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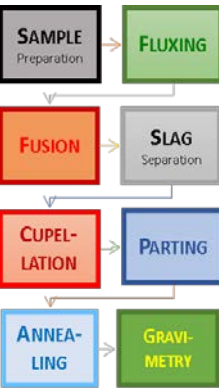
OFFICE FIRE ASSAY SL – CARRER DE NOVELL, 54 – 2nd FLOOR
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FIRE ASSAY METHOD : BASIC INFORMATION

Edition
October 2024

FLOWCHART FIRE ASSAY STEPS



SECTIONS	ICONS	DETAILS	LINK	PAG
GOLD ANALYSIS: MULTILINGUAL TERMINOLOGY	 THE TREE OF LANGUAGES	• 1. MULTI-LINGUAL VOCABULARY - Seven Languages: ◦ English, German; Dutch, French; Italian, Spanish, Russian. ◊ 1.1 GOLD ASSAY ◦ Cupellation ISO 11426 – ASTM E1335-08 ◊ 1.2 FIRE ASSAY: ◦ Minerals - Concentrates - Residues ISO 10378 – ASTM E1805-07 ◊ 1.3 REAGENTS ◦ Fluxes - Collectors - Inquarts - Apparatus ◊ 1.4 Other GOLD ASSAY METHODS ◦ Spectrometry ◊ 1.5 PRECIOUS METALS ◦ Its Alloys – Associated Base Metals ◊ 1.6 GOLD EXTRACTION ◦ Auriferous Minerals - Sulfides Associated with Gold	Voc 1 Voc 2 Voc 3 Voc 4 Voc 5 Voc 6	1.1 1.2 1.3 1.4 1.5 1.6
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BIBLIOGRAPHY: IMPORTANT ARTICLES (free download !)	 MUST READ ARTICLES & PAPERS	• 3. ANALYTICAL METHODS FOR DETERMINATION OF GOLD (Articles & Papers): ◊ 3.1 Articles from ► Word Gold Council (WGC) ◊ Assaying Gold Jewellery - Review Methods for Measuring Gold Content Dr. C. W. Corti ◊ Gold Analysis - Comparisons of available Techniques Dr. C. W. Corti ◊ 3.2 Articles from ► "Gold Technology" Magazine (WGC) ◊ "Assaying of Gold Jewel. - Choice of Technique" (GT, nº 32, 2001) Dr. C. W. Corti ◊ "Analysis of Carat Gold" (GT, nº 22, Jul. 1997) M. Brill ◊ "Assaying and Hallmarking in London" (GT, nº 3, Jan 1991) D. W. Evans ◊ "Assaying Gold in Switzerland" (GT, nº 3, Jan 1991) Wälchi / Vuilleumier ◊ "Touchstone Testing of Precious Metals" (GT, nº 3, Jan 1991) Wälchi / Vuilleumier ◊ 3.3 Articles from ► "Gold Bulletin" Journal (WGC) ◊ "Analysis of Gold. A Review of Methods" (GB, Vol. 13, issue 1) Roland S. Young ◊ "Fire Assay Reloaded" (GB, Vol. 47, issue 1) Battaini / Bemporad ◊ 3.4 Articles from ► "Alchemist" Journal , (LBMA) ◊ "The Art & Science of a Precious Metal Lab." (Alch., nº 48, LBMA) David Court ◊ 3.5 Articles from "Pure & Applied Chemistry" Magazine ◊ "Analytical Chemistry of Noble Metals" (Pure & App. Chem., Vol. 49) Jon Cl. van Loon	Articles Corti1 Corti2 Corti3 Brill1 Evans Wälchi1 Wälchi3 Young Battaini Court vLoon	3.1.1 3.1.2 3.2.1 3.2.2 3.2.3 3.2.4 3.2.5 3.3.1 3.3.2 3.4.1 3.5.1
BIBLIOGRAPHY: TEXTBOOKS ► INTERNET ARCHIVE (I.A) (free download !)	 INDISPENSABLE BOOKS	• 4. REFERENCE BOOKS - Free download ► INTERNET ARCHIVE (I.A.) ► Brewster Kahle ◊ 4.1 "A Textbook on Fire Assay" Edward E. Bugbee ◊ 4.2 "Fire Assaying" Orson C. Shepard & Waldemar F. Dietrich ◊ 4.3 "A Manual on Fire Assaying" Charles Herman Fulton ◊ 4.4 "The Sampling and Assay of the Precious Metals" Ernest Alfred Smith ◊ 4.5 "Metallurgy of Gold" Thomas K. Rose ◊ 4.6 "The Precious Metals: comprising Gold, Silver and Platinum" Thomas K. Rose ◊ 4.7 "A Text Book of Assaying" C. Beringer & J. J. Beringer ◊ 4.8 "Introduction to Applied Fire Assay Theory" Don Juergenson & Thomas J. Gilbert ◊ 4.9 "Fundamentals of analysis of gold, silver & platinum group metals" Corby G. Anderson	Bugbee Shepard Fulton Smith Rose1 Rose2 Bering Gilbert Anders.	4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9
GOLD ASSAY BEAUTIES: POEMS & WOODCUTS & TEXTS	 ARFE AGRICOLA	• 5. FOUNDATION STONES OF MODERN METALLURGY: (free download) ◊ Touchstone method mentioned in Late Middle Age Poetry ◊ 5.1 "Lo Canviador" - ► Rialc – Università Federico II (Napoli, 1420) Jordi de Sant Jordi ◊ The Founding Fathers - First technological Treatises on Metallurgy & Assaying: ◊ 5.2 "De la Pirotechnia", (Venezia, 1540) Vannoccio Biringuccio ◊ 5.3 "De Re Metallica", (Basel, 1556) Georg Bauer "Agricola" ◊ 5.4 "Quilatador de la Plata, Oro y Piedras", (Valladolid, 1572) Juan de Arfe ◊ 5.5 "Das große Proberbuch", (Frankfurt / Main, 1598) Lazarus Ercker	StJordi Biring. Bauer Arfe Ercker	5.1 5.2 5.3 5.4 5.5

