EPONYMS IN LABORATORY EQUIPMENT

Dedicated to the 100th anniversary of the birth of doc. RNDr. PhMr. Miroslav Malát, DrSc.

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1. Introduction

The word has played an important role in human culture since time immemorial. It is the gateway to communication between people and, since the invention of writing, to the exchange of information between people distant in place or time. But it can also make communication difficult or impossible. This is also demonstrated by more than sixty years of modern chemophobia[1–3] and its association with the dilution of chemical identity[4], and its fundamentally negative effect on the acquisition and on retention of new chemical talents[5]. The correct naming of a thing, being or phenomenon is so essential in order for communication to be meaningful, i.e., for the idea that is shared by the word to be truly understood. The origin of words is elucidated by etymology, a subfield of linguistics. Etymology is also used in chemistry, where many technical names are based on Greek, Latin or Arabic[6], and therefore knowledge of the origin or history of a given technical name also greatly facilitates the understanding of the context in which it occurs, which also has an important didactic impact when teaching chemistry[7,8]. For this reason, etymological dictionaries are also compiled, with origins going back to the famous *Etymologiae* written by St. Isidore of Seville (c. 560−636). There are several etymological works for chemistry, of which Senning's works stand out[9,10].

As a special case, we can consider the naming, which contains a personal name – both of a real or fictional person. It is referred to as an eponym, from the ancient Greek word ἐπώνυμος, composed of the preposition ἐπί- meaning *after what*, ὄνυμα meaning *name*, and the prepositional ending -ος. The use of eponyms has a long tradition and a rich distribution in chemistry[11]: they are found in the names of chemical elements, trivial names of chemical compounds, reactions, phenomena, techniques, laboratory equipment, laws, analytical determinations and reagents[12].

In this communication we focus on eponyms from the field of laboratory equipment, i.e., the names of vessels, tools and instruments that, like the chemical laboratory itself, have centuries of development behind them. In addition to their ordinary utilitarian value and their important commemorative significance as reminders of the skill and excellence of previous generations of chemists, today these objects of chemical material culture also play the role of important witnesses to the existence of chemistry in disciplines with chemical fundament, but with non-chemical names. Fancy names may warrant public attention, but they ultimately deprive chemistry of its reputation as a cutting-edge science, and, logically, of the interest of potential students. Laboratory equipment is also of considerable didactic importance in helping to place chemistry in the context of everyday life. Indeed, it demonstrates its origins in elementary human activities, such as food preparation and in the environment where these activities commonly take place. The earliest laboratory vessels are still based on kitchen vessels, as can be seen in the name of one of the most commonly used, the beaker. In the days of alchemy, laboratory equipment items were called primarily by their shape, an example being the curcubit, so called because of its shape resembling a gourd (Latin *curcubita*), or the famous retort (Latin literally "backwards turned"). With the development of chemistry, especially in the 19th century, more sophisticated and complex laboratory apparatus and instruments were constructed, and the names of their discoverers or those who popularised them began to be eponymously inserted into their names. Alternatively, it may be the name of a non-person, such as Eppendorf, the name of the town district in Hamburg where the company of the same name was originally located (hence the misnomer of the often-used phrase "*microtube according to Eppendorf"*). Apart from the commemorative or historical significance, practical reasons also play a role, in particular a quicker and more correct understanding of which instrument to use (no need to describe it in detail), or even to specify how an operation was performed or the result obtained (everyone knows that it makes a difference if the temperature is measured in Kelvin, degrees Celsius, not to mention degrees Fahrenheit).

The eponymic names in the field of laboratory equipment are used in two equivalent forms:

– the first, which is older way, uses the conjunction *according to*, for example, *funnel according to Büchner* (similarly in German *Trichter nach Büchner*);
– the second, which is shorter and prevails today, for example, *Büchner funnel*, sometimes written in the truly possessive form *Buchner's funnel* (similarly in German *Büchnertrichter,* or *Büchner-Trichter,* in older texts also *Büchner'schen Trichter*).

In the following review, we have selected the most commonly used eponyms in the field of laboratory equipment today, identified their primary sources (where possible) and actual authors by excerpting historical chemical literature, and supplemented the names of the chemists cited with bibliographic data. This also provides the reader with the literature for further, in-depth study. Laboratory equipment is naturally evolving, so that some of its representatives have fallen into oblivion; therefore we omit some of the classical instruments for the determination of physico-chemical constants (since these are now determined instrumentally) or narrowly used devices for special purposes.

2. Containers

2.1. Beakers

The beaker is not referred to by eponyms in the Czech chemical literature, but it is distinguished only on the basis of the ratio of height to diameter into low (height:diameter ratio around 1.4) and high (height:diameter ratio around 2.0) beakers. In German and English texts, the low beaker is referred to as the **Griffin beaker** after the British chemist John Joseph Griffin (1802–1877), who was a Glasgow-based supplier to chemical laboratories and publisher of scientific literature[13]. He was also active in publishing, including translating Heinrich Rose's famous *Handbuch der analytischen Chemie* into English in 1831, and was himself the author of the very popular *Chemical Recreations: a Popular Manual of Experimental Chemistry* (first edition 1823). In the same linguistic area, the tall beaker is known as the **Berzelius beaker**, a name given to it by the Swedish analytical chemist Jöns Jacob Berzelius (1779–1848)[14,15], famous in particular for his contributions to stoichiometry, analytical chemistry, electrochemistry, catalysis, and also for the discovery of cerium, selenium, and thorium. As a matter of interest, the name **Thuringian beaker** ("Thüringer Becherglas") can also be found in the German-speaking area for the medium beaker, no doubt due to its manufacture from the famous Jena glass invented by the German chemist Friedrich Otto Schott (1851–1935)[16].

Less used today is the **Phillips beaker** (sometimes referred to as the Phillips flask), the walls of which taper upwards and can be considered a precursor of the Erlenmeyer flask, from which it differs in its spout. The existing literature is widely divided on its authorship. However, the first reference to it was Michael Faraday's excellent book *Chemical Manipulation: Being Instructions to Students in Chemistry* (first edition 1827)[17], where it appears as "Phillip's precipitating glass." At the same time, Faraday refers to the source, a book *An Elementary Introduction to the Knowledge of Mineralogy* by the English mineralogist and geologist William Phillips (1775–1828)[18]. In the third edition of this work, published in 1823, there is an illustration of the aforementioned Phillips beaker, naturally without an eponymic designation (Fig. 1).

2.2. Flasks

The retort was an iconic vessel for the alchemical laboratory, and the **Erlenmeyer flask** occupies a similar position in today's chemical laboratory. It was designed by the German chemist Richard August Carl Emil Erlenmeyer (1825–1909)[19,20], a pupil of Justus von Liebig and August Kekulé. Erlenmeyer was particularly interested in organic chemistry and organic analysis. He drew attention to his later so famous flask in 1857 (ref. [21]). The main advantage of the flask is its conical shape, which guarantees high stability on the laboratory bench and also allows easy mixing of the contents. The narrow neck reduces evaporation of the solution when the contents are heated and can be easily closed with a stopper.

