

ZBIGNIEW BELA

Museum of Pharmacy Jagiellonian University
Poland

Devices for gilding pills at the Cracow Museum of Pharmacy

The pill-gilding devices that are found on display at the Cracow Museum of Pharmacy include gold leaves (Fig. I), glass vessel for gum arabic (Fig. II) and a wooden capsule for gilding pills (Fig. III).

The reasons why apothecaries used to coat pills with gold or silver have been formulated in a variety of ways. *L'apothicaire charitable* (*The Charitable Apothecary*) by Jacob Girard des Bergeries (Genève, 1673) reads: "The best way to swallow them (i.e. bitter pills) is to gild them or sprinkle them with sugar"¹. The same reason is given by Nicolas Lémery in his *Pharmacopée Universelle* (Paris, 1698): "Since pills can leave a bad taste in the mouth, they are enveloped in soaked wafer or coated with gold or silver leaves or dipped in preserve"². On the other hand, according to Jan Bogumił Freyer's textbook for apothecaries³, pills were gilded so as to prevent them from sticking to-

¹ "Le meilleur moyen de les avaler, c'est de les dorer & saupoudrer de sucre". Jacob Girard des Bergeries, a physician and botanist, the author of a trilogy comprising three books, which were popular towards the end of the 17th c: *Le chirurgien charitable* (*The Charitable Surgeon*), *L'apothicaire charitable* (*The Charitable Apothecary*) and *Le médecin charitable* (*The Charitable Physician*).

² N. Lemery, *Pharmacopée Univeselle* (Paris, 1698): "Comme les pilules pourraient donner un mauvais gout en passant par le palais, on les enveloppe, tantôt avec du pain à chanter mouillé, tantôt avec des feuilles d'or ou d'argent, tantôt avec des confitures". Nicolas Lémery (1645–1715), a French apothecary and chemist, a pioneer of phytochemistry, who introduced improved methods of extraction to obtain new medicinal substances from plants through analysis. He gave private lectures on chemistry, accompanied by demonstrations. He is the author of *Cours de chymie* (*Course in Chemistry*, 1675), which had thirteen editions and was considered the fundamental textbook of chemistry in Europe for over a century. Other well-known works by Lémery include: *Pharmacopée universelle* (*Universal Pharmacopoeia*, a textbook of pharmacy, 1698) and *Traité de l'antimoine* (*Treatise on Antimony*, 1707).

³ J.B. Freyer, *Formulare, czyli nauka o sztucznem przepisywaniu lekarstw* (*Formulare, or on Skilful Prescription of Medicines*, Warszawa 1816, p. 93). Jan Bogumił Freyer (1778–1828), son of an apothecary, was a physician and a surgeon, who was also interested in botany. He taught dispensing and pharmacognosy at the Medical Academy in Warsaw. Except for *Formulare* he published *Materya medyczna, czyli nauka o sposobie skutkowania środków lekarskich* (*Medical Matter, or a Doctrine of Properties of Medicinal Substances*, Warsaw, 1817).

gether⁴. Bronisław Koskowski's *Receptura (Dispensing)*, a textbook of pharmaceutical practice (1916), states: "If pills have a nasty smell or taste or if they tend to disintegrate when exposed to the air or, finally, if they are to dissolve not in the stomach but in the bowels, they are coated with various substances. (...) The most popular substances used for coating pills are: sugar, chocolate, silver, gold, keratin, varnishes, cocoa oil, colloidion, etc."⁵

The reason why pills were gilded has yet another historical connotation, which is connected with mankind's age-old conviction that gold exhibits medicinal properties. This conviction has been documented since the earliest times in various languages and various parts of the world. The oldest known sources concerning the matter are the *Caraka-samhitā* (a fundamental textbook of Ayurveda – the traditional Indian medicine, 2nd c. AD), the Chinese collection of alchemical recipes entitled *Nei P'ien*, by Ko Hung (ca 320 AD)⁶ and the two essential works of Arab medicine: Rhazes' *Kitab al-Mansuri fi al-tibb (The Book of Medicine for Mansur, 9th c. AD)* and Avicenna's *Qanun fi 't-Tibb (The Canon of Medicine, 11th c. AD)*⁷. In Europe, especially in the 15th and 16th century, it was popular to prepare the so called 'aurum potabile' ('drinkable gold'), which was said to cure all diseases⁸. Gold preparations can also be found in seventeenth- and eight-

⁴ „Sposoby zapobiegające, aby z sobą (pigułki) nie lepiły się, co zwykle posypywaniem (*conspergere*) proszkiem skuteczniamy. Naypospoliej do tego używanym bywa *pulvis lycopodii* (...) Czasem przykazuje się w tym zamiarze Pigułki posrebrzać lub ozłacać (*obducantur folio argenti – auri*)”. “To prevent (pills) from sticking together, one sprinkles them with a powder. This is most commonly done by means of *pulvis lycopodii* (...) Sometimes it is recommended to coat pills with silver or gold to the same effect”.

