 326–27).

An improvement on Alsop's measure was Ashton's minim meter whereby the plunger did not touch the liquid (*Pharm. J. & Trans.*, 1851–52, 11, 222). At around the same time measures with guttapercha or rubber bulbs were discussed in the pharmaceutical press (*ibid.*, pp. 268 and 358). Such tubular minim measures are now rare, but one 60-minim and one 5-minim are in the possession of J. R. Scott. Another is in the early nineteenth-century medicine chest which belonged to the Duke of Kent and is now in the London Museum. The measure is protected by a tinned metal case.

widespread use of footed minim measures in the home,⁷⁶ and many critical remarks on the use of drops.⁷⁷ Also, towards the end of the century medical students were taught, by practical experiments, that minims were different from drops and that the latter varied according to the type of solution and method of measuring.⁷⁸

In view of this undoubted popularity of the minim it is surprising that the drop survived until well into this century. The reason for this is not altogether clear, though it seems linked with the extraordinarily widespread belief that drops and minims were identical. This confusion has already been noted, but one more example deserves notice to demonstrate the type of thinking that became common. Soon after the introduction of the minim Robert Thomas, in revising his *The Modern Practice of Physic*, altered formulae from drops to minims without changing the figures (e.g. gutt: XXX became m. XXX) thus creating an unintentional change in strength.⁷⁹ Another reason for the persistence of the drop was undoubtedly its convenience and it is of interest that W. Martindale, an influential pharmacist, in recognizing this and its disadvantages, wanted, in the 1870s, to introduce a new standard drop—a goutt—rather than persist with minims.⁸⁰

The same reason—convenience—accounted for the continued use of the domestic spoon for measuring medicines, despite persistent medical opposition to it. Spoons of around tablespoon size have a long history as medicine measures extending back until at least classical times,⁸¹ but during the period being considered the tablespoon was supplemented by both the teaspoon and the dessertspoon. The former came into popularity in the eighteenth century, in part replacing liquorice sticks used for taking thick linctuses,⁸² while the dessertspoon gained in popularity during the nineteenth century.⁸³

Supplementing these was the common kitchen spoon. Whitla described this as being generally of iron coated with tin, and fluctuating less in size than other domestic measures. It could be relied on, he said, to hold two fluid drachms.⁸⁴ Such a comment is a reflection of the perpetual problem with domestic spoons for administering medicines—their variability. Adverse comments on their accuracy were always com-

⁷⁶ Minim measures were widely mentioned in medicine chest companion booklets. Over thirty of the measures survive in the Wellcome medicine chests.

⁷⁷ To give one example, J. M. Neligan, *Neligan's Medicines, their Uses and Mode of Administration* (ed. R. MacNamara), London, 1867, p. 859, stated 'drops and minims are pretty generally looked upon as being convertible terms which however is a grave error.'

⁷⁸ Cf. J. Calvert, *Practical Pharmacy and Prescribing for Students of Medicine, being the Course in Use at St. Bartholomew's Hospital*, London, 1903, p. 2. Drop measures could cause confusion. In the Wellcome collection of medicine chests there are sixteen cylindrical minim measures and two 60-drop measures of identical style and shape. The latter give no indication of the solution used to calibrate them, and they are equivalent to 55 and 64 minims.

⁷⁹ Cf. p. 129 of 2nd edition (1807) and p. 136 of 4th edition (1813).

⁸⁰ *Pharm. J. & Trans.*, 1875–76, 6, (3), 679–80.

⁸¹ For a brief history cf. Griffenhagen, G., 'Dose: one spoonful', *J. Am. Pharm. Assn.*, 1959, 20, 202–5.

⁸² In H. D. Gaubius's *A Complete Extemporaneous Dispensary*, London, 1741, p. 101, it is stated that 'the dose of a linctus is seldom ascertained by weight; but when it is, it should not exceed ʒ ss. The more usual method of dosing this form, is, by the measure of a large, eating, or small, teaspoon, or as much as can be taken up by a bruised liquorish [*sic*] stick'. The translator indicated that the method was then in disuse in Britain and the use of the teaspoon preferable (cf. also p. 103).