The determination of nitrogen in samples of mainly organic substances, which is still used today and is of particular importance for food chemistry and agriculture, was proposed in 1883 by the Danish chemist Johan Gustav Christoffer Thorsager Kjeldahl (1849–1900)[22]. A small

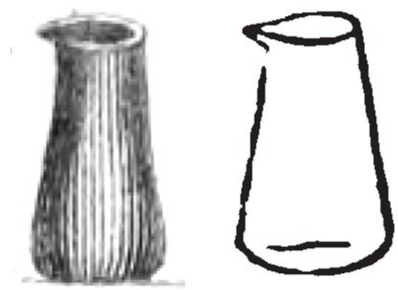

Fig. 1. **Phillips beaker** as depicted in William Phillips' book *An Elementary Introduction to the Knowledge of Mineralogy* of 1823 (left) and Michael Faraday's book *Chemical Manipulation: Being Instructions to Students in Chemistry* of 1827 (right).

long-necked flask, called a **Kjeldahl flask**, is essential for the mineralization of the sample in this method[23].

For the purpose of organic synthesis in an inert atmosphere, the German organic chemist Wilhelm Johann Schlenk (1879−1943)[25], a disciple of the famous Emil Fischer, developed in 1913 (ref.[24]) an elegant and versatile system to enable synthesis in the absence of atmospheric oxygen and moisture, based on a set of interconnecting flasks. The basic **Schlenk flask** is a round-bottomed, pear-shaped or tube-shaped flask with a stopcock and a side arm to allow evacuation or filling of the apparatus with inert gas. The **Schlenk frit** is particularly ingenious, consisting of two flasks attached to each end of a glass tube containing a Soxhlet cartridge to filter pyrophoric materials, which became known as the "Schlenk-Kreuz" (Schlenk cross).

2.3. Special containers

The double-walled container, which, due to the evacuation of the space between the walls, keeps the contents at a constant temperature for a relatively long time, is known to the layman as a vacuum flask (thermos). It shows that just as the kitchen has given rise to a range of laboratory equipment, chemistry can in turn provide new things for the kitchen. In the laboratory, it is referred to as the **Dewar flask** after its discoverer, the Scottish chemist James Dewar (1842−1923)[26,27], who, among other things, studied low temperatures. For his experiments, he constructed the first version of the flask in brass in 1873 (ref.[28]), followed by a glass version in 1893 (ref. [29]).

Among the special vessels, we can include the **Petri dish**, which was introduced in 1887 (ref.[30]) by the German bacteriologist Julius Richard Petri (1852−1921)[31] for the cultivation of microorganisms, but which also found its application for a number of purposes in the chemical laboratory. However, as shown by Shama[32], the dish is in fact a simultaneous invention of a number of bacteriologists active in the mid-1880s and thus bears Petri's name only by chance.

To experimentally verify the validity of the law of conservation of mass, the Swiss chemist, discoverer of the oscillating iodine reaction[34], Hans Heinrich Landolt (1831−1910)[35] constructed in 1893 (ref.[33]) a vessel consisting essentially of two test tubes connected together by a glass tube in an arc (Fig. 2). Reagents are placed into each part, and the vessel is sealed. After weighing it accurately, the reactants can be mixed and it can be demonstrated that the mass of the reactants has not changed. Landolt used a series of experiments to demonstrate the validity of the basic chemical law mentioned above[36]. Today, the **Landolt vessel** can be used for demonstration purposes in chemistry education.

With regard to our country, let us also mention polarographic vessels (Fig. 3). Although polarographic measurements can also be made in a beaker, a number of vessels have been developed for this purpose, of which the following four have been used in practice[37]. The **Heyrovský vessel** was developed by the inventor of polarography Jaroslav Heyrovský (1890−1967). It is essentially an Erlenmeyer flask, with a mercury bottom contact (auxiliary electrode) sealed into its wall, and a tube allowing the introduction of inert gas into the analysed solution to remove dissolved oxygen[38]. For the accurate determination of half-wave potentials, the **Kalousek vessel**, designed in 1939 (ref. [39]), is used, in which the left part is

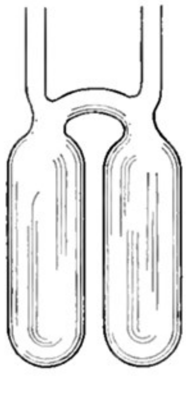

Fig. 2. **Landolt vessel** (taken from ref.[33])

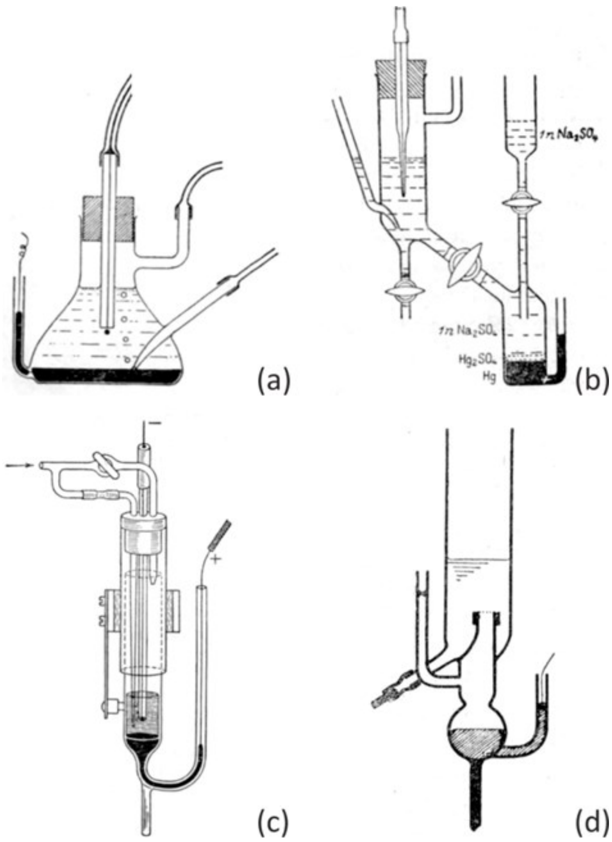

Fig. 3. Polarographic vessels (a) **Heyrovský vessel**, (b) **Kalousek vessel**, (c) **Novák vessel**, (4) **Šerák vessel** (taken from ref. [38,39,41,42])

used to place the analysed solution, the right part being the reference electrode (usually mercury/mercurous sulfate electrode). The arrangement was designed by Heyrovsky's disciple Mirko Kalousek (1915−1996)[40]. Its modification is the **Šerák vessel** designed in 1953 (ref.[41]). It was designed by another Heyrovsky's disciple Lubomír Šerák (1926−2011)[37]. For serial analyses, the **Novák vessel** is advantageous because its lower part with analysed solution can be quickly replaced. In 1947 (ref.[42]), it was designed by Heyrovsky's disciple Jiří V. A. Novák (1913−2000)[37].

2.4. Ground glass joints

The sealing of vessels or their combination into more complex apparatuses was already known and used by alchemists. An echo of these times is the term **hermetically sealed**, which is still used in the laboratory. It originated in the days when no ground glass joints were used to combine parts of apparatuses, but the individual parts were bandaged with a cloth impregnated with egg white, wax or clay, or sealing matter – made of complex mixtures of many substances, and called *lutum sapientiae* (mud of wisdom)[43] – was used. The result was a virtually gas-tight joint. This system was called *sigillum hermetis* (hermetic seal) after the mythical founder of alchemy, Hermes Trismegistus[44].