⁵ „Jeżeli pigułki mają smak lub zapach przykry albo jeżeli pod wpływem powietrza mogą podlegać rozkładowi, jeżeli wreszcie mają rozpuszczać się nie w żołądku, ale dopiero w kiszkiach, to powleka się je rozmaitymi środkami. (...) Najbardziej używanymi środkami, którymi powleka się pigułki, są: cukier, czekolada, srebro, złoto, keratyna, lakiery specjalne, olej kakaowy, kolodyum i.t.d.” (B. Koskowski, *Receptura [Dispensing]*, Warsaw, 1916, p. 209). Bronisław Koskowski (1863–1946), a Polish pharmacist and an organiser of courses of pharmacy in Warsaw. Since 1886 he conducted research into the hygiene and quality of foodstuffs. Between 1896 and 1908 he taught courses of pharmacy in Lviv and Warsaw. In the years 1922–1931 and 1945–1946 he taught applied pharmacy at the University of Warsaw. His published works include: *Podręcznik analizy wody do picia (A Textbook of Drinking Water Analysis, 1909)*, *Receptura (Dispensing, 1933)*, *Podręcznik oceny dobroci leków (A Textbook of the Evaluation of Medicines, 1933)*, *Analizyka kapilarna (Capillary Analysis, 1933)*, *Propedeutyka farmaceutyczna (An Introduction to Pharmacy, 1935)* i *Zarys historii leków (An Outline of the History of Medicines, 1935)*.

⁶ For example, in Chapter 4 of *Nei P'ien*, entitled *Gold and Cinnabar*, the author writes: “The volumes I have studied as I examined writings on the nurturing of life and collected recipes for acquiring everlasting vision must number in the thousands; yet there was not one amongst them that did not insist that reverted cinnabar and Potable Gold were the things of highest importance. These two, it seems, mark the peak of the divine process leading to geniehood. (...) To compound this Potable Gold, take one pound of gold by the old scale, use also mercury, realgar, Turkestan salt, sulphur, magnetite and cinnabar. (...) Seal them together until they liquefy”. (*The Nei P'ien of Ko Hung*. Translated by James R. Ware. The MIT Press, Cambridge, Massachusetts, and London, England).

⁷ Avicenna's views on the medicinal properties of gold will be discussed below.

⁸ This is demonstrated, for example, by works of such authors as Giovanni Francesco II Pico della Mirandola (1469–1533) or Alessio Piemontese (Alexius Pedemontanus, first half of the 16th c.). The former states at the beginning of Chapter 4 of his treatise *De Auro libri tres (Three Books About Gold, Venice 1529)*: “Among other things, I would like to discuss the matter of drinkable gold, which is **commonly** used against all ailments and to maintain health. Those who use drinkable gold do not, in fact, drink gold as such, but its most perfect and purest part, described as quintessence (*quinta essentia*)”. Alexius Pedemontanus wrote a short treatise on preparing gold: *À dissolver l'oro in liquor potabile* (“How to dissolve and reduce gold into a potable licoure, which conserveth the youth and health of a manne, and will heale every disease that is thought curable, in the space of seven daies at the furthest”). *De secreti del reverendo domo Alessio*

eenth-century pharmacopoeias⁹, whereas pure gold was considered a valuable medicine by homeopathic physicians¹⁰. Pioneering research into the use of gold salts in infectious diseases was conducted by Dr Adolf Feldt (1913)¹¹, while the first scientists to study the use of gold salts in rheumatism (RA) were Ernst P. Pick (1927) and Jacques Forestier (1929)¹². Nowadays three gold preparations are used to treat rheumatism: au-