⁸³ The earliest mention found for the dessertspoon is in S. F. Gray, *The Elements of Pharmacy*, London, 1823.

⁸⁴ W. Whitla, *Elements of Pharmacy, Materia Medica, and Therapeutics*, London, 1889 (fifth ed.), pp. 108–9.

mon, but particularly so in the 1870s when the replacement of the draught by the multidose mixture was making the problem more acute. On 27 January 1876, Bernard Proctor wrote:

I recently had my attention forcibly directed to a coming difficulty with regard to the customary directions for patients to take their medicines by tablespoonfuls.

A physician prescribing a pretty full dose of Fowler's Solution [cf. fn. 53] appended his usual instructions 'ʒss t.d.' I wrote the label 'A tablespoonful thrice a day', and proceeded to caution the patient to use a graduated glass, tablespoons being so variable, when I was met with the reply 'the doctor told me a dessertspoonful'. The Apparent error having been cleared away by an explanation that the dessertspoonful as verbally ordered by the doctor would no doubt correspond pretty closely with the written instructions of ʒss and with the old tablespoonful which is still retained as the customary measure for medicine.⁸⁵

Many suggestions were made to overcome the problem, the most obvious being the use of special medicine spoons and measures, and at least two were marketed for the first time in the 1870s.⁸⁶ Not everyone, however, accepted the value of these devices and in 1902 M. I. Wibert reported that the porcelain, graduated medicine spoons of English manufacture and the pressed glass graduated spoons introduced in America were even less reliable than the teaspoon.⁸⁷ Alfred W. Smith's comment of 1876 is also of interest. He considered that graduated glass measures were very confusing to 'people who are not over intelligent'.⁸⁸ Judging from the Wellcome collections this could be a real danger: for instance, one-ounce, conical-shaped glass medicine measures were very common, but occasionally measures of similar overall size and shape were confusingly calibrated for such quantities as $\frac{3}{4}$ or $1\frac{1}{2}$ ounces.⁸⁹

In the light of adverse comments on measures it is no surprise that the 1870s saw many other suggestions to overcome the problem of administering medicines by domestic spoons. Not unexpectedly, it was recommended that the draught be re-introduced,⁹⁰ while Joseph W. Swan believed the following label was useful:

CAUTION

The dose here ordered is intended to be measured in a small-sized old-fashioned spoon, or properly in a graduated medicine glass. This is important to be observed, as most modern spoons hold double the quantity.⁹¹

W. Martindale also accepted that the use of the spoon was too well established to be altered, but he proposed that a tablespoon should be considered as 5 drachms rather than 4 drachms. This was fairly convenient in that a 10 fl. oz. bottle would contain eight doses of two such tablespoons.⁹²

⁸⁵ *Pharm. J. & Trans.*, 1875–76, 6, (3), 658–59.

⁸⁶ Examples of these are in the Wellcome collections, see J. K. Crellin, *Medical Ceramics, A Catalogue of the English and Dutch Collections in the Museum of the Wellcome Institute of the History of Medicine*, London, 1969, pp. 227–33.

⁸⁷ Quoted by Griffenhagen, *op. cit.*, (fn. 81).

⁸⁸ *Pharm. J. & Trans.*, 1875–76, 6, (3), 679.

⁸⁹ The Wellcome collection has 53 x 1 ounce measures, 2 x $1\frac{1}{2}$ ounce and 1 x $\frac{3}{4}$ ounce, all of similar conical shape and size. Of these only one has the word ounce inscribed on the measure rather than the symbol ʒ.

These measures are mostly from medicine chests and among other conical glass measures in the chests are 8 x 2 drachm and 2 x 1 drachm. For a note on minim measures see fns. 75 and 76.

⁹⁰ *Pharm. J. & Trans.*, 1875–76, 6, (3), 758. The writer W. Ashton wrote 'In the discussion [on administration of medicines] the old fashioned, but accurate and safe practice of sending out liquid medicines in separate doses by means of draughts . . . has been overlooked.'

⁹¹ *Ibid.*, p. 739.

⁹² *Ibid.*, p. 679. Martindale attempted to introduce this idea into the University College Hospital Pharmacopoeia, but he failed saying that 'conservative ideas prevailed.'