Today's chemist prefers the use of ground glass joints, which have been known since the early modern period. The possibility of easy interchangeability of individual grinding pieces was achieved at the beginning of the 20th century by standardising the dimensions of the inner (core) and outer (socket) joints. One of the leading figures in this standardization was the German chemist Fritz Paul Walter Friedrichs (1885−1958), author of a number of improvements in laboratory equipment[45], some of which are listed below. This is why in some literature the most common conically tapered joints are referred to as **Friedrichs joitns**[46]. **Keck clamps** are used to secure conically tapered joints. This simple device was designed by the German chemist Hermann Keck (born 1919) in 1982 (ref.[47]).

Flat joints, now little used, are referred to in older literature as **Ramsay joints**, after the famous Scottish chemist William Ramsay (1852−1916)[48], who was awarded the Nobel Prize in 1904 for his discovery and isolation of noble gases. To him chemistry also owes discovery of the **Ramsay grease**, a mixture of paraffin wax, petroleum jelly, and natural rubber[49]. Flat joints with a wider contact area are called **Babo joints**, after the German chemist Lambert Heinrich Clemens von Babo (1818−1899)[50], whose name we shall meet later. A specialised joint that ensures a perfect seal is the mercury-sealed **Kahlbaum cup joint** (the name is used only in German chemical literature as "Kahlbaumschen Napfschliff"), named after the German physical chemist Georg Wilhelm August Kahlbaum (1853−1905)[51].

3. Working with solids

Various types of mortars and pestles have been used to grind solids since time immemorial. The **Plattner mortar**, made of special steel, is used for crushing particularly hard materials. The German metallurgical chemist Carl Friedrich Plattner (1800−1858)[52] introduced it into chemical practice in 1847 (ref.[53]). However, the actual author was the St. Petersburg-based German chemist Otto Wilhelm Hermann von Abich (1806−1886)[54], as confirmed by his earlier publication of 1831 (ref.[55]).

For drying solids, desiccators of various designs are used. The most commonly used today is the **Scheibler desiccator** (but is usually referred to without this eponymic name), designed by the German chemist Carl Wilhelm Bernhard Scheibler (1827−1899)[56] for the analysis of carbohydrates. A device for the highly efficient drying of substances, in which the substance to be dried is placed in a vacuum vessel that is heated with solvent vapour to increase drying effect, was described in 1910 (ref.[57]) by the Swiss biochemist Emil Abderhalden (1877−1950)[58]. It is called the **Abderhalden drying pistol** after the shape the device resembles.

For the ingintion of solids (samples) in a stream of hydrogen or inert gas, a **Rose crucible** is used, which is covered by a porcelain lid with a central hole through which a curved porcelain tube passes for the supply of the gas. The author of this arrangement is the eminent German analytical chemist Heinrich Rose (1795−1864)[15,59], codiscoverer of niobium and author of the aforementioned *Handbuch der analytischen Chemie* (first edition 1829), which also influenced Czech chemistry[60,61].

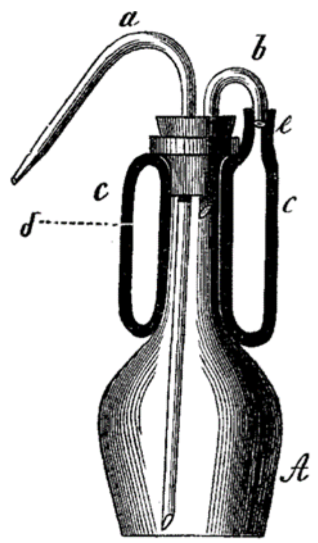

Fig. 4. **Gawalowski wash bottle** had a hollow rubber ring (cc) placed around the neck of the vessel (A), which, by squeezing it – when closing the opening (d) with a finger – air was forced into the vessel through the tube (b) and as a result water was forced out of the vessel through the tube (a). The wash bottle could also be advantageously used for hot water (taken from ref.[63])

4. Dosing and measuring of liquids

The liquid dosing aid, which is practically the chemist's daily companion, is the wash bottle. In the past, many chemists have devoted themselves to its appropriate design, giving rise to a number of design variations. Since the current laboratory uses wash bottles made almost exclusively of polymers, we refer to the exhaustive work of Stähler[62] for the historical development of wash bottles. Given our latitudes, we will only mention the **Gawalowski wash bottle**[63] (Fig. 4), which, by using a rubber balloon, resembles the one in use today. Its designer was the Czech-Austrian chemist Anton Karl Wilhelm Gawalowski (1848−1927), who worked as an analytical chemist in Brno[64]. He is also the author of many other improvements to laboratory equipment[62], but these are no longer used.

One of the most important chemists of all time, the Frenchman Louis Pasteur (1822−1895)[65] constructed an efficient **Pasteur pipette** from a glass tube, which he pulled into a capillary at one end, to carry small quantities of liquids. The exact date cannot be ascertained; it appears in the literature under this name as early as 1881. Although originally designed by Pasteur for microbiological purposes (the long, thin tip is easily sterilised by flame), it soon achieved great popularity for many other purposes in chemical laboratories as well, and is still widely used today (mostly in a disposable, plastic version).

So far, simple dripping is sufficient in some cases to dispense liquids such as indicator solutions. For this purpose, the **dropping bottle according to Schuster** can also be used advantageously (Fig. 5). A simple container, in which the liquid spout is easily controlled by a finger placed over the opening of the side tube, was invented by the Trnava pharmacist Joseph Carl Schuster (1783−1849)[66]. Its original purpose was for the precise dispensing of opium tincture, and it first appeared in the literature in 1818 (ref. [67]). The bottle has also found its application in ophthalmology, where it is used to wash out the eyes. For this reason it is also called undine, from the Latin *unda* = water ripple, a term coined by the famous Theoprastus Paracelsus (1493−1541) in his treatise *Ex libro de nymphis, sylvanis, pygmaeis, salamandris, et gigantibus etc.*, published posthumously in 1566.

Fig. 5. **Dropping bottle according to Schuster**, on the left in one of the oldest illustrations according to J. A. Bucher's book *Repertorium für die Pharmazie, VI. Band.* (Nürnberg, 1819), on the right the present-day form

A glass hinged pipette – nicknamed "starling" (after the bird's alleged ability to repeat everything) – is used to automatically deliver a defined volume of solution repeatedly. In the literature, it is erroneously eponymously referred to as the **automatic pipette according to Kipp**, apparently in reference to the name of the famous Peter Jacob Kipp, whom we discuss in more detail below. In this case, however, it is a mistranslation of the German term *Kippautomaten* (literally "hinged automaton"), coined by the inventor of the device, the Swiss chemist and industrialist Niklaus Gerber (1850−1914), author of the method still used today for determining fat in milk[68]. Gerber introduced his pipetting automaton in 1908 specifically for the purpose of food analysis[69].