JORDI DE SANT JORDI

+ 1382 – † 1423

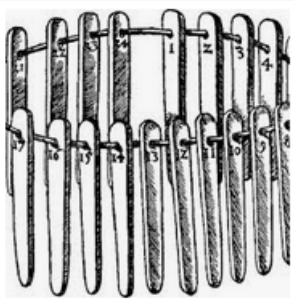
THE POET OF TOUCHSTONE & ACCURATE ASSAY

The First Public Bank in European History



Founded on:
20th. January 1401

Touchstone Method for Gold Assay



Lo Canviador
“tocs dels metalls”
“lo bon assay”

La Taula de Canvis



Created by
Consell de Cent of Barcelona

Lo Canviador

1 Pus que tan bé sabets de canviar
2 e coneixets moneda com s'ic val,
3 assats tenits ben covinent cabal,
4 si dura tant la taula d'esmerçar;
5 parroquians no us falran per bon ús,
6 mas eu no crei gassanyets amb me pus.

7 *Ja no metrets vostres diners menuts* (tornada)
8 *amb mos **florins** de pes ben coneguts.*

9 **Florí** de pes, **ducat**, **dobla** e **escut**
10 o mitg **florí**, **croat**, **malla**, **diner**,
11 mesclats arreu en lo vostre carner,
12 que mai comptar no volets per menut;
13 e crei que u faits per franquessa de cor.
14 Mas jur vos Déu que per aqueixa por,

15 *ja no metrets vostres diners menuts* (tornada)
16 *amb mos **florins** de pes ben coneguts.*

17 Un bon **florí** sai que val per tot lloc
18 d'aicest país onze sous, o lo pes,
19 e dats lo vos per un **diner jaqués**,
20 e no curats si val molt més o poc.
21 Cert, ara fets lo guany de Na Peix-frit,
22 però no cur de vostre bon partit.