Piemontese (1st edition: Venice, Sigismondo Bordogna, 1555), a collection of recipes, gained extraordinary popularity all over Europe and was translated into English, French, Flemish, Latin, Spanish, Polish, German, and Danish. By the end of the 18th c the book had had over 170 reprints. The recipes collected in *Secreti* concern medicine, odoriferous substances, fruit conserves, cosmetics, and decorative arts. Most scholars suggest that Alessio Piemontese is a pseudonym and that the *Secreti* were written by the sixteenth-century author Girolamo Ruscelli. However, there is no evidence to support this claim. An author named Alessio Piemontese did live at the turn of the 15th c., as shown by his *Treatise on Sublimation*, housed at the Wellcome Historical Medical Library, London. Piemontese was a monk and an alchemist and may have been the physician to Joan of Aragon, also known as “the Mad” (because she went insane after the death of her husband, Philip the Handsome). The first English translation of the *Secreti* was *The Secrets of the Reverend Maister Alexis of Piemount. (...) Translated out of Frenche into English by Wyllyam Warde* (London: John Kingstone for Nicolas Inglande, 1558).

⁹ For example in the *Dispensatorium Pharmaceuticum Austriaco-Viennense* of 1729, which includes a recipe entitled *Aurum fulminans* (*Fulminating gold*, p. 236): “Take an ounce of gold flakes, dissolve them in the suitable amount of *aqua regia*, then add some spring water. Drop by drop, add *oleum tartari*, obtained by way of deliquescence, to the solution mixed with water, until it precipitates powder, then add some more pure water. Next add sweet water time after time, until the liquid does not taste tart or salty any more. Then separate the powder from the water by means of tissue paper and leave it in the shade to dry. However, you must handle the powder very carefully, because it can ignite just because it has been rubbed fairly hard in a mortar and, spreading downwards, tear into pieces everything that lies underneath, thus causing danger to the people standing by. It is a diaphoretic as well as cardiac remedy”.

¹⁰ The medicinal properties of pure gold were much appreciated by homeopathic physicians. In the introduction to the chapter entitled *Aurum* in his *Materia Medica Pura* (*Reine Arzneimittellehre, Pure Medical Matter*) of 1811, Samuel Hahnemann writes: “In this place I will speak only of gold, and not of this metal altered by the ordinary chemical processes, consequently not of it dissolved by the action of acids nor precipitated from its solution (fulminating gold), both of which have been declared to be, if not useless, then absolutely noxious, apparently because they cannot be taken without dangerous consequences when given in what is called a *justa dosis*, or, in other words, in excessive quantity. No! I speak of pure gold not altered by chemical manipulations. Modern physicians have pronounced this to be quite inactive; they have at length expunged it out of all their *Materia Medica*s, and thereby deprived us of all its mighty curative virtues. (...) They were all wrong, and so are all the modern physicians. Gold has great, peculiar medicinal powers”. See also a book *Gold as a Remedy in Disease* (London, 1879) published by the British homeopathic physician James Compton Burnett (1840–1901).

¹¹ Dr Adolf Feldt (1855–1938) first worked for the Bakteriologischen Institut der Farbwerke in *Höchst am Main*, then for the Robert Koch Institute in Berlin. Feldt conducted research into such gold preparations as aurocanthan (the compound of detoxicated cantharidine with diamine ethylene and gold cyanid, used in the treatment of tuberculosis – 1913), aurothioglucose, used to treat syphilis (1915), and krysolgan (a derivative of benzene, the first organic gold preparation to be used in the treatment of tuberculosis, 1917), all of which are described in such publications as *Zur Chemotherapie der Tuberculose mit Gold* (*On the Chemotherapy of Tuberculosis by Means of Gold*), *Krysolgan – ein neues Goldpräparat gegen Tuberculose* (*Krysolgan – a New Gold Preparation against Tuberculosis*), *Goldbehandlung der Tuberculose und der Lepra* (*The Treatment of Tuberculosis and Leprosy with Gold*) or *Die Wirkungsweise von Goldpräparaten im Infizierten Tiere* (*The Effect of Gold Preparations on the Organism of an Infected Animal*).

¹² Ernst P. Pick (1872–1960) was a pioneer of immunochemical research, head of the Institute of Experimental Pharmacology and the Institute for Research into Medicines in Vienna. After emigrating to the USA in 1939, he was Professor of Pharmacology at Columbia University and at Mount Sinai Hospital in New York. Pick published the results of his research into gold compounds in the context of rheumatism treatment in 1927, in an article entitled *Goldbehandlung des Rheumatismus* (*The Use of Gold in the Treatment of Rheumatism*). Jacques Forestier (1890–1978), director of the therapy centre Aix-les-Bains, author of numerous scientific articles, secretary general of ILAR (International League against Rheumatism), organiser of many

ranofin (commercial preparations: Auropan, Ridaura, Ridauran), sodium aurothiomalate (commercial preparations: Myocrisin and Tauredon) and aurothioglucose (commercial preparation: Solganal).