Drip funnels, which are a derivative of separating funnels, are used for the dripping of fluids into a closed apparatus. The most famous is the **Walter funnel** (also spelled Waltr funnel), which allows one to observe the rate of liquid flow, designed in 1885 by the Swiss chemist Johann Walter (further biographical data could not be found)[70].

Burettes are used to accurately deliver liquids, not only in analytical chemistry, and many chemists have been involved in their design and modification[15] and we will list here only those most widely used today. The simplest, that is, a glass tube surrounded by graduations and a stopcock, is known as the **Mohr burette**. It was designed by the eminent German analytical chemist Karl Friedrich Mohr (1806−1879)[15,71]. Mohr′s design of the burette was based on that of previous authors[15], and his original version of the device used a rubber tube fitted with a metal pusher instead of a glass stopcock (which was also named after its inventor, see below). He introduced his burette in 1853 (ref.[72]) and included it two years later in the first edition of his authoritative book *Lehrbuch der chemisch-analytischen Titrirmethode*.

In 1855 (ref.[73]), the German physicist and mathematician Karl Heinrich Schellbach (1805−1892)[74] proposed a narrow strip of blue enamel fused into a wider strip of white enamel on the back of the burette for easy and correct reading of the meniscus. On this **Schellbach stripe**, the refraction of light in the level of the meniscus causes a visible narrowing of the blue strip, so that the position of the meniscus is easily read.

For microscale titrations, where the consumption of the volumetric solution is only in units of millilitres, the **Bang microburette** is used. It was proposed in 1916 (ref.[75]) by the Norwegian analytical chemist Ivar Christian Bang (1869−1918)[76] for clinical analysis. The Irish biochemist Edward Joseph Conway (1894−1968)[77], who in 1933 proposed a microdiffusion method for the determination of nitrogen for which he constructed the **Conway dish**[78], also associated his name with microanalysis.

The **automatic Pellet burette** is used for routine analyses. The burette is attached directly to a storage bottle containing the standard solution (titrant). The solution is forced into the burette by air pressure blown into the apparatus by a rubber balloon. The zero position is set automatically, by means of a capillary which sucks the excess solution back into the storage bottle. The author of this device is the French chemist Henry Pellet (1848−1918)[79], who published his ingenious improvement of the Mohr burette in 1879 (ref. [80]). A modification of the Pellet burette is the **automatic burette according to Dr Schilling**, in which the storage bottle itself is used to fill the burette with the solution instead of the rubber balloon. The storage bottle is made of polyethylene, so that a light pressure on the walls of the bottle pushes the standard solution into the burette, the zero position being set automatically. The first reference to this burette found is in a paper from 1940 (ref. [81]), according to which the design of the burette can with some degree of probability be attributed to the German chemist Eugen Schilling (1861−1941).

The **Lunge-Rey pipette**, designed in 1891 (ref. [82]), is used for weighing corrosive and volatile liquids. Its author is the German analytical chemist Georg Lunge (1839–1923)[15,83], who in the publication[82] identifies his assistant H. Rey as co-author.

5. Working with gases

The development of gas chemistry in the late 18th century led to the development of various sophisticated devices for the preparation of gases[84]. Of these, the **Kipp apparatus**, introduced in 1844 (ref.[85]) by the Dutch pharmacist Petrus Jacobus Kipp (1808−1864)[86], was the most popular and is still used in the laboratory. Based on the success of the instrument, Kipp founded a still existing scientific instrument company Kipp & Zonen. The fame of the device led, as mentioned above, to the erroneous attribution of the authorship of the hinged pipette to Kipp.

A common part of the apparatus in which gases are handled is a thick-walled **Woulfe bottle** with usually three necks. Its inventor was the Irish chemist and mineralogist Peter Woulfe (1727−1803)[87], who incidentally also visited Bohemia during his mineralogical expeditions (and suspected a new element, today's tungsten, in the mineral wolframite found near Jáchymov). Woulfe in 1767 designed an apparatus for preparing, purifying and working with noxious gases such as ammonia, hydrogen chloride, and chloroethane by bubbling them through a flask or bottle containing water[88]. Originally it was just a retort with a side tube, from which Woulfe subsequently developed a three-necked bottle[89]. Sometimes, it is written with an error in the name as a Woulff bottle. The Woulfe bottle is also used as a safety bottle when working with a vacuum.

Numerous gas washing bottles were designed to wash the gases as analogues of the Woulfe bottle. The basic one is the **Drechsel gas washing bottle**, designed in 1876 (ref. [90]) by the German chemist Ferdinand Heinrich Edmund Drechsel (1843−1897)[91].

Working with gases naturally includes working with low pressure to vacuum, which has fascinated natural scientists since time immemorial (recall *horror vacui*). The most common laboratory device for reducing pressure is the **Volmer water jet pump**, although it is usually referred to without an eponymic designation. It was designed in 1919 (ref.[92]) by the German chemist Max Volmer (1885−1965)[93], who is best known for his important contributions to electrode kinetics.

6. Filtration

Filtration is one of the longest used chemical techniques. This is evidenced by one of the oldest eponymic names of laboratory equipment, which is the **Hippocratic sleeve** (Latin *manica Hippocratis*), although this name is no longer used today. It is a cone made of cloth (cotton, linen, wool) through which a suspension is poured, the filtrate being collected in an underlayed container (Fig. 6). It is therefore essentially a filtration without the use of a funnel. The alleged author of the device is the most famous physician of antiquity, Hippocrates of Kos (c. 460 − c. 370 BC). In his work Περι των εντοσ παθων (On Internal Affections)[94] he does mention the filtration of plant juices with a cloth, but as Schultze has shown[95], the eponymic naming of this device does not appear until the middle of the 16th century and was only retrospectively linked to Hippocrates. In particular, because it was used to filter a medicinal, spiced wine called Hippocrates, the recipe for which actually comes from the famous Greek physician.

For the filtration of strongly acidic solutions that damage common filter materials such as paper or cotton, the aforementioned Jöns Jacob Berzelius designed in 1818 a conical glass tube filled with asbestos[15], which became the basis of the fritted glasses used today. Of these, the **filter tube according to Allihn** retains its eponymic name[96]. It was introduced in 1879 by the German chemist Felix Richard Allihn (1854–1915). He was the author of

Fig. 6. **Hippocrates sleeve,** miniature from the manuscript Pedanius Dioscorides *Tractatus de herbis* from 1458 (Biblioteca Estense Universitaria, sign. α. l.09.28)

numerous modifications of laboratory equipment[62], but most of these have fallen out of use; his name will be encountered below.

Similarly, for gravimetric determinations, the American analytical chemist Frank Austin Gooch (1852−1929)[98] proposed in 1878 (ref. [97]) a crucible with a perforated bottom, on which a filter layer is formed by pouring a suspension of a suitable filter material (asbestos), which settles on this perforated bottom. It is named the **Gooch crucible**, after its author.