It would be risking tedium to elaborate further on the controversies that took place during the 1870s, controversies on measures, spoons, and labelling which, as indicated, were largely precipitated by the developing use of multidose mixtures. These controversies were not resolved, however, and have continued intermittently ever since. Only recently have the efforts for standardization really borne fruit with the introduction of 5 ml. doses to be administered by standard 5 ml. plastic spoons (British Standard 3221/4).

THE WELLCOME COLLECTION OF BRITISH GLASS DISPENSING CONTAINERS

The story so far, culled almost entirely from literary sources, has referred to at least two points on which the Wellcome Collection of glass dispensing containers throws further light: the deep concern with accuracy, and the widespread use of draughts until they were generally superseded by mixtures in the second half of the nineteenth century.

There is unfortunately little information about the provenance of the 653 vials to be considered here, though they all conform closely with published details of British medicine vials.⁹³ (Various continental and miscellaneous vials are excluded from the 653: for instance, twenty-six from Italy,⁹⁴ and fifty-one of a dark green colour mostly showing a slight narrowing of the waist. The latter are virtually identical with the small vials which were widely used for Haarlem oil imported from Holland in the nineteenth and early twentieth centuries.)⁹⁵ Even so, the possibility that some of the 653 vials are of continental origin cannot be ruled out. For instance, two early nineteenth-century containers in the Wellcome Collection match Samuel Gray's 1823 description of Dutch vials: 'the common [English] phials used for [draughts] are peculiarly awkward, as they seldom stand on their bottom, and never with any degree of safety; by which means the mixture is always brought in contact with the cork, and frequently accidents happen from the medicine being spilled. It were to be wished the English glass makers would imitate the ounce and ounce-and-half phials of the Dutch, which are as broad as they are long.'⁹⁶ Nevertheless there is no firm evidence for a Dutch origin for the two Wellcome vials, while other squat Wellcome containers of similar shape are probably seventeenth-century English.⁹⁷

⁹³ For a general account of vials, see L. G. Matthews, *History of Pharmacy in Britain*, Edinburgh, 1962, pp. 308–9. Matthews relied heavily on W. A. Thorpe, *Catalogue of Old English Glass*, London, 1937. See also W. A. Thorpe, *English Glass*, London, 1961; L. Dopson, 'Drug bottle finds at Bristol', *Chem. & Drugg.*, 1957, 168, 226–27; I. N. Hume, 'Neglected glass', *Country Life*, 1954, 2 Sept., 716–17; and I. N. Hume, 'Mediaeval bottles from London', *Connoisseur*, 1957, 139, 104–8.

A good collection of material excavated in London can be found in the Guildhall Museum, London.

⁹⁴ Vial group 113. Of these, eight are steeple-shaped. They are labelled for liquor alkermes, sweet elixir of rhubarb, and antihysterical water, the medicine being prepared by the convent S. M. Novella di Firenze. For note on English steeple-shaped vials, see fn. 111.

⁹⁵ Vial group 91, average size 9.5 x 1.5 cms. One of these vials (with Haarlem oil label) is illustrated in A. Davis, *Package and Print*, London, 1967, plate 30 (left hand bottle). This is late nineteenth century, and, being moulded, is of a more uniform cylindrical shape than the majority of containers in group 91.

One vial in group 91 has a tag label inscribed '3i mochus' suggesting that such bottles were used for substances other than Haarlem oil. However, vials and bottles were, of course, commonly re-used. Museum purchase records indicate a French origin for this musk bottle.

⁹⁶ *The Elements of Pharmacy*, London, 1823, p. 293.

⁹⁷ The two nineteenth-century vials (group 158)—preferably called small bottles—are of flint glass and are 5.5 x 4 cms. in size. They may have been used for perfumes, for in 1866 S. Maw & Son depicted a similar container as a 'round essence of best quality, warranted accurate measure' in their *Catalogue of Surgeons' Instruments & Appliances; also of the Apparatus, Implements, Utensils . . . employed in Pharmacy*, London, p. 185.