Many respected works on the history of pharmacy attribute the origin of the practice of gilding and silvering pills to the famous Arab physician Avicenna¹³. Among them are such established publications as Matthews's *History of Pharmacy in Britain* and Wootton's *Chronicles of Pharmacy*. Others, such as Trease's *Pharmacy in History*, Higby's *Gold in Medicine* and Cowen and Helfand's monumental *Pharmacy: An Illustrated History*, state that the custom originated around the time and place that Avicenna lived¹⁴.

A thorough examination of Avicenna's *Canon* does indeed furnish some interesting examples of the medical application of gold and silver, but no mention of gilding or silvering pills. Book 2 contains the following notes on gold:

"Gold. *Nature*. Gold is perfectly balanced¹⁵. *Actions and properties*. Gold in the form of *limatura* (fine powder) goes into medicines against melancholy, while cauterizations made with a golden tool are better and heal faster¹⁶. *Personal hygiene*. Gold kept in the mouth removes foul smell from the mouth, and if drunk (in the form of suspension) it goes into drugs against loss of hair, foxsickness and into ointments against ringworm.

congresses of rheumatology, president of European League Against Rheumatism, honorary member of most of the national divisions of the League, and member of Polish Rheumatological Society. In 1929 Forestier published the article *L'aurothérapie dans les rhumatismes (Aurotherapy in Rheumatisms)*.

¹³ Ibn Sina, known in the West as Avicenna (981–1037), a Persian physician and Islamic philosopher. He wrote almost 450 treatises on a wide range of subjects, of which around 240 have survived. In particular, 150 of his surviving treatises concentrate on philosophy and 40 of them concentrate on medicine. His most famous medical work is the *Qanun (Canon)*, an immense encyclopedia of medicine, which was a standard medical text at many Islamic and European universities until the 18th century.

¹⁴ L.G. Matthews, *History of Pharmacy in Britain*, Edinburgh, 1962; A.C. Wootton, *Chronicles of Pharmacy*, London, 1910, 1: p. 423; G.E. Trease, *Pharmacy in History*, London, 1964, p. 235; G.J. Higby, *Gold in Medicine. A Review of its Use in the West before 1900*, "Gold Bulletin" 15 (1982), p. 130–140. D.L. Cowen and W.H. Helfand, *Pharmacy: An Illustrated History*, New York, 1988 write, at p. 42: "Avicenna is particularly noted in pharmacy for introducing the gilding and silvering pills". Leaving aside the bluntness of this assertion, it is worth pointing out that the wording of the entry reduces Avicenna's role in the history of medicine to a rather modest one – to that of a mere inventor of gilding and silvering pills; never mind his *Canon*, in which he systematized the whole medical knowledge of his time and which, along with the work of Galen, constituted the core of information for medieval Europe's medical and pharmacological practitioners, and still informs practices of some Middle Eastern physicians.

¹⁵ Avicenna's view on the formation and structure of metals is based on Aristotle's theory, according to which individual forms of matter originate from the four elements (earth, air, fire and water). These form some 'primordial mixture', out of which sulfur and mercury emerge. After a period of 'maturation' and 'digestion' (both of which occur in the bowels of the Earth), particular metals and other minerals are formed. Their diversification depends on the dominance or deficiency of any number of the elementary qualities. For example, Vannoccio Biringuccio (*De La Pirotechnia*, Venice 1540) states that Nature meant antimony (stibnite) to be a metal, but its development was 'stopped' during the process of 'maturation', because of an excess of hot and dry elements in its structure and because of insufficient 'digestion'. By this theory, gold is the metal that has reached the highest level of maturity, with the contributing elements stabilized in perfect equilibrium.

¹⁶ In the Middle Ages, cauterization (the burning of the body with red-hot metal) was employed not only in surgery – to treat wounds – but also in almost all diseases, including mental ones. An eleventh-century manuscript kept at the British Museum (Sloane Collection, 475) contains a brief treatise that not only provides an instruction of how to cauterize, but also contains illustrations showing nude (and smiling!) humans and a number of specific spots where red-hot iron should be applied. Similar pictures were drawn throughout the Middle Ages, but mostly to be used in blood-letting. In both cases a rule applied that cauterization or vein opening should be applied to the side of the body opposite to the diseased organ.