Filtration can be greatly accelerated by lowering the pressure below or raising the pressure above the filter; the technique has been used since the mid-19th century[99]. The German organic chemist Otto Nikolaus Witt (1835−1915)[100], a chemist working on the chemistry of dyes, improved the filtration technique considerably with two devices that are used until today. In 1886, he introduced a perforated porcelain plate[101], called a **Witt plate**, which is inserted into the funnel, increasing the filtration area and preventing the filter paper from tearing. His second invention is an all-glass filtering device designed in 1899 called the **filtering apparatus according to Witt** or simply the **Witt pot**[102], which allows the filtrate to be efficiently collected in a suitable container.

The instability of the Witt plate, only loosely inserted into the funnel, was eliminated in 1888 (ref.[103]) by the German chemist Rudolf Hirsch (1856−1913). His solution was simple: He had the plate sealed into the wall of the funnel, thus creating the **Hirsch funnel**.

Only six months after the publication of the Hirsch funnel, another adaptation of the Witt plate appeared and became even more popular[104]. It was designed by the German chemist Ernst Wilhelm Büchner (1850−1924). **Büchner funnel** has the advantage of perpendicular walls, which increases the volume of solution that can be poured onto the filter and also the surface area of the filter. Another contribution of this chemist is the **Büchner flask**, a thick-walled vessel with a side tube that allows air to be exhausted.

Another example of an eponymic naming of a laboratory device attributed to a famous chemist, although he is not its author, is the **Willstätter nail** for microscale filtration. However, as Stock[105] has shown, this is merely an association based on frequent mentions in the literature of the authorship of the famous German organic chemist Richard Martin Willstätter (1872−1942)[106], who was awarded the Nobel Prize for dye chemistry in 1915. The real author was probably the German chemist Emil Josef Diepolder (1870−1923).

The German chemist Fritz Paul Walter Friedrichs, mentioned above, recommended in 1908 a double-walled funnel for hot water filtration[107]. However, the **funnel according to Friedrichs** can also be used for heat-sensitive solutions, in which case it is cooled with ice water.

7. Distillation

Distillation, a method to separate the components of a mixture based on their different boiling points, has been known to humans since ancient times[49,108]. Key to its successful application was the discovery of suitable and efficient cooling. For basic, simple distillation under normal pressure, the most common condenser to date is the **Liebig condenser**, which is erroneously eponymously associated with the famous German chemist Justus von Liebig (1803−1873)[109]. As Forbes[108] has shown, the principle of this condenser was described in the mid-18th century, by several independent authors. Liebig's name was most likely associated with the condenser because of the great authority he enjoyed among 19th century chemists through his textbooks, which naturally mentioned this condenser[15].

Condensers also play a large role in higher temperature syntheses where the reaction mixture is heated under a reflux condenser to avoid solvent loss. The efficiency of the reflux condenser is directly proportional to the size of the cooling surface area and many chemists have worked to improve it. By corrugating the surface of the inner tube of the Liebig condenser, the aforementioned Felix Richard Allihn constructed the so-called **Allihn condenser** in 1886[110]. Another possibility is to extend the cooling path by replacing the straight inner tube of the Liebig condenser with a spiral. Probably the first such solution was proposed by the German chemist Georg Andreas Karl Städeler (1821−1871)[111]. His **Städeler condenser** has a spiral through which the cooled vapour passes, surrounded by a container of freezing mixture, allowing cooling even to very low temperatures[112]. Conversely, the spiral through which the cooling medium flows was used to construct a condenser around 1910 by the German chemist Otto Dimroth (1872−1940), after whom the **Dimroth condenser** was named[113]. It is also used in rotary vacuum evaporators. The **Friedrichs condenser**, in which steam is led in a spiral path around a large cooling finger, was designed in 1910 (ref.[114]) by the aforementioned Fritz Paul Walter Friedrichs.

Vacuum distillation, performed under reduced pressure, can be advantageously used to separate high boiling substances or substances that would decompose at higher temperatures. The safe implementation of this demanding technique was made possible by the German chemist Ludwig Rainer Claisen (1851−1930)[115], who in 1893 (ref. [116]) combined a vapour tube, a thermometer and a boil-refining capillary in a single piece of glass (the latter had been introduced before him in 1867 by the Italian chemist Pietro Pellogio[117]). The result was the **Claisen flask**, or **Claisen adapter**, to which an arbitrarily large flask can be attached. An arrangement that does not disturb the reduced pressure is needed to remove fractions during vacuum distillation. The most common is a device that has two eponymous names. In German (and Czech literature) it is known as the **Anschütz and Thiele adapter**, named after two German organic chemists, Richard Anschütz (1852−1937)[118,119] and Friedrich Karl Johannes Thiele (1865−1918)[120]. Another eponymic name is associated with the latter: the **Thiele tube** for the determination of the melting point of a substance, which was designed by Thiele in 1907 (ref.[121]). In the English-speaking world, the aforementioned adapter is known as the **Perkin triangle** because it was popularised by the English chemist William Henry Perkin Jr. (1860−1929)[122]. As it happens, the real inventor, who was the English chemist Leonard Temple Thorne (1855−1941)[123], was left out. He constructed his device during his studies in Germany in 1883 (ref.[124]).

Rectification, which essentially involves multiple distillations, is used to separate substances with close boiling points. A key component of the rectification apparatus is a suitable column, the design of which has received extensive attention[49,108]. For packed columns, the most common packing material is the small ceramic or metal **Raschig rings** introduced in 1914 (ref.[125]) by the German chemist Friedrich August Raschig (1863−1928)[126], or the **Berl saddles** designed in 1932 (ref.[127]) by the Bruntal-born German chemist Ernst Berl (1877−1946)[128]. The most commonly used of the other types of column is the **Vigreux column** from 1908 (ref.[129]), designed by the French glassmaker Henri Narcisse Vigreux (1869−1951), or the **Widmer column**, designed by the Swiss chemist Gustav Widmer in 1924 (ref.[130]).

8. Extraction

Extraction is one of the most common operations used to separate substances from mixtures, and it is not only used in the laboratory; we use it every day to make tea or coffee. One of the most efficient ways of carrying out liquid extraction from solid material is the **Soxhlet extractor**[131], developed in 1879 (ref.[132]) by the German chemist Franz von Soxhlet (1848−1926)[133], a native of Brno. For liquid-liquid extraction, the **Kutscher-Steudel extractor** was developed on a similar principle in 1903 (ref.[134]) by the German chemists Friedrich Kutscher (1866−1942)[135] and Hermann Steudel (1871−1967).

9. Heat sources

One of the oldest laboratory heating devices still in use is the water bath, called in older sources **Mary's bath** (ref.[136,137]); the Latin *balneum Mariae*, the French term *bain-marie* or the Italian *bagnomaria* are known in the culinary arts, where this device is also used. The principle is that a container of heated liquid is placed in a larger container of water, which is heated by a heat source. This indirectly heats the liquid in the inner container and, more importantly, the heating is uniform and the temperature does not exceed 100 °C. According to tradition, it was invented by the mythical alchemist Mary the Jewess (also known as Mary the Prophetess), said to have lived at the turn of the 3rd and 4th centuries AD. It is the oldest known eponymic naming of a laboratory device ever.

The air bath for heating round flasks by direct flame, which received the – now practically forgotten – name of **Babo bath** or **Babo funnel** (or **Babo sheets**), was designed by the above-mentioned Lambert Heinrich Clemens von Babo[50]. It is a slotted, comical cone made of sheet steel with radially arranged asbestos strips on the inner wall.