23 *Ja no metrets vostres diners menuts* (tornada)
24 *amb mos **florins** de pes ben coneguts.*

25 Un fin **ducat** ço que val hom bé u sab,
26 e d'un **escut** e **dobla**, qu'ès d'or fi,
27 canvi fets vos amb **croat** mallorquí
28 ez amb diner **margullés** e de cap.
29 Qui us trametès en Flandes per esmerç
30 no cregats Déu qu'eu hi volgués lo terç.

31 *Ja no metrets vostres diners menuts* (tornada)
32 *amb mos **florins** de pes ben coneguts.*

33 Mas, pus le **tocs dels metalls** fer sabets
34 prou destrament, ques autre bé no us say,
35 ez avets fayt dels bons lo **bon assay**,
36 e com ets tals que'l millor no'n triets,
37 no us pensets vos que us ho dia per me,
38 qu'aicest traüt no us vull far, per ma fe.

39 *Ja no metrets vostres diners menuts* (tornada)
40 *amb mos **florins** de pes ben coneguts.*

41 En **canviador**, tant sots de bona fe
42 que tot es u a vos lo mal e'l bé.

43 *Ja no metrets vostres diners menuts* (tornada)
44 *amb mos **florins** de pes ben coneguts.*

The Money Exchanger

1 As you so well know how to exchange
2 and you know the worth of money,
3 thus you possess a convenient fortune,
4 if the table (of exchange) lasts so long;
5 customers will not lack for good use,
6 but I don't think you will earn with me anymore

7 *No longer shall you meddle your tiny pennies* (refrain)
8 *together with my **florins** of weight well known*

9 Heavy **florin**, **ducat**, **dobla** and **escut**
10 Or half a **florin**, **croat**, **malla**, **diner**,
11 mixed in your meat cage,
12 that you never want to count because too small,
13 and believe me I do it because my heart is frank,
14 but I swear to God that because of this fear,

15 *No longer shall you meddle your tiny pennies* (refrain)
16 *together with my **florins** of weight well known*

17 A good **florin** I know what it is worth everywhere
18 in this country eleven shilling or its weight,
19 and you give it for a **penny** from **denier jaqués**,
20 and you do not care if it is worth more or few.
21 True now you make the gain of Lady Fried Fish,
22 but I do not care or your good party.

23 *No longer shall you meddle your tiny pennies* (refrain)
24 *together with my **florins** of weight well known*

25 A fine **ducat** what it is worth man knows well,
26 and from one **escut** and **dobla**, which is fine gold,
27 exchange you make with **Majorcan crusade**
28 and with **Margullés** denier e de cap.
29 He who would send you to Flanders for invest
30 by God don't believe I would like to obtain the third.

31 *No longer shall you meddle your tiny pennies* (refrain)
32 *together with my **florins** of weight well known*

33 But given that you know the **touch of the metals** how to make
34 so skilful, that I doubt if there is anything else you can do as well,
35 and you have made the best amongst the **good assays**,
36 why is it that the best you didn't choose ?
37 don't imagine that I ask you this for me,
38 that in this nuisance I do not want to meddle you, for my faith.

39 *No longer shall you meddle your tiny pennies* (refrain)
40 *together with my **florins** of weight well known*

41 Monsieur **Exchanger**, you are so much of good faith
42 that with you is the same the bad and the good

43 *No longer shall you meddle your tiny pennies* (refrain)
44 *together with my **florins** of weight well known*

A DICTIONARY OF NUMISMATIC NAMES

THEIR OFFICIAL AND POPULAR DESIGNATIONS

by Albert R. Frey

Croat - A silver coin with a cross upon it.
The term derives from Latin *grossus denarius*.
Catalan equivalent of the *Gros*, introduced in 1285
Silver coins issued by the Counts of Barcelona during the
fourteenth and fifteenth centuries.
It was the most stable of all the Aragonese coinage and widely
used in the Mediterranean trade

Diner - *Denier*:
A silver coin corresponding to the Penny.
Current throughout Western Europe from the Merovingian
Dynasty.
The name is derived from the *Denarius*, and the *Danaro*,
Dinero, *Dinar*, and *Dinheiro*, are modifications of the same coin.
Under Charlemagne's reforms of the monetary system 240
Deniers were ordered to be struck from one pound of fine silver,
and the *Denier* was valued at one twelfth of the *Solidus*.