Gray's comments on the instability of English containers is just, many in the Wellcome Collection having pontil marks which are proud to the base.⁹⁸ Equally, a number of the vials are crudely made, and there is no doubt that during the eighteenth and early nineteenth centuries the difficulty of obtaining consistently accurate vials was a persistent problem. This is reflected in the many complaints from the pharmaceutical company now known as Allen & Hanbury. For instance, on 23 August 1826, William Allen wrote to his supplier: 'The quality of the vials on the whole is scarcely so good as what we require, being defective in form, particularly the 4 oz., 1 oz., and 1½ oz., body too long—shoulder awkward in some—necks of some too narrow, others too wide . . . But there is another improvement necessary—*uniformity of size*—some of your 8 oz. hold little more than 6 oz. and we must use them as such and be charged accordingly.'⁹⁹

The Wellcome vials amply support Allen's criticisms about variations in capacities. A particular size, such as those obviously intended for four ounces, show size differences resulting from different thicknesses of glass, and varying amounts of kick-up in the bases. In 1800, James Lucas¹⁰⁰ published a plan for the arrangement of an apothecary's shop depicting one place for 'vials arranged in exact sizes'. At that time, variations in vial sizes undoubtedly made the chore of sorting and arranging them very difficult. Even in 1848, Redwood instructed that in making draughts 'the requisite number of vials of the proper size, are in the first place selected, and it is desirable that these should correspond as largely as possible, not only in capacity, but also in length and general appearance'.¹⁰¹

Certainly, differences in size and capacity were a hazard; they could nullify the great advantage of dose accuracy of draughts (cf. p. 141), for it was not uncommon practice to fill vials for draughts by eye from the bulk mixture, rather than by measure.¹⁰² However, by the 1840s the moulded vial—more uniform in shape and capacity—was probably becoming more generally used. In 1849 Apsley Pellatt, a Southwark glass manufacturer, wrote that 'mould making decidedly gives a more polished surface to the bottles, and produces excellent apothecaries' vials of uniform

The squat seventeenth-century vials (Wellcome groups 26–29) comprise 9 green, squarish, bulbous-shaped containers of size c. 3 x 3 cm. and capacity c. 3 fluid drachms. Another vessel in the Collection (group no. 116) is squarer and larger (6 x 3 cm.) and has a capacity of six fluid drachms. For an illustration of this style of bottle see I. N. Hume, 'Neglected glass', *Country Life*, 1954, 2 Sept., 716–17, fig. 2. Whether these small, bulbous containers were used for dispensed medicines must remain an open question.

Other Wellcome containers of dumpy-shape are of larger capacity (2–3 fluid ounces) and have irregular-shaped rims (group 172). Cf. fig. 1E.

⁹⁸ It is of interest, too, that a number of eighteenth- and early nineteenth-century caricatures depict vials standing in basins or leaning against some object for support.

⁹⁹ Quoted in S. Stander, 'A history of the pharmaceutical industry', unpublished University of London M.Sc.(Econ.), thesis, 1965, p. 192.

¹⁰⁰ J. Lucas, *A Candid Inquiry into the Education, Qualifications, and Offices of a Surgeon-Apothecary*, London, 1800, plan between pp. 144 and 145.

¹⁰¹ F. Mohr, and T. Redwood, *Practical Pharmacy*, London, 1848, p. 339.

A further point deserving notice is the cleanliness of vials, for as Chamberlaine indicated, this sometimes created problems. For instance, he stated: 'always examine the phials that you are going to send out, that there be no straws, weevils, or flies in them' (*Tyrocinium Medicum; or a Dissertation on the Duties of Youth*, London, 1819 (2nd ed.), p. 2). One of the biggest tasks was washing dirty vials, which were commonly purchased (cf. Peter Squire's accounts for the 1830s, Wellcome MS. 5639).