The simplest heat source in chemistry is the burner[138]. Today's gas burners, although abandoned in many laboratories, have their origin in the gas burner designed by the aforementioned Michael Faraday in 1827 (ref. [17,138]). Several modifications followed, the most successful of which is the **Bunsen burner**, still in use in the laboratory[139,140], designed around 1855 (ref. [141]) by the famous German analytical chemist Robert Wilhelm Bunsen (1811−1899) (ref.[15,142]), founder of spectral analysis and discoverer of caesium and rubidium. In 1891 (ref.[143]), the Romanian chemist Nicolae Teclu (1839−1916)[144], designed a different design of the burner, and the Teclu burner was named after him. Finally, a further modification from 1905 (ref.[145]), the **Méker burner**, became popular, its creator being the French chemist Georges Méker (1875−1975), and led to a flame with a temperature of up to 1500 °C (ref.[146]).

10. Small aids

The aforementioned Robert Bunsen contributed to the development of laboratory equipment in many ways. In addition to the above-mentioned burner, the universal **Bunsen stand** (which can have either a rectangular plate or a tripod as a base) bears his name, on which various holders can be attached[62]. A simple **Bunsen valve** is used to close the reaction vessels that are pressurized. It is based on a longitudinally slit rubber tube closed by a rod. If there is a higher pressure inside the vessel, gas can escape from the vessel, otherwise air is prevented from entering the vessel[62].

Clamps or clips are preferably used to control the flow of liquid or gas through a rubber tubing[62]. The older **Mohr clip**, designed by the aforementioned Karl Friedrich Mohr, is based on the spring principle. The younger **Hofmann clip** is based on a screw pressing a metal plate against a second metal plate on the tubing, so it can be more finely regulated. As Hofmann clip is documented in the literature as early as 1884 (ref.[147]), its author is probably the famous German organic chemist August Wilhelm von Hofmann (1818−1892)[148] , a pioneer in the research of aniline dyes.

In organic synthesis, a **Hershberg stirrer**, consisting of a suitably coiled stainless steel wire attached to a glass rod which can be easily pushed through the neck of the flask, is used to stir the reaction mixture in a spherical flask. It was designed in 1936 (ref.[149]) by the American organic chemist Emanuel Benjamin Hershberg (1908−1987).

11. Conclusions

The genesis of laboratory equipment provides, perhaps too unexpectedly for many, an interesting testimony to the importance of sequence in the development of chemistry. Historically, the transmission of ideas, experiences, and practices between professional chemists and their students and successors has led not only to the multiplication of chemistry's ideological richness but also its material culture. The review of the 72 most commonly used representatives of eponymic names in laboratory equipment presented in this article demonstrates not only the proficiency of chemists in creative activities with virtually invisible atoms and molecules, but also their ability to effectively solve the problems they face when working with chemicals. At the same time, it aptly illustrates the existence of the dual nature of chemistry as both a science and an art, i.e., on one side abstract-verbal and at the same time physical-palpable, which must be mastered through solid practical training. Thus, it demonstrates the pitfalls of online teaching, which not only does not allow practical verification of the acquired theoretical knowledge, but above all prevents a perfect, truly haptic mastery of laboratory techniques. It thus condemns the foolish calls for the abolition of laboratory courses, whether because of their financial costliness, their alleged redundancy or their supposed obsolescence in the face of the possibilities of online teaching.

As eponymic reality has shown, some names have entered the chemical consciousness alongside the actual creators, either after the manufacturers (Griffin beaker) or after those who popularized the device (Liebig condenser) or were associated with it because of their fame (Willstätter needle). This not only demonstrates the importance of the power of habit, but also points to the possibility of changing this in the everyday practice of the chemical laboratory, or in the wider context of human society. Eponymic naming of laboratory equipment thus represents not only a legacy of the past, but also an important means of communication in contemporary chemistry. Eponymic names can be put to good use in communicating chemistry to students and lay people, based on the stories and personalities behind them[4,5,150].

At the same time, eponyms can help confront one of the key problems in chemistry today. In our article[4], we highlighted the identity difficulties for chemists and the difficulty of finding points of contact between young talent and chemistry as a science, as more and more cutting-edge fields with chemical substance are being referred to by non-chemical names. In line with this practice, Schummer[151] speaks of *"der Etikettenschwindel"* (label fraud), when top chemistry is renamed nanotechnology, organic chemistry is renamed molecular science, inorganic chemistry is renamed materials science, physical chemistry is renamed physical research, and biochemistry is renamed molecular biology or life science or bionanotechnology. Campos[152] in turn sums up the problem in the sigh *"there seem to be fewer chemists that identify themselves as such"* to raise the existential question: *"What does it mean to be a chemist?"* However, in her view, the chemist is at the same time an identity and a profession. Or, as we put earlier[4]: *"Once you go through chemical formation, you remain a chemist forever."* Until this logical position is generally shared by all concerned, however, laboratory equipment, as a set of everyday chemical objects with a known history and a clear identity, will play the role of an important witness to the existence of chemistry in fields whose representatives have often undergone chemical training and formation but are now silent about chemistry.

REFERENCES

1. Chalupa R., Nesměrák K.: Chem. Listy *108*, 995 (2014).
2. Chalupa R., Nesměrák K.: Monatsh. Chem *149*, 1527 (2018).
3. Chalupa R., Nesměrák K.: Monatsh. Chem *150*, 1585 (2019).
4. Chalupa R., Nesměrák K.: Monatsh. Chem *151*, 1193 (2020).
5. Chalupa R., Nesměrák K.: Monatsh. Chem. *153*, 697 (2022).
6. Crosland M. P.: *Historical Studies in the Language of Chemistry*. Harvard University Press, Cambrigde 1962.
7. Slabin U., Krasitski V.: J. Balt. Sci. Educ. *16*, 250 (2017).
8. Urban P. L.: J. Chem. Educ. *91*, 1753 (2014).
9. Senning A.: *Elsevier's Dictionary of Chemoetymology.* Elsevier, Amsterdam 2007.
10. Senning A.: *The Etymology of Chemical Names*. De Gruyter, Berlin 2019.
11. Cintas P.: Angew. Chem., Int. Ed. *43*, 5888 (2004).
12. Braun T., Pálos A.: TrAC, Trends Anal. Chem. *8*, 158 (1989).
13. Gee B., Brock W. H.: Ambix *38*, 29 (1991).
14. Dunsch L.: *Jöns Jacob Berzelius*. BSB Teubner, Leipzig 1986.
15. Szabadváry F.: *History of Analytical Chemistry*. Pergamon Press, Oxford 1966.
16. Steiner J.: Glass Sci. Technol. (Offenbach, Ger.) *74*, 292 (2001).
17. Faraday M.: *Chemical Manipulation*. Phillips, London 1827.
18. Torrens H. S., in the book: *The Making of the Geological Society of London* (Lewis C. L. E., Knell S. J., ed.), pp. 129–144. Geological Society Publishing House, London 2009.
19. Krätz O.: Chem. Unserer Zeit *6*, 53 (1972).
20. Conrad M.: Ber. Dtsch. Chem. Ges. *43*, 3645 (1910).
21. Erlenmeyer E.: Z. Chem. Pharm. *3*, 21 (1860).
22. Veibel S.: J. Chem. Educ. *26*, 459 (1949).
23. Kjeldahl J.: Z. Anal. Chem. *22*, 366 (1883).
24. Schlenk W., Thal A.: Ber. Dtsch. Chem. Ges. *46*, 2840 (1913).
25. Tidwell T. T.: Angew. Chem., Int. Ed. *40*, 331, (2001).
26. Armstrong H. E.: J. Chem. Soc. *1928*, 1066.

