



The evolution of pharmacy Theme D, Level 1

The development of dosage forms

The origins of dosage forms

The origins of the earliest dosage forms are lost in the mists of history. We can safely assume that primitive man took parts of plants including leaves, stems, roots and berries internally for a range of symptoms. A variety of plant and animal products would undoubtedly also have been applied externally to aid the healing of wounds. The vapours of volatile herbs would have been inhaled, and later combinations would have been used, no doubt incorporated into a selection of fats, oils and honey. As time went on they would have been processed by boiling, grinding or dissolving.



Dosage forms used by early civilisations

Early civilisations used an extensive range of dosage forms, for the application of medicines to every surface and orifice. The Ancient Greeks and Romans used a number of dosage forms, many of which we would recognise today: they included **ointments**, oils, **powders**, **pills**, **pessaries**, gargles and eye lotions. Others had different names to those used today; enemas were known as clysters or glisters, and were liquids that were injected into the rectum using a horn as a funnel, or an animal bladder attached to a greased tube inserted into the anus. The Arabs introduced a number of sweet preparations based on sugar, including syrups, conserves, confections, electuaries and juleps. Syrups were made by boiling an extract with sugar; conserves were flowers, herbs, roots or fruits preserved in sugar; confections and electuaries both involved mixing dried and powdered ingredients with syrup or honey; and juleps were clear, sweet liquids. The Arabs also used flavours such as rose water, orange and lemon peel.

Following the departure of the Romans from Britain in the early fifth century, Anglo-Saxon practitioners used a form of medicine known as leeches. Their preparations included ointments, poultices, plasters, fomentations, internal medicines sweetened with honey, herbs mixed with water, ale or wine, inhalations of vapours, and fumigation using hot herbal decoctions or burning seeds.

In the fifteenth century, the introduction of printing meant that books such as pharmacopoeias became more widely available. These contained formulas for frequently-prescribed medicines and also methods for making them. As well as herb simples, containing a single remedy, they included many medicines with a large number of ingredients.

Medicines for internal use

Medicines for internal use ranged in consistency from watery liquids to thick liquids, such as syrups and emulsions, to semi-solid products such as **lozenges** and **pastilles**, to solid dose forms such as pills and tablets. Early **liquid medicines** included spirits and distilled waters, which were made by macerating drugs with spirit of wine and then collecting the liquid produced by distillation. Mixtures of oils were distilled to produce balsams, whilst quintessences were produced by distilling an essential oil in pure spirit of wine and concentrating the result by repeated distillation. Tinctures were made by soaking the ingredient in spirit and then straining the result.

Elixirs were similar to tinctures, but stronger and thicker. **Powders** were preparations made from ingredients that were mixed together and powdered in a **mortar** and pestle. They were either a simple (with one ingredient) or compound. As they often had an unpleasant taste, pharmacists would insert them between layers of rice paper, becoming a wafer. An improvement on wafers were **cachets**, consisting of powder sealed between shaped rice paper plates.

Pills were a useful dosage form for medicines that had an unpleasant taste. Solid ingredients were powdered and then made into a stiff mass, which was then formed into roughly spherical pills. A variety of equipment was developed to facilitate this, and **pill-making** became an essential part of the pharmacist's art.

Mass production enabled the development of products with reliable content and characteristics. **Capsules and tablets** became the dominant forms. Products were also developed to be dissolved in the mouth rather than to be swallowed. These included **lozenges and pastilles**.

Medicines for external use

Amongst the preparations applied externally were **ointments, creams and plasters**. Ointments were made using several types of base: greasy ones made from fats, waxes or oils; emulsifying bases that could be emulsified by water, oil-in-water or water-in-oil emulsion bases; and water-soluble bases. Today they have largely been replaced by greasy or non-greasy creams.

Lotions were liquid external preparations designed to be applied without friction, whereas liniments were designed to be rubbed into the skin. Pastes were topical preparations in a base of starch, glycerin, glycogelatin or paraffin.

Plasters (not to be confused with sticking plasters) were usually spread on a fabric such as leather or calico using a hot plaster iron. Shapes for use on the breast, back, chest or shoulder were made.

Medicines for body cavities

As well as application to the skin, products were developed for insertion into body cavities. These included **suppositories, pessaries and bougies**. Suppositories are solid preparations made by mixing the active ingredient with molten theobroma oil, glycerine or other material, pouring into moulds and allowing to set. They are normally bullet-shaped to allow easy insertion into the rectum. Pessaries are for vaginal insertion, and bougies were medicated pencils for urethral, aural or nasal use.

Enemas are liquid preparations for insertion into the rectum, and are mainly used to relieve severe constipation. Originally powerful clyster syringes were used, but these were replaced by a funnel and rubber tube and more recently by micro-enemas.

Lamellae were medicated discs intended for application to the eye; they were made from glycerin, gelatine and water in which the active ingredient was dissolved. Inhalations were volatile substances that could be inhaled from a handkerchief or inhaler. Others were dispersed in hot water and inhaled from a container such as a Nelson's inhaler. Vitrellae were capsules made of thin glass that could be crushed and the contents inhaled. Finally injections were sterile products that could be injected by a number of routes including intramuscular, intravenous and subcutaneous.

FIND OUT MORE

Links to other sheets:

The **underlined words** indicate more detailed sheets on the Museum of the Royal Pharmaceutical Society's *Information Sheets* webpage.

Further Reading:

Jackson, W A, 'From electuaries to enteric coating: A brief history of dosage forms' in Anderson S (ed.), *Making Medicines: A brief history of pharmacy and pharmaceuticals*, (Pharmaceutical Press, London, 2005)

Trease G E, *Pharmacy in History*, (Baillière, Tindall and Cox, London, 1964)

Poynter F N L, *The Evolution of Pharmacy in Britain*, (Pitman Medical, London, 1965)