Eyes. When used in the form of alcohol¹⁷, it relieves eye pain. *Lungs and Chest*. It is helpful in heart pain and tremor, in the ills of the soul, and those who speak to themselves”¹⁸.

The entry on silver reads as follows:

“Silver. *Nature*. It is chilling and drying. *Actions and properties*. Its scoria (or dross) is fairly astringent, and it possesses attractive and desiccating properties. And when some shavings of it are mixed with other medicines, it is usefully applied to remove viscous humidity. *Wounds and ulcers*. Silver is a good agent for scabies and pruritus. *Head*. In powdered form helps against foul smell from the mouth, when it is added to other mixtures. *Lungs and chest*. Pulverized and mixed with an electuary, it is helpful against heart tremor”¹⁹.

Furthermore, gold and silver are mentioned in Chapter 3 of the treatise on heart diseases (*Libellus Avicennae de viribus cordis*), which lists and briefly describes all *simplicia* (medicinal raw materials) used in the treatment of heart diseases²⁰. The entry about gold reads as follows:

“About gold. The properties of gold situate it between silver and hyacinth²¹. Gold is warmer than silver and slightly cooler than hyacinth. It has appropriate proportions (its structure is balanced), and this is just the reason for its healing advantages”.

In the same treatise silver was considered “slightly cooler and drier than gold and capable of action similar to that of hyacinth, but slightly weaker,” while hyacinth was believed to be “moderately warm and possessing ability to gladden and strengthen the heart and provide efficient protection against poison”.

And yet no portion of the *Canon* or of any other work by Avicenna mentions the use of gold or silver to coat medicinal pills. Nor do other Islamic physicians of that era seem to be familiar with the practice. Neither the *Continens* (*Kitab al-Hawi fi al-tibb – The Comprehensive Book on Medicine*) by Avicenna’s predecessor Rhazes (8th/9th c. AD) nor the twelfth-century *Practica Johannis Serapionis* refers to coating pills with gold or silver²². Likewise, there is no mention of it in the works of Arnaldus of Villanova

¹⁷ Until the 16th century, the Arab term *al-kohol* stood for a very fine powder. Cf. Marcin Siennik’s *Herbarz* (*Herbal*) (Kraków 1568), which mentions the following properties of gold: “Gold strengthens the eyes, filed and triturated into fine powder, just like alcohol which we see in sunrays...”. See also Nicolas Lemery’s *Pharmacopée Universelle*, Paris, 1697, p. 18: “Alkool est un mot arabe qu’on employe en Chymie pour exprimer un esprit très-subtil, ou une poudre fort fine; ainsi on appelle alkool de vin, de l’esprit de vin bien rectifié, & du corail réduit en alkool, du corail qui a été broié en poudre impalpable stir le porphyre”.

¹⁸ Avicenna, *Canon*, Padua, 1476, Book 2, Treatise 2, Chapter 79: “Aurum. *Natura*. Est equale subtile. *Operationes & proprietates*. Limatura eius ingreditur in medicinis melancholiae, et melius cauterium, et velocius sanabile est, quod fit cum cauterio auri. *Decoratio*. Retentio ipsius in ore removet faetorum oris, et ingreditur limatura eius in medicinis alopeciae, et serpiginis liniendis, et in eis, quae bibuntur. *Membra oculi*. Confortat oculum in collyrio positum. *Membra anhelitus & pectoris*. Confortat doloribus cordis, et tremori ipsius, et malitiae animae, et ei qui solus loquitur”.

¹⁹ *Ibidem*, chapter LXV: “Argentum. *Natura*. Est infrigidativum, exsiccativum. *Operationes et proprietates*. Scoria eius styptica valde, et in ipsa est attractio et exsiccatio. Et quando permiscetur confricatio eius medicinis aliis, confert humiditatibus viscosis. *Vulnera & ulcera*. Est bonum valde scabiei, et pruritui. *Membra capitis*. Confricatio eius confert faetori oris, quum permiscetur permixtionibus aliis. *Membra anhelitus et pectoris*. Confricatio (limatura) eius cum commistionibus confert tremori cordis”.

²⁰ The original incipit of this chapter reads: “Capitulum tertium de simplicibus medicinis cordialibus secundum ordinem alphabeti”.

²¹ *Lapis hyacinthus* – a variety of zircon (ZrO₂), a semiprecious stone.

²² *Continens Rasis*, Venice, 1529; *Practica Joannis Serapionis*, Lyon 1525.