Dobla - A gold coin of Spain,
Introduced about the time of Peter I (1350- 1368) and struck at
Seville, Toledo, etc.

Ducat - A money of account in the Venetian Republic during the
fifteenth century.
Also called *Ducato* and *Dukat*.
The best known of all gold coins.
It is generally supposed to have been first issued by Roger II,
King of Sicily, about 1150.
This coin bore the figure of Christ, and the inscription:
sit tibi xre dat q tv regisiste dvcat,
i.e., *Sit tibi Christe datus, quem tu regisiste ducatus* –
"To thee, O Christ, be dedicated this duchy
which thou rulest."
From the last word of the inscription the coin received its name.
The *Ducat* was extensively copied by the chief rulers of Europe.

Escut – From Latin "Scutum" meaning a shield.
Escut is the Catalan equivalent for the French *Ecu*, the Italian
Scudo and the Portuguese *Escudo*.

Florí - The gold *Florin* was first coined in the Republic of
Florence, in the year 1252.
The obverse bore a full-length figure of St. John the Baptist,
with the legend
s. ioannes. b.,
i.e., *Sanctus Johannes Baptista*.
On the reverse was a lily, the arms of the city of Florence, and
the inscription *Florentia*, usually preceded by a small cross.
The excellence of the gold made the *fiorino d'oro*, as it was
commonly called, speedily current throughout Europe, and the
type was adopted by all the principal powers, as well as by
other potentates who possessed the right to strike money.

Jaqués - A copper coin.
Received its name from Jacca, the old capital of Aragon.
Documented in ordinances of the fourteenth century
It was originally struck by Sanzio Ramirez I (1063-1094).

Malla - Half a *denier*.
The smallest of all the Catalan copper coins.
Its value was one half of a *Denier*, and it circulated in Majorca
and Barcelona as early as the fourteenth century.
The name appears to be the Catalan equivalent for *Maille*.

Margullés - From Magalona (French "Maguelone")
The *sol melgoirés* (French "melgorien") was the money of the
Counts of Melgueil.
It was *silver denier* widely used in all the Occitan domain.
Magalona is one of the eight cities of the Septimania
Septimania = Narbona, Besiers, Agde, Magalona, Lodeva,
Nîmes, Usès, Elina.