¹⁰² Redwood (*ibid.*, p. 340) wrote that the '[draught-mixture] is poured into the vials, and equally divided between them, the correctness of the division being determined by the eye of the operator.'

size and capacity'.¹⁰³

The 653 Wellcome vials under consideration are mostly of green glass and pre-c. 1850.¹⁰⁴ They are readily divided into four groups according to capacity: (a) above 8 ounces (many of these are perhaps better described as bottles, as are some of the 6 and 8 ounce size listed under b);¹⁰⁵ (b) 4, 6 and 8 ounce size; (c) 3 to 1½ ounces and (d) 1 ounce and less. In addition, the Wellcome Collections contain a small number of miscellaneous bottles which will be considered at the end of this section. Groups a–d are, respectively, appropriate-sized containers for juleps, mixtures, draughts, and drops, although during the eighteenth century draughts were occasionally prescribed in quantities of 4 ounces, and mixtures above 8 ounces.¹⁰⁶

The numbers in each of the four groups expressed as a percentage of the whole are as follows: julep size, 1.8 per cent, mixture size, 11.6 per cent, draught size, 47.6 per cent, and drop size, 39 per cent. The proportions of julep and mixture bottles in the Collection are probably unrepresentative of the numbers of juleps and mixtures dispensed prior to 1850, possibly because the larger containers were more liable to breakage or because they went back to the glass house as cullet. Also badly represented in the Collection are the large bottles for 1, 2 and 3 pints.¹⁰⁷ Such sized bottles

¹⁰³ *Curiosities of Glassmaking*, London, 1849, p. 103.

¹⁰⁴ The main exception is the 152 water-white flint vials which became popular in the first half of the nineteenth century when the flint glass manufacturers were allowed, under the Excise Acts, to make vials not greater than 6 ounce size. Bottles were made from 'bottle glass' and vials from 'flint glass'. (Cf. *Thirteenth Report of Commissioners on Exciseglass*, London, 1835).

¹⁰⁵ 'Bottle' is a preferable description for a vessel when the slenderness and small shoulders characteristic of vials are absent. The practice that developed under the Excise Acts of calling glass containers above 6 ounces 'bottles' and those below 6 ounces 'vials' was an appropriate convention.

However, the terms 'bottles' and 'vials' seem to have been sometimes used indiscriminately. Jacob Bell, for instance, in his 'Book of Fractures' (Pharmaceutical Society of Great Britain MS. 363), where he recorded the items he broke during his apprenticeship in the 1820s, repeatedly listed draught bottles. There is no evidence that Bell was referring to anything but cylindrical vials, though two 2-oz. rectangular, flat green bottles (c. early nineteenth century) are in the Wellcome Collections (group 152). Nor is it known whether *Eau medicinale d'Husson* was sold in distinctive bottles rather than common vials. E. G. Jones *An Account of the Remarkable Effects of the Eau medicinale d'Husson in the Gout*, London, 1810 (2nd ed.), p. 26, wrote: 'the eau medicinale d'Husson is sold in bottles, which will hold little more than two drachms by measure, and always contain that quantity of liquid.'

¹⁰⁶ The possibility that some of the vials were used for powders cannot be ruled out. Davis, for instance, in *Package and Print*, London, 1967, fig. 32, illustrates a vial for 'The Chalybeate Aperient, or improved Cheltenham Salts'. This vial appears to be typical of the nineteenth-century water-white glass vials in the Wellcome Collections (cf. fn. 104). Nevertheless, vials for powders were generally wide-mouthed, and 54 such vials are excluded from the 653 being considered. This 54 includes 35 cylindrical ones from one provenance (group 173), but powders were commonly placed in square containers. 20 square vials are in the Wellcome Collections (group 174), one of the most interesting being of green glass and bearing the label: 'Dr. Boerhaave's Powders for Fevers, Pleurisies/and Sore Throats'. Another two (group 175) have wide flared necks and are of the type sometimes bearing the embossed label: 'Cephalic Snuff.'

Apart from powders, the possibility that some of the vials were used for pills, or even homeopathic medicines, cannot be ruled out. The largest nineteenth-century homeopathic vials, such as those found in medicine chests, are generally c. 5 x 2 cms.

¹⁰⁷ Of 48 'wine bottles' in the Wellcome Collections, number 1, of cylindrical shape, is of 16 ounce capacity; number 2, also cylindrical, is of 32 fluid ounces, and number 3 (flask-shaped) is of 32 fluid ounces. These sizes are appropriate for pints and quarts of medicines from 1720 until after 1825 when the 20 ounce imperial pint was introduced. The remaining bottles are of 26 or 13 ounce capacity, corresponding approximately to the reputed 'quart' and its 'half.'