27. Soulen R. J.: Phys. Today *49*, 32 (1996).
28. Dewar J.: Trans. R. Soc. Edinburgh *27*, 167 (1876).
29. Dewar J.: Proc. R. Inst. G. B. *14*, 1 (1893).
30. Petri R. J.: Centralbl. Bakteriol. Parasitenkd. *1*, 279 (1887).
31. Voswinckel P., in the book: *Neue Deutsche Biographie. 20. Band*, pp. 263–264. Duncker & Humblot, Berlin 2001.
32. Shama G.: Endeavour *43*, 11 (2019).
33. Landolt H.: Abh. Preuss. Akad. Wiss., Phys.-Math. Kl. *1910*, 1.
34. Gaspar V., Showalter K.: J. Am. Chem. Soc. *109*, 4869 (1987)
35. Oesper R. E.: J. Chem. Educ. *22*, 158 (1945).
36. Andrade Martins R.: Found. Chem. *21*, 109 (2019).
37. Jindra J.: *Dějiny elektrochemie v českých zemích 1882−1989.* Libri, Praha 2009.
38. Heyrovský J., Zuman P.: *Úvod do praktické polarografie.* 2nd Ed. Nakladatelství Československé akademie věd, Praha 1953.
39. Heyrovský J., Kalousek M.: Collect. Czech. Chem. Commun. *11*, 464 (1939).
40. Jindra J.: Chem. Listy *109*, 574 (2015).
41. Šerák L.: Collect. Czech. Chem. Commun. *18*, 439 (1953).
42. Novák J. V. A.: Collect. Czech. Chem. Commun *12*, 237 (1947).
43. Thomas N., in the book: *Craft Treatises and Handbooks: The Dissemination of Technical Knowledge in the Middle Ages* (Córdoba R., ed.), pp. 249–270. Brepols, Turnhout 2013.
44. Bull C. H.: *The Tradition of Hermes Trismegistus*. Brill, Leyden 2018.
45. Friedrichs F.: *Das Glas im Chemischen Laboratorium*. 2nd Ed. Springer, Berlin 1960.
46. Fresenius W.: Z. Anal. Chem. *61*, 410 (1922).
47. Keck H.: US Pat. 4442572 (1984).
48. Davies A. G.: Sci. Prog. *95*, 23 (2012).
49. Krell E.: *Handbook of Laboratory Distillation*. 2nd Ed. Elsevier, Amsterdam 1982.
50. Landolt H.: Ber. Dtsch. Chem. Ges. *32*, 1163 (1899).
51. Strunz F.: Ber. Dtsch. Chem. Ges. *38*, 4239 (1905).
52. Plattner C. F.: *Die Probirkunst mit dem Löthrohre.* Barth, Leipzig 1847.
53. Plattner H., in the book: *Neue Deutsche Biographie. 20. Band*, pp. 519. Duncker & Humblot, Berlin 2001.
54. Seibold I., Seibold, E.: Int. J. Earth Sci. *95*, 1087 (2006).
55. Abich H.: Poggendorff's Ann. Phys. *23*, 305 (1831).
56. Engel M. in the book: *Neue Deutsche Biographie. 22. Band*, pp. 627–628. Duncker & Humblot, Berlin 2005.
57. Abderhalden E.: *Handbuch der biochemischen Arbeitsmethoden. Erster Band.* Urban & Schwarzenberg, Berlin 1910.
58. Hanson H.: Pharmazie *6*, 233 (1951).
59. Rammelsberg C.: Arch. Pharm. (Weinheim). *175*, 1 (1866).
60. Nesměrák K.: Chem. Listy *107*, 804 (2013).
61. Chalupa R., Nesměrák K.: Monatsh. Chem. *151*, 1659 (2020).
62. Stähler A.: *Handbuch der Arbeitsmethoden in der anorganischen Chemie. Erster Band.* Veit, Leipzig 1913.
63. Gawalovski A.: Z. Anal. Chem. *14*, 170 (1875).
64. *Österreichisches biographisches Lexikon 1815–1950. 1. Band*, p. 414. Akademie der Wissenschaften, Wien 1957.
65. Debré P.: *Louis Pasteur*. The Johns Hopkins University Press, Baltimore 1996.
66. Anonymous: Oesterreichischer Bürger-Kalender *2*, 43 (1847).
67. Schuster J. C.: Intellligenzblatt der östereichischen Literatur *1818*, 58.
68. Kleyn D. H., Lynch J. M., Barbano D. M., Bloom M. J., Mitchell M. W.: J. AOAC Int. *84*, 1499 (2001).
69. Anonymous: Vierteljahresschr. Prakt. Pharm. *5*, 279 (1908).
70. Walter J.: J. Prakt. Chem. *32*, 425 (1885).
71. Oesper R. E.: J. Chem. Educ. *4*, 1357 (1927).
72. Mohr K.: Justus Liebigs Ann. Chem. *86*, 129 (1853).
73. Schellbach K. H.: Chem.-Ztg. *9*, 1515 (1885).
74. Müller F.: Abhandlungen zur Geschichte der mathematischen Wissenschaften mit Einschluss ihrer Anwendungen *20*, 3 (1905).
75. Bang I.: *Methoden zur Mikrobestimmung Einiger Blutbestandteile*. Bergmann, München 1916.
76. Schmidt V.: Clin. Chem. *32*, 213 (1986).
77. Maizels M.: Biogr. Mem. Fellows R. Soc. *15*, 69 (1969)
78. Conway E. J., Byrne A.: Biochem. J. *27*, 419 (1933).
79. Deelstra H., Péters M.: Studium *3*, 226 (2008).
80. Pellet H.: Bull. Soc. Fr. Photogr. *25*, 299 (1879).
81. Almy E. G., Griffin W. C., Wilcox C. S.: Ind. Eng. Chem. Anal. Ed. *12*, 392 (1940).
82. Lunge G., Rey H.: Z. Angew. Chem. *4*, 165 (1891).
83. Berl E.: J. Chem. Educ. *16*, 453 (1939).
84. Aynsley E. E., Campbell W. A.: J. Chem. Educ. *35*, 347 (1958).
85. Kipp P. J.: Tijdschrift voor Handel en Nijverheid *1*, 229 (1844).
86. Snelders H. A. M.: Rev. Hist. Pharm. (Paris). *212*, 3 (1972).
87. Campbell W. A.: Chem. Ind. *35*, 1182 (1957).
88. Woulfe P.: Philos. Trans. R. Soc. London *57*, 517 (1767).
89. Tomory L.: Ann. Sci. *66*, 473 (2009).
90. Drechsel E.: Z. Prakt. Chem. *13*, 479 (1876).
91. Tschirsch A.: Leopoldina *34*, 43 (1898).
92. Volmer M.: Ber. Dtsch. Chem. Ges. *52*, 804 (1919).
93. Knobloch E.: *"The Shoulders on Which we Stand": Wegbereiter der Wissenschaft: 125 Jahre Technische Universität Berlin*. Springer, Berlin 2004.
94. Potter P. (ed.): *Hippocrates. Volume VI.* Harvard University Press, Cambridge 1988.
95. Schultze D.: J. English Philol. *126*, 429 (2008).
96. Allihn F.: Neue Z. Rübenzucker-Industr. *3*, 230 (1879).