VANNOCCIO BIRINGUCCIO

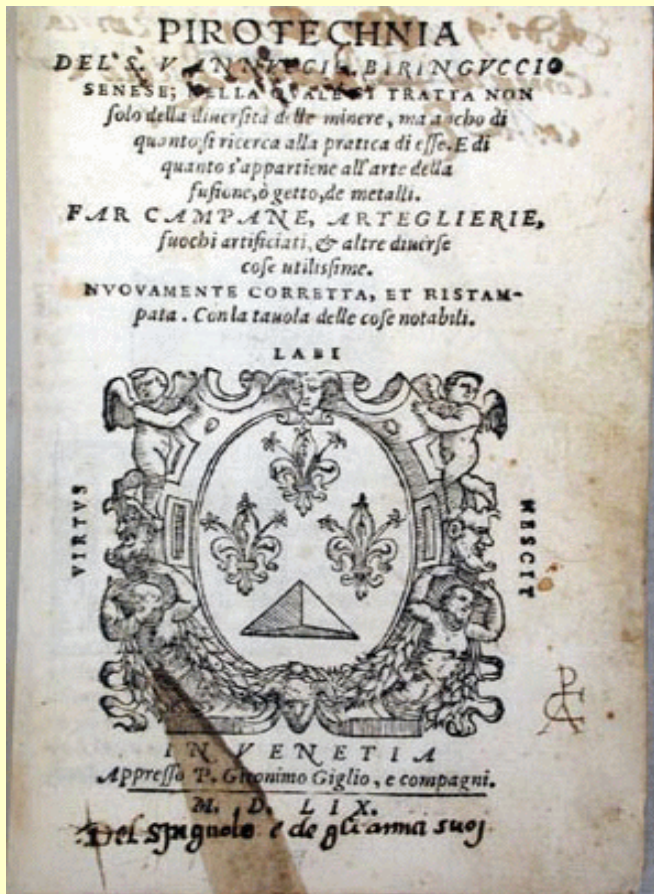
+ 1480 - † 1539

FATHER OF FOUNDRY TECHNOLOGY

DE LA PIROTECHNIA LIBRI X - MDXL



VANNOCCIO BIRINGUCCIO



DE LA PIROTECHNIA is the first printed book to cover the whole field of metallurgy. It was written in Italian and published in Venice in 1540.

The author was **VANNOCCIO BIRINGUCCIO** (*1480 in Siena, Italy, †1539).

BIRINGUCCIO is considered the father of the foundry industry as **DE LA PIROTECHNIA** is the first written account of proper foundry practice. In his career he managed an iron mine near Siena, and also he headed the city's mint and arsenal. He was in charge of casting cannons for Venice and later Florence.

BIRINGUCCIO was born in Siena. His father, an architect, was Paolo Biringuccio and his mother was Lucrezia di Bartolommeo. He was baptised on October 20, 1480.

In 1536, he was offered a job in Rome by the Church, and in 1538 he became head of the papal foundry, and director of the artillery factory ("capo della fonderia apostolica").

DE LA PIROTECHNIA is the first comprehensive treatise on applied metal arts and processes of ore reduction and to describe the foundry techniques which had been development since the bronze age. It marked the beginning of technological literature.

BIRINGUCCIO stresses the use of mineral and metals in the arts; their alloying, working, and the art of casting. He provides the earliest account of the method of typecasting and the making of statutes, medallions and bells.

The book is illustrated with 94 woodcuts and for the first time it mentions the analysis of gold and silver by fire assay.

AGRICOLA was to borrow many sections of **BIRINGUCCIO**'s work for use in his "**DE RE METALLICA**"

VANNOCCIO BIRINGUCCIO (II)

ASSAYING



1



2

1. THE ASSAYER

2. MAKING CUPELS

MELTING



3. How to prepare the metals
before the fusion



4. How to melt the ingots and
reduce them in fine lead.

GEORGIOUS AGRICOLA

- + 1494 - † 1555

FOUNDING FATHER OF METALLURGY

GEORGII AGRICOLAE
DERE METALLICA LIBRI XII QVI
bus Officia, Instrumenta, Machinae, ac omnia deniq; ad Metallis
tam spectantia, non modo luculentissimè describuntur, sed & per
effigies, suis locis insertas, adiunctis Latinis, Germanicisq; appella
tionibus ita ob oculos ponuntur, ut clarius tradi non possint.

E I V S D E M

DE ANIMANTIBVS SVTERRANEIS Liber, ab Autore res
cognitus; cum Indicibus diuersis, quicquid in opere tractatum est,
pulchrè demonstrantibus.



BASILEAE M D LVI

Cum Privilegio Imperatoris in annos v.
& Galliarum Regis ad Sexennium.

DE RE METALLICA LIBRI XII



GEORGIUS AGRICOLA

(GEORG BAUER)

De Re Metallica (On the Nature of Metals) is a book cataloguing the state of the art of mining, refining, smelting and assaying metals, published in Basle (Basel, Bâle, Basilea) by Hieronymus Froben and Nikolaus Episcopus, in March 1556.

The author was **Georg Bauer**, (* 1494 in Glauchau, Saxony, † 1555 in Chemnitz, Saxony) whose pen name was the latinized **GEORGIUS AGRICOLA**. The book remained the authoritative text on mining for 250 years after its publication.

AGRICOLA had spent nine years in the Bohemian town of Sankt Joachimsthal (now Jáchymov), in the Czech Republic). This city is famous for its silver mines and mint, and the origin of many silver coins: Thaler, taler, (rijks-)daalder, tolar, (riks-)daler and dollar.