The general scarcity of green or 'black' (i.e. very dark green) bottles suitable for ½, 1 and 2 pints of medicines is a little surprising in view of the large numbers evidently in use. In the 1730s Silvanus and Timothy Bevan were supplying large numbers to Guy's Hospital (invoices in possession of Guy's Hospital). For the large numbers in use 100 years later cf. *Catalogue of the Whole of the Extensive and Valuable Stock in Trade of Drugs, Chemical preparations in the premises of Messrs. Balkwell & Sons . . . which will be sold by Auction by Paddon & Son, Plymouth, n.d. [1836].* (Copy in Pharmaceutical Society of Great Britain).

were largely used for decoctions (see p. 139), though sometimes the ingredients alone were prescribed so that the patient could prepare his own infusions and decoctions and thus avoid the use of large bottles.¹⁰⁸ Large quantities of other medicaments, however, were sometimes dispensed, such as lime-water, or miscellaneous medicines for home use. In 1782, Sir John Russell asked Mr. Jones, chemist in Russell Street, London, to send to Chequers by the Aylesbury Coach, 1 pint of laudanum, 2 oz. of powder of tin, 2 lb. soluble tartar, $\frac{1}{2}$ pint Goulard's extract, and 1 quart cinnamon water.¹⁰⁹

If the Wellcome Collection does not reflect accurately the extent of prescribing of juleps, mixtures and large volumes of other medicines, there is no doubt that the large number of vials for draughts mirrors the popularity of this form of medication. A little surprising, however, are the innumerable vials of drop size, for while there is no doubt that drops were a common form of medication, they were not so popular as draughts (which were, anyway, commonly dispensed in batches of six). Of course, such small vials for drops were liable to survive better than the large bottles, but their numbers do raise the general question as to what other items (i.e. apart from dispensed medicines) were put into vials.

One of the most popular uses was undoubtedly for proprietary medicines, large numbers of which were sold throughout the period being considered.¹¹⁰ However, care must be taken in assuming that very large numbers of the common dispensing vials were used for such medicines, as many proprietaries were marketed in distinctive glass bottles, often with the name of the medicine and of the proprietor embossed on the outside. One well-known example of distinctive bottles is the steeple-shaped variety used for Godfrey's Cordial.¹¹¹ It has to be remembered, too, that the common

¹⁰⁸ Cf. Account Book of Charles Heygate (Wellcome MS. 1088).

¹⁰⁹ Wellcome A.L.S., 10601. (For some information on the Jones establishment see G. M. Watson, 'Some eighteenth-century trading accounts' in F. N. L. Poynter (ed.), *The Evolution of Pharmacy in Britain*, London, 1965, pp. 45–77.)

¹¹⁰ In 1748 the *Gentleman's Magazine* (1748, 18, 346–50), listed 202 proprietary medicines, many of which were liquids.

¹¹¹ These persisted until this century. G. B. Griffenhagen, and J. H. Young, ('Old English Patent Medicines in America', *Contributions from the Museum of History and Technology, United States National Museum Bulletin*, 1959, 218, pp. 155–83), illustrate nineteenth- and twentieth-century labelled bottles of Godfreys' Cordial. Steeple-shaped bottles, however, were also used for Dalby's Carminative (two eighteenth-century examples are illustrated by Griffenhagen and Young (ibid.), while two further examples (dated c. 1850) are in the possession of the Pharmaceutical Society of Great Britain, cf. fig. 1). Another steeple-shaped bottle, bearing a pricked inscription: 'Dr. Squire's Elixir' is in the Guildhall Museum, London.

Apart from these, many steeple-shaped bottles have been excavated, and are generally dated fifteenth to sixteenth centuries (cf. Thorpe and Hume, op. cit. (fn. 93)). Fifteen examples of steeple-shaped bottles are in the Wellcome Collections (group 54).

'Godfrey's bottles' were sold empty during the nineteenth century. These were presumably steeple-shaped (see above), but it must be noted that F. Jacobson & Son were advertising 'Godfrey's round' and 'Godfrey's flat' in 1837 (*A Catalogue of Medical Earthenware, Glass, Pharmaceutical Implements*, London, p. 57.)