97. Gooch F. A.: Chem. News J. Phys. Sci. *37*, 181 (1878).
98. van Name R. G.: Biogr. Mem. (Natl. Acad. Sci. U. S. A.) *15*, 105 (1934).
99. Jensen W. B.: J. Chem. Educ. *83*, 1283 (2006).
100. Noelting E.: Ber. Dtsch. Chem. Ges. *49*, 1751 (1916).
101. Witt O. N.: Ber. Dtsch. Chem. Ges. *19*, 918 (1886).
102. Witt O. N.: Chem. Ind. (Berlin) *22*, 510 (1899).
103. Hirsch R.: Z. Anal. Chem. *27*, 390 (1888).
104. Büchner E. W.: Chem.-Ztg. *12*, 1277 (1888).
105. Stock J. T.: J. Chem. Educ. *69*, 822 (1992).
106. Robinson R.: Biogr. Mem. Fellows R. Soc. *8*, 609 (1953).
107. Friedrichs F.: Z. Angew. Chem. *21*, 2319 (1908).
108. Forbes J. R.: *Short History of the Art of Distillation*. Brill, Leiden 1948.
109. Brock W. H.: *Justus von Liebig: The Chemical Gatekeeper*. Cambridge University Press, Cambridge 2002.
110. Allihn F.: Z. Anal. Chem. *25*, 36 (1886).
111. Kraut K.: Ber. Dtsch. Chem. Ges. *4*, 425 (1871).
112. Friedrichs F.: Z. Angew. Chem. *33*, 157 (1920).
113. Ebert L.: Ber. Dtsch. Chem. Ges. *74*, A1 (1941).
114. Friedrichs F.: Z. Angew. Chem. *23*, 2425 (1910).
115. Anschütz R.: Ber. Dtsch. Chem. Ges. *69*, A97 (1936).
116. Claisen L.: Justus Liebigs Ann. Chem. *277*, 162 (1893).
117. Pellogio P.: Z. Anal. Chem. *6*, 396 (1867).
118. Kauffman G. B.: J. Chem. Educ. *59*, 627 (1982).
119. Kauffman G. B.: J. Chem. Educ. *59*, 745 (1982).
120. Straus F.: Z. Angew. Chem. *31*, 117 (1918).
121. Thiele J.: Ber. Dtsch. Chem. Ges. *40*, 996 (1907).
122. Haworth R. N.: J. Chem. Soc. *1930*, C81.
123. Baker J. L.: J. Chem. Soc. *1942*, 336.
124. Thorne L. T.: Ber. Dtsch. Chem. Ges. *16*, 1327 (1883).
125. Raschig F.: AT81978 (1914).
126. Rosenheim A.: Ber. Dtsch. Chem. Ges. *62*, A109 (1929).
127. Berl E.: Chem. Fabrik *5*, 188 (1932).
128. Iser M.: Helv. Chim. Acta *29*, 957 (1946).
129. Vigreux H.: Bull. Société Chim. Fr. Ser. 4 *2*, 855 (1908).
130. Widmer G.: Helv. Chim. Acta *7*, 59 (1924).
131. Jensen W. B.: J. Chem. Educ. *84*, 1913 (2007).
132. von Soxhlet F.: Dingler's Polytech. J. *232*, 461 (1879).
133. Rommel O.: Muench. Med. Wochenschr. *73*, 994 (1926).
134. Kutscher F., Steudel H.: Hoppe-Seyler's Z. Physiol. Chem. *39*, 473 (1903).
135. Walter H., in the book: *Neue Deutsche Biographie. 13. Band*, pp. 347−348. Duncker & Humblot, Berlin 1982.
136. von Lippmann E. O.: *Abhandlungen und Vorträge zur Geschichte der Naturwissenschaften. 2. Band*, pp. 185−200. Veit, Leipzig 1913.
137. Raggetti L., in the book: *Gendered Touch: Women, Men, and Knowledge-Making in Early Modern Europe* (Antonelli F., Romano A., Savoia P., eds.), pp. 21–39. Brill, Leiden 2022.
138. Kohn M.: J. Chem. Educ. *27*, 514 (1950).
139. Jensen W. B.: J. Chem. Educ. *82*, 518 (2005).
140. Lockermann G.: J. Chem. Educ. *33*, 20 (1956).
141. Bunsen R., Roscoe H.: Ann. Phys. *176*, 43 (1857).
142. Lockemann G.: *Robert Wilhelm Bunsen: Lebensbild eines deutschen Naturforschers*. Wissenschaftliche Verlagsgesellschaft, Stuttgart 1949.
143. Teclu N.: J. Prakt. Chem. *45*, 281 (1892).
144. Baiulescu G. E., Moldoveanu S., West T. S.: Talanta *30*, 135 (1983).
145. Méker G.: J. Phys. Theor. Appl. *4*, 348 (1905).
146. Jensen W. B.: J. Chem. Educ. *86*, 1362 (2009).
147. Vogtherr M.: Arch. Pharm. (Weinheim) *11*, 539 (1884).
148. Meinel C.: Angew. Chem., Int. Ed. *31*, 1265 (1992).
149. Hershberg E. B.: Ind. Eng. Chem. Anal. Ed. *8*, 313 (1936).
150. Chalupa R., Nesměrák K.: Monatsh. Chem. *152*, 1045 (2021).
151. Schummer J., in the book: *Zwischen Faszination und Verteufelung: Chemie in der Gesellschaft.* (Weitze M.-D., Schummer J., Geelhaar T., eds.), pp. 1–16. Springer, Berlin 2017.
152. Campos B.: Chem. Eng. News *94*(38), 2 (2016). doi: 10.1021/cen-09438-editorial.

Abstract

In the chemistry laboratory, we can find plenty of tools that bear the name of their creator. Such names are called eponyms. The article presents 72 of the most commonly used representatives of eponymic names in the laboratory technique. Their primary sources (where possible) and actual creators were identified by excerpting historical chemical literature including rare and not easily accessible items. The article shows that some eponymic names are not based on the name of the discoverer, but rather on the names of the manufacturers (e.g., Griffin beaker), the names of those who popularized the device (e.g., Liebig condenser), or who were associated with it because of their fame (e.g., Willstätter needle). Eponymic names in the laboratory technique are not only a legacy of the past and an important means of communication in contemporary chemistry, but they can also be used to communicate chemistry to students and lay people, using interesting stories hidden behind them.

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