Thereafter he spent the rest of his life in Chemnitz, a mining town in Saxony (Sachsen). Both Sankt Joachimsthal and Chemnitz are in the Ore Mountains (Erzgebirge , Krušné hory).

One of the primary problems this book addressed was the removal of water in the mining. The limit **AGRICOLA** documents for raising water from the mines via a pump is 32 feet (9.7 m) It could then be dumped into another level and pumped from there. The investigation of this problem would spark a discussion leading to discovery of atmospheric air pressure (1 atm = 10.3 m water column). Also included in this volume are discussions of geology of ore bodies, surveying, mine construction, and ventilation.

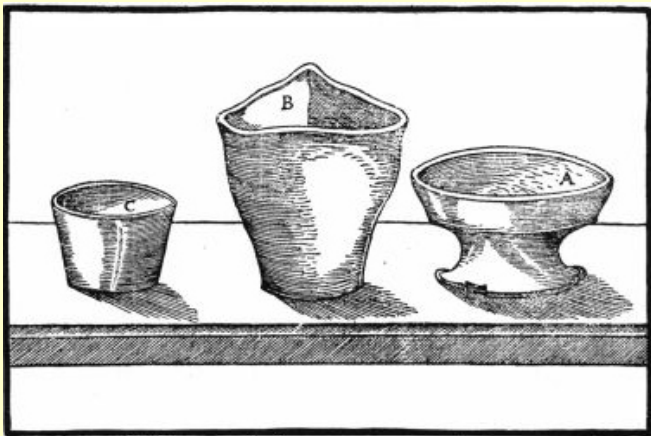
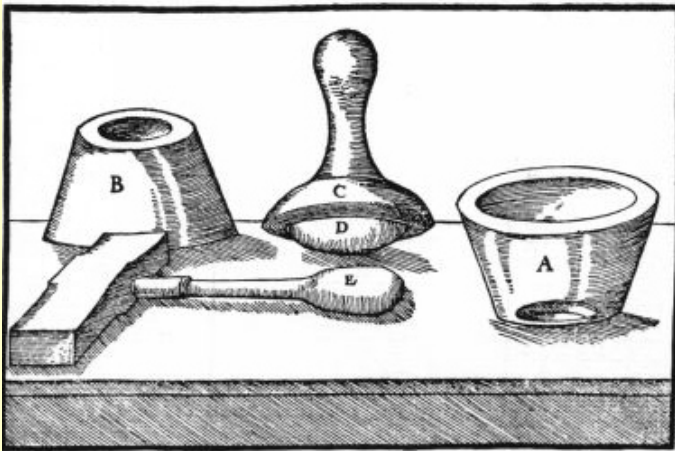
De Re Metallica was not limited to mining. Divided into 12 "books" ("libri XII") it also covered assaying (book 7th), refining, smelting, and marketing. It explains the creation of saltpetre, and the use of different acids in the refining process, as well as alchemy, timbering, and even some of the professional health problems of miners and smelters.

AGRICOLA died in 1555, but publication was delayed until completion of the detailed **292 woodcuts**. The book was costly and limited in distribution: in many areas it was chained in churches, so that the priest could translate from Latin for parishioners.

GEORGIOUS AGRICOLA - (II)

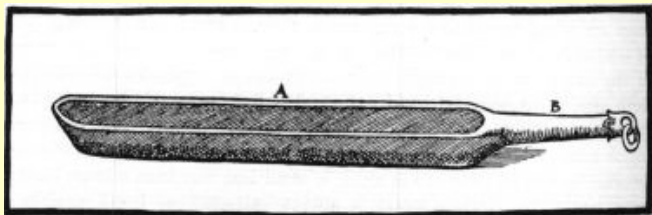
Liber Septimus est de experimento uenarum