(1235–1312), a Catalan physician under the explicit influence of Arabic medicine and of Avicenna in particular. A section of his *Liber de vinis* does describe several ways of ingesting gold and silver, from cooking to holding them in the mouth and swallowing them, but does not refer to the use of the substances to coat pills²³.

The lack of information on gilding or silvering pills in the works of Rhazes, Avicenna, Serapion and Arnaldus disproves the claim that the tradition dates back to Arab or, for that matter, medieval times. As further evidence, it is worth mentioning that later authors, such as Raymund Lull (ca 1235–1315) or Johannes de Rupescissa (ca 1300–1365), never refer to the practice²⁴. And neither do medieval and Renaissance compendia, such as the widely popular *Ortus sanitatis*, Valerius Cordus's *Dispensatorium*, as well as the best-selling *De' secreti del reverendo donno Alessio Piemontese*²⁵.

The earliest mention of coating pills with precious metals that the author of this article is familiar with appears in Sir William Vaughan's *Golden Fleece* (published un-

²³ I used the edition Arnaldus de Villa Nova, *Liber de vinis*, Leipzig, ca 1501. The chapter entitled *Vinum extictionis auri* reads: "Many nobles and prelates these days have in their kitchens pieces of gold boiled. Others ingest it in the form of confections, and others yet in shavings, just like in *dyacameron*, a medicine composed of gold as well as silver shavings. Some hold chunks of gold in their mouths and swallow it, and some dissolve it in drinking water. Those who hold it in their mouths are not unreasonable, as it is known that silver, if held in the mouth, quenches thirst, and coral, also held in the mouth, strengthens the stomach". ("Et multi modernorum de nobilioribus et maxims de prelatis faciunt bullire petias auri in coquina eorum; et alii recipiunt in pannellis cum electuarijs et alii in limatura: sicut in confectionibus que dicitur dyacameron in qua intrat scilicet utraque auri scilicet et argenti limatura. Et quidam utuntur tenere frustum auri in ore et salivam aglutire. Et quidam alii convertunt in aquam potabilem. (...) Et qui assiduam tenere in ore etiam si faciunt preter rationem non faciunt: non tamen hoc agent absque similitudine veritatis. Nam copertum est quod argentum in ore retentum extinguit sitim. Et corallus in ore retentus confortat stomachum").

²⁴ Medieval authors did, however, subscribe to Avicenna's recommendation ("et in eis qui bibentur" – see Fig. VII) to drink gold (*aurum potabile*). Examples are found in the Bibliothèque Nationale de France, Paris, MS. 7150, fols. 116r–118r ("Liber ad faciendum aurum potabile. Fili doctrinae, postquam ego Raymundus Lullus vobis declaravi in precedenti tractatu..."); the Biblioteca Apostolica Vaticana, MS. 5847, fol. 55v ("Aurum potabile sic fit secundum Raymund Lul..."); or the All Souls College Library, Oxford, MS 81, fols 100r–133v ("Incipit liber de quinta essencia editus a fratre Johanne de Rupecissa de ordine fratrum minorum. Canon primus de investigatione quinte essentie et causa investigationis..."). A description of how to prepare drinkable gold is found in *Canon quartus*.

²⁵ Johannes von Cube, *Ortus sanitatis*, Mainz 1491: there, Caput XVIII, on the medical properties of gold the author mentions that "powdered gold, with the addition of antidotum, heals leprosy and scabies, (...) gold shavings strengthen heart and help against strong heartbeat. (...) If held in the mouth fights bad breath". ("Aurum est calidum nature / lepram ac scabiem curat: in pulvere redactum et antidotis mixtum. [...] Limatura auri confortat cor: et pulsione medetur. [...] Retentio eius in ore / fetorem ipsius oris removet"). Valerius Cordus, *Dispensatorium, hoc est pharmacorum conficiendorum ratio*, Nuremberg 1546: here gold is mentioned as an ingredient of a confection named *diathamaron* (which either Arnald de Villanova or the type-setter referred to incorrectly as *dyacameron*). Confections (*confectiones*) were mixtures of medicine and sugar or honey. They assumed either solid (*confectio dura*) or half-liquid form. In his notes on the recipe, cordus provides the following information on the use of gold and silver: "fine powder of gold and silver. Since gold is a metallic substance and a heavy one, its shavings settle on the bottom and don't mix with confections evenly. For that reason here as well as under other apothecary circumstances, one should use gold flakes (to mash them into powder). Gold significantly helps those who have trouble breathing, suffering from asthma and tormented by cough, or languishing. It also helps in all other ailments of chest, as well as stomach and against water retention under the skin; it relieves kidney pain and increases weight". ("*Limaturae auri et argenti*. Cum aurum sit metallicum et valde ponderosum corpus, limatura eius vel scobis, semper fundum petit, nec aequaliter confectionibus commiscetur, quare et hic, et reliquis omnibus locis sumantur folia auri. Efficaciter prodest difficulter spirantibus, arteriacis, tussientibus, tabidis et omni thoracis et stomachi offensae, aquae subter cutem fusae, renum doloribus voluptatem patit, corporaque saginat").