Many bottles for perfumery were, like proprietary medicine bottles, highly distinctive (cf. K. Foster, *Scent Bottles*, London, 1966). The Wellcome Institute contains a small collection of scent bottles and eighteenth- to nineteenth-century Eau de Cologne bottles. A few of the latter (c. 20 x 3 cms.) are labelled: Admirable Eau de Cologne/Colonia Fina; Acqua Colonia/ di perfettissima qualità/del Fabricatore Giovanni Trovati,/ premiato dal R. C. Instituto di Milano il giorno 4 Ottobre 1815,/ e confermato dal Governo; DOUBLE EAU DE COLOGNA ROYALE/DE LA REINE DES FLEURS/RECTIFIÉE PAR DISSEY ET PIVER, PARFUMEURS BREVETÉS DU ROI/RUE SAINT MARTIN, No 111, à PARIS; EXTRAIT D'EAU DE COLOGNE/Laugier Père et Fils/Rue Bourg-l'abbé/No 41, PARIS; ACQUA D'ODORE/di Colonia/Profumiero

dispensing vials that were used for proprietary medicines—such as those marketed on a small scale by an apothecary or chemist and druggist—were often of a superior quality. For example, a price list for medicinal glass from Apsley Pellatt, dated from the 1830s, included a special section of ‘moulded bottles for patent medicines, perfumery, &c.’¹¹²

But apart from medicines (whether dispensed or proprietary) there were other possible uses of vials, such as for inks and essences. However, these items were also commonly presented in distinctive packs, and there seems little doubt that the majority of vials under discussion was used for dispensing medicines.

Bottles and miscellaneous containers

An intriguing feature about the Wellcome Collection of vials and bottles is the comparative rarity of bottles from the first half of the nineteenth century (other than round ones), despite the fact that ‘flats, octagons and ovals’ were widely sold from at least the second quarter of the century.¹¹³ The Wellcome Collection contains twenty regular-shaped octagons, four flat octagons, and two flat rectangles which, nowadays, are referred to as ‘flats’.¹¹⁴ However, during the first half of the nineteenth century the term ‘flats’ was generally applied to ‘flat octagons’, rather than flat rectangles. For instance, Jacobson, in 1837, listed bottles as ‘six ounce octagon, flat, wide mouth’ and similar ones with short or long necks in 8, 10, 12 and 16 oz. sizes.¹¹⁵ Some years later (1867) Cooley stated that ‘mixtures are generally dispensed or “sent out” in 6-oz. or 8-oz. green-glass bottles, which are either “flat octagons” with long necks, or “regular octagons” with short necks, and with the doses marked in

RIDOLFO). Further evidence for the use of these distinctive bottles occurs from the depiction of such a bottle labelled ‘eau de Colon . . .’ in a print, dated 15 November 1820, entitled ‘The bill thrown out—but the pains and penalties inflicted’, published by S. W. Fores.

¹¹² These are priced:

Above 2 oz. . . . 1s. 2d. per lb.
2 oz. and under . . . 1s. 4d. ditto
If very small 12s. the gross
Green ditto 1d. per lb. less.

(Price list in possession of the Pharmaceutical Society of Great Britain). The Wellcome Collections include a number of vials of superior quality with well shaped rims and necks. These could have been used for proprietary medicines.

¹¹³ Evidence for this can be found in references in fns. 111 and 112, and from the records of an unknown chemist whose purchases for his shop between 1847 and 1857 are recorded in a stockbook (Wellcome Institute of the History of Medicine MS. 285, ff. 143–46).

¹¹⁴ Group 180. The two flat, rectangular bottles may well be eighteenth century, and the regular octagons, which are calibrated in parts (cf. fig. 1K), are possibly from the second half of the nineteenth century.