BOOK SEVENTH : Assaying

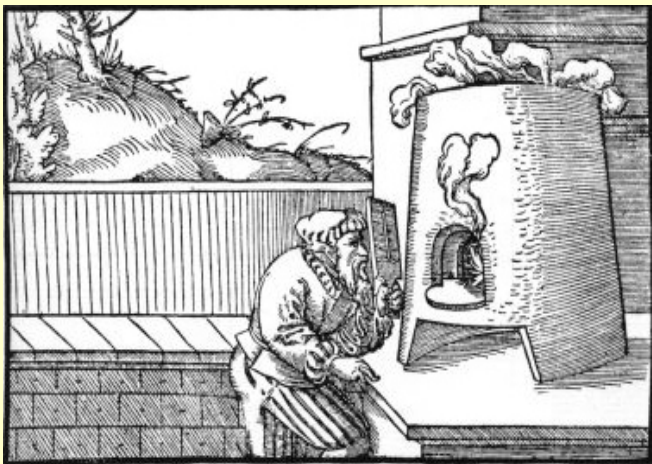


Mortariolum	A	Little Mould
Mortariolum inuersum	B	Inverted Mould
Pistillum	C	Pestle
Eius tuber	D	Its knob
Alterum pistillum	E	Second Pestle

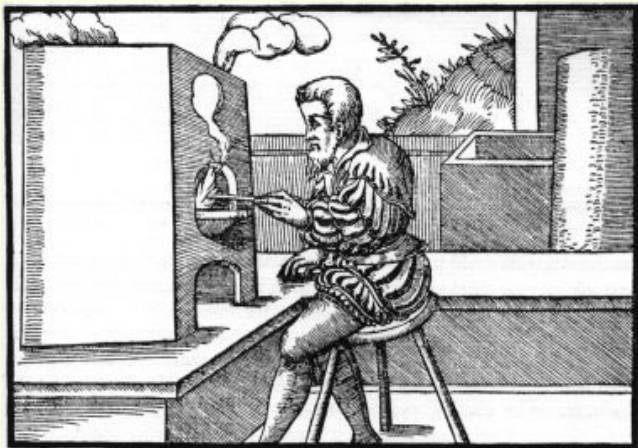
Catillus fictilis	A	Scorifier
Catilius triangularis	B	Triangular Crucible
Catillus cinereus	C	Cupel



Canaliculus ferreus	A	Iron Mould
Eius manubrium	B	Its handle



Fornacula Rotunda	A	Round Assay Furnace
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Fornacula Quadrangula	A	Rectangular Assay Furnace
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JUAN DE ARFE

+ 1535 - † 1603

TEACHER OF ASSAYERS



QVILATADOR DE LA PLATA, ORO, Y PIEDRAS (1572)

ARFE in person placing a cupel in the furnace.
Remark also a balance (upper left side).



IOAN DE ARPHE

JUAN DE ARFE Y VILLAFANE (*1535, †1603) was a well known goldsmith and silversmith of German ancestry (the cradle of his family is in Harff , near Bedburg, Rhineland). He was born in the city of León (Spain).

His family had a long tradition of precious metals working. His grandfather Enrique de Arfe was active in Andalusia where he left numerous woks.

Juan was above all builder of processional shrines ("custodias procesionales") and golden statues and also precious metals assayer in the Segovia Mint (Real Casa de la Moneda de Segovia - "Ceca de Segovia").

He wrote a Goldsmiths' Treatise called **QVILATADOR DE LA PLATA, ORO, Y PIEDRAS** published in 1572.

QVILATADOR DE LA PLATA, ORO, Y PIEDRAS,

COMPVESTO POR IOAN ARPHE
de Villafañe: natural de León: vecino de Valladolid.



Impreso en Valladolid, por Alonso y Diego Fernáñez de Cordoua, Impresores de su Magestad. Año M. D. LXXII.
CON PRIVILEGIO.

It contains 5 sections:

- In the First he exposes the Castilian marc and its weights. He teaches the silver alloys with the tables for high and low silver alloys.
- In the Second he shows the gold weights and how to make gold alloys with high and low amounts with tables done for this purpose.
- In the Third he deals with **ways of assaying** both metals (gold and silver).
- In the Fourth how silver is to be examined and how the weights and measures are made for all maintenances with table with the prices.
- In the Fifth he deals with the value and knowledge of precious stones and pearls, with part of their virtues.