For *De' secreti del reverendo donno Alessio Piemontese* see footnote 8.

der a pseudonym in 1626) – a work that has no relation whatsoever to medicine²⁶. The reference to pill gilding is found in the first part of the text, where the author compares the practice of attracting the barbaric Goths and impressionable Romans to the Catholic Church by means of paintings on church walls to the practice of gilding pills in order to conceal their bitter taste and encourage the patient to take them (“For the like cause Apothecaries doe sometimes gild over their ugly and bitter Pills to please the Sicke mans view...”). The fact that Vaughan mentions gilding of pills casually, in order to draw an analogy between medicine and religion, shows that the practice was common at the time (1626), at least in England.

Another reference is found in one of Robert Boyle’s notes, made between 1665 and 1669, which reads, among other things, that gold beaters counterfeited gold by laying a thin piece of gold plate on a silver one and beating them together in such a way as to make the silver invisible. Boyle says that some apothecaries used such gold to gild pills²⁷.

A seventeenth-century medicine chest retrieved from the wreck of the Swedish warship “Kronan” is yet another example showing that pills were commonly gilded in the second half of the 17th century, and especially that the process was technologically advanced at the time. “Kronan” went under during a sea battle against the Danes in the vicinity of the Swedish island of Öland in 1676²⁸. Following the catastrophe many groups of divers recovered various equipment from the sea, and one of them fished out a medicine chest in which – among other things – a wooden bowl for gilding pills have been found²⁹.

²⁶ [Sir William Vaughan], *The Golden Fleece, divided into three Parts, under which are discovered Errors of Religion, the Vices and Decayes of the Kingdome, and lastly the wayes to get wealth, and to restore Trading so much complayned of. Transported from Cambrioll Colchos, out of the Southermost Part of the Island, commonly called the Newfoundland, by Orpheus Iunior, for the generall and perpetuall Good of Great Britaine*. London 1626. Sir William Vaughan (1575–1641) – a Welsh academician, writer and poet, ardent supporter of colonialism. *The Golden Fleece* consists of three parts. In the first one the author criticises Roman Catholicism as the ideological cause of the bad condition of the British state, in the second one he describes the economic and social causes of the condition, in the third one he suggests ways of acquiring wealth, such as colonising Newfoundland (the expedition to fetch “the golden fleece”).

²⁷ “Gold Beaters sometimes lay a thin piece of Gold Plate upon one of Sylver exactly congruous to it, & by beating them together betwixt the skins, they make them so that at length »of« the leaves produc’d the upper part was Gold, & the other Sylver, tho in gilded Pills, of divers Apothecarys the Gold only is seene, by which Artifice halfe the Price is sav’d”. Robert Boyle (1627–1691), a British chemist and physicist of Irish origin, known, among other things, for being the first man to formulate a modern definition of the chemical element.

²⁸ “Kronan” (“The Crown”) was a Swedish warship. She was one of the largest ships at the time and the most heavily armed warship in the world. The naval battle of Öland took place on 1st June 1676, south off the island of Öland in the Baltic Sea. Maneuvering during the battle, “Kronan” turned sharply without closing her gunports or reefing her sails. This caused her to heel over and water started pouring into the gunports, capsizing her. As she was sinking, a lamp in the gunpowder store fell off its hook and ignited the gunpowder, causing a violent explosion that killed most of her crew (an estimated 800 men were on board). Only 42 men survived the sinking. The explosion left the debris scattered over the sea bottom within the radius of several kilometers. (<http://en.wikipedia.org>)

²⁹ The information related to the medicine chest comes from prof. Björn Lindeke of the Royal Swedish Academy of Sciences, Stockholm: “The chest – he wrote in his email to the author of this article – contains about a hundred jars, bottles, boxes etc. Among other things we have discovered a bundle of gold leaves (...) and a wooden bowl constituting a hollow half-sphere with in its bottom visible traces of gold”.