The example of a flat rectangular bottle shown in figure 1J is for a proprietary medicine. It can be dated 1836–1864, and is embossed round the sides as follows: G. GILBERT ONLY/PROPRIETOR OF THE/ROYAL ANTI/SCORBUTIC DROPS. This is an example of a medicine being administered by drops, recommended directions being ‘begin with four drops after breakfast in your last cup of tea, or any simple liquid; take six drops after dinner and eight after supper . . .’. The bottle is in the possession of the Pharmaceutical Society of Great Britain.

¹¹⁵ F. Jacobson & Son, *A Catalogue of Medical Earthenware, Glass, Pharmaceutical Implements*, London, 1837, pp. 60–61 (italics added).

The flat octagon medicine bottle was not new to the nineteenth century, at least in the field of proprietary medicines. In the eighteenth century Daffy’s Elixir was marketed by Dicey & Co. in these bottles (6 oz. and 8 oz. capacity) as evidenced in an undated broadsheet entitled: *Just received from Dicey and Okell’s Great Original Elixir Warehouse . . . a Parcel of their Original Medicines*. From testimonials on the broadsheet (which is in the Wellcome Institute of the History of Medicine) it can be dated c. 1780. A half-pint of Daffy’s Elixir in a flat octagon, which can be dated 1836 to 1864, is in the museum of the Pharmaceutical Society of Great Britain.

the glass on one of their sides.’¹¹⁶

Nevertheless, judging from the Wellcome bottles of the late nineteenth and early twentieth centuries (as well as from advertisements for medicine bottles) the flat octagon had generally disappeared by 1900 as a commonly used bottle for dispensed medicines. It lost ground to the ubiquitous ‘flat’ rectangular bottle—often with rounded corners—still surviving today, albeit sometimes made of plastic.¹¹⁷

This account of medicine vials and bottles must not ignore the fact that a wide variety of miscellaneous containers found use as medicine bottles—certainly in hospitals—until at least the advent of the National Health Service. This point was brought out in the quotation from the *Pharmaceutical Journal and Transactions of* 1870 in which careless labelling was also criticized (see fn. 52).

Criticism on the inadequacy of labelling could perhaps be applied to much of general pharmaceutical practice, for tag labelling—commonly used until well into the nineteenth century—hardly stood up to careless handling.¹¹⁸ In 1819 William Chamberlaine was writing:¹¹⁹ ‘many accidents have happened from the loss of labels tied round the neck of phials. Mineral acids destroy the ink, and corrode the paper. Sometimes not even the pains to tie the labels round the neck is taken, but they are, through laziness, stuck into the mouths of phials, and only held there by the cork.’

Chamberlaine’s answer to the problem was to gum his labels to the bottle, a method which gradually gained universal sanction.¹²⁰ Undoubtedly improvements in bottle-making facilitated the use of the adhesive label, the flat surface of a moulded, hexagonal or rectangular bottle being better adapted for labelling than the uneven hand-made cylindrical bottles, vials and other containers of the seventeenth and eighteenth centuries. A further important improvement of moulded bottles was that the neck was shaped so that standard-sized corks could be used. There is little doubt that dispensed medicines became more consistent in appearance, though they could hardly have matched the elegance of small vials of cordials with silken stoppers, such as were described by Gideon Harvey in 1678.¹²¹

¹¹⁶ A. J. Cooley, *The Mixture-Book*, London, 1867, p. 117.

¹¹⁷ The octagon survived into the twentieth century for certain proprietary medicines, as did the two- and four-ounce cylindrical vials.

¹¹⁸ Twelve examples of tag labelling survive in the Wellcome Collections.

¹¹⁹ *Tyrocinium Medicum; or a dissertation on the Duties of Youth apprenticed to the Medical Profession*, London, 1819 (2nd ed.), p. 224.

¹²⁰ Chamberlaine, who used engraved labels, had them ‘gummed’ by applying mucilage of acacia to the back of the sheet and allowing it to dry. The individual labels were then cut by scissors and licked to render them adhesive. Later, dextrin gum (or British gum) replaced gum acacia on chemists’ labels. Label suppliers between 1849 and 1860 advertised ‘dispensing labels, ready gummed and cut, for immediate use’ (see advertisements in the Medical Directories for these years).

¹²¹ *Casus Medico-Chirurgicus: or, a Most Memorable Case of a Noble-Man, Deceased*, London, 1678, p. 74.