The practice of coating pills with gold and silver survived in Europe into the first half of the 20th century, as documented by the 22nd edition of Herman Steinbuch's catalogue of pharmaceutical equipment (1930), which advertised capsules for gilding and silvering pills³⁰.

As far as pill-gilding utensils are concerned, the earliest mention in specialist literature can be found in a 1762 handbook of pharmacy, entitled *Elements de Pharmacie Théorique et Pratique*, written by the outstanding French chemist and pharmacist Antoine Baumé. The fragment which refers to gilding pills begins as follows: "To gild and silver pills one uses a wooden box, similar to those in which you keep soap, because their round form is the most suitable of all. (...) "³¹.

One of the Polish handbooks that offer a technical description of the gilding pills process is *Farmacya (Pharmacy)* by T. Heinrich and S. Fabian (1835): "Hard dry pills cleaned from powder³² are poured onto the pill-rolling plate, moistened with a few drop-lets of Arabic gum (*Mucilago Gummi Arabici*), or plain syrup, and rolled in the fluid several times, then poured into a spherical box consisting of two half-globes made of wood, horn, glass, porcelain etc. At least one leaf of gold is added into the box, the box is closed and rotated. If all this is done properly and sufficient amounts of gold is used, pills quickly get a glossy coating. Should pills gain no gloss, the manipulation should be repeated"³³.

³⁰ The title page of Steinbuch's 1930 catalogue states: "Illustriert Haupt-Katalog von Hermann Steinbuch vormals F.A. Wolff & Söhne. Wien, V., Mittersteig 26. Budapest, VIII., Bezzédy utca 6. Vertretung für Polen: W. M. Iwiński, Warszawa, Chmielna 7. Vertretung für Rumänien: D.D. Zobel, Bukarest, str. Romana 61. Fabrik für Apothekenstandgefäße sowie für alle pharmazeutischen, chemischen, physikalischen Apparate und Utenseln. Gegründet 1871. 22. Ausgabe. Die Weitergabe dieses Kataloges an Konkurrenzfirmen sowie der Nachdruck auch einzelner Teile ist verboten. Ein Missbrauch dieses Kataloges wird nach § 12 des Gesetzes vom 26. Sept. 1923 strafrechtlich verfolgt. Wien, 1930".

³¹ "Pour dorer & argenter les pilules, on se sert d'une boîte de bois, semblable à celles dans lesquelles on met des savonnets, à cause de la forme ronde qui est plus commode que toute autre". (A. Baume, *Elements de Pharmacie Théorique et Pratique*, Paris 1777, p. 685).

³² To prevent pills from sticking together, apothecaries used a variety of powders. Among them the most popular was *pulvis lycopodii* – dried and pulverized club moss (*Lycopodium clavatum*) having analgesic and antiseptic properties.

³³ „Złocenie pigułek. Pigułki twarde, suche i oczyszczone z proszku wsypuje się na krążek do rolowania, zwilża paru kroplami kleiku gumy arabskiej albo syropu zwykłego, i przez kilkakrotny obrót otacza się danym płynem, poczem wsypuje do kulistego pudełka, składającego się z dwóch półkul z drzewa, rogu, szkła, porcelany i.t.p. Do tegoż pudełka wkłada się listek lub więcej złota, zamyka pudełko i nadaje mu się ruch kulisty. Jeżeli wszystko było należyście wykonane i użyto dostatecznej ilości złota, to wkrótce pigułki pokrywają się błyszczącą powłoką. Gdyby pigułki nie były błyszczące, należy powyższą manipulację powtórzyć” (T. Heinrich, S. Fabian *Farmacya*. Warsaw 1835, vol. II, p. 188).

STRESZCZENIE

Przyrządy do złocenia pigułek w zbiorach Muzeum Farmacji UJ w Krakowie

Założeniem artykułu jest przedstawienie znajdujących się w zbiorach Muzeum Farmacji w Krakowie utensyliów służących do powlekania złotem pigułek, a także omówienie przyczyn występowania tego zjawiska w farmacji, zgodnie z odwiecznym przekonaniem, że złoto posiada właściwości lecznicze. Ponadto, artykuł neguje głoszony wcześniej pogląd, że żyjący w X w. arabski lekarz Avicenna był prekursorem tejże praktyki, i dowodzi, że zwyczaj ten pojawił się w Europie na przełomie XV i XVI wieku. Część końcowa zawiera opis procesu złocenia pigułek.