QVILATADOR DE LA PLATA, ORO, Y PIEDRAS

Compvesto por **IOAN ARPHE DE VILLAFANE**.

Imprenta de Alonso y Diego Fernáñez de Cordoua.
Valladolid, Año 1572.

Facsimilar reprint:

QVILATADOR DE LA PLATA, ORO Y PIEDRAS, JUAN DE ARFE Y VILLAFANE
Librerías París – Valencia. Valencia, 1985.

LAZARUS ERCKER

+ 1528 - † 1594

THE FIRST MODERN ASSAYER



Beschreibung/
**ALLERFÜRNE-
MISTEN
MINERALISCHEN
ERTZT VNND
BERGKWERCKS ARTEN / ...**
(‡)

Gedruckt zu
Frankfurt am Mayn /
durch Johan Feyerabendt
1598

"DAS GROßE
PROBIERBUCH"
(‡)
LAZARUS
ERCKER

LAZARUS ERCKER's (* 1528 in Annaberg, Saxony; † 1594 in Prague, Bohemia) knowledge of metallurgy derived from his extensive experience in the mining industry.

During the **1550's**, he supervised mining and foundry operations for several German principalities, notably Dresden and Braunschweig (Brunswick).

After the publication of his magnum opus, the **Beschreibung allerfürnemisten mineralischen Ertzt vnnd Bergkwercks arten** ("**Treatise on the Foremost Mineralogy and Metallurgy**") (‡) (first edition **1574**), **ERCKER** became director of mining affairs for the Bohemian Crown and **Münzwardein** (**Assay Master**) in **Kuttenberg**, (now Kutná Hora, in the Czech Republic), a post he occupied through the **1580's**.

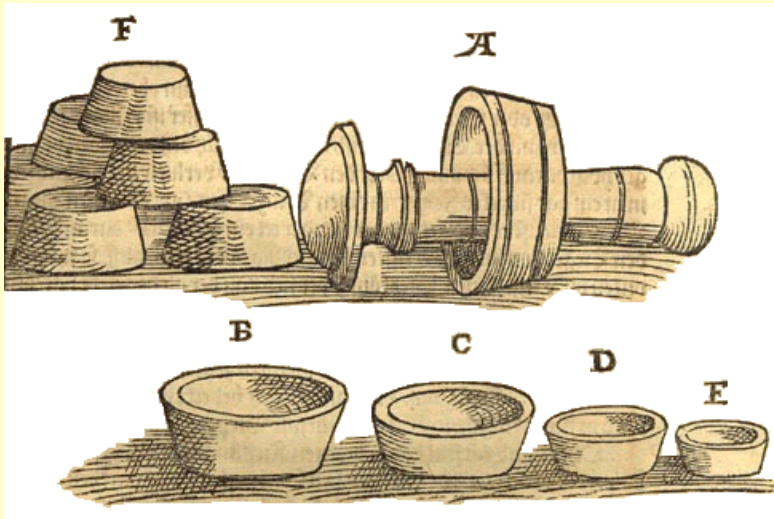
The **Beschreibung** reviews methods for mining and refining metal alloys, and discusses a wide variety of metallurgical equipment.

ERCKER also describes laboratory equipment and furnaces, making his text an important source of information on early modern science.

ERCKER seems to have been an opponent of alchemical procedures and beliefs; his text does not refer to them.

(‡) also known as "**GROßES PROBIERBUCH**"

LAZARUS ERCKER (II)



CUPEL Moulds & Sizes of CUPELS for different uses

Das Cappeln Futter A Die Cappeln zu den Kupffer Proben vnd geringen Erzen B die Cappeln zu den geringen Silbern oder Gekornen / vnnd gemeinen Erz proben C die Cappeln zu den gemeinen Silber proben / die nach dem Gewicht Probirt werden D die Cappeln zu den brandt Silber Proben E wie die Cappeln auff einander gesetzt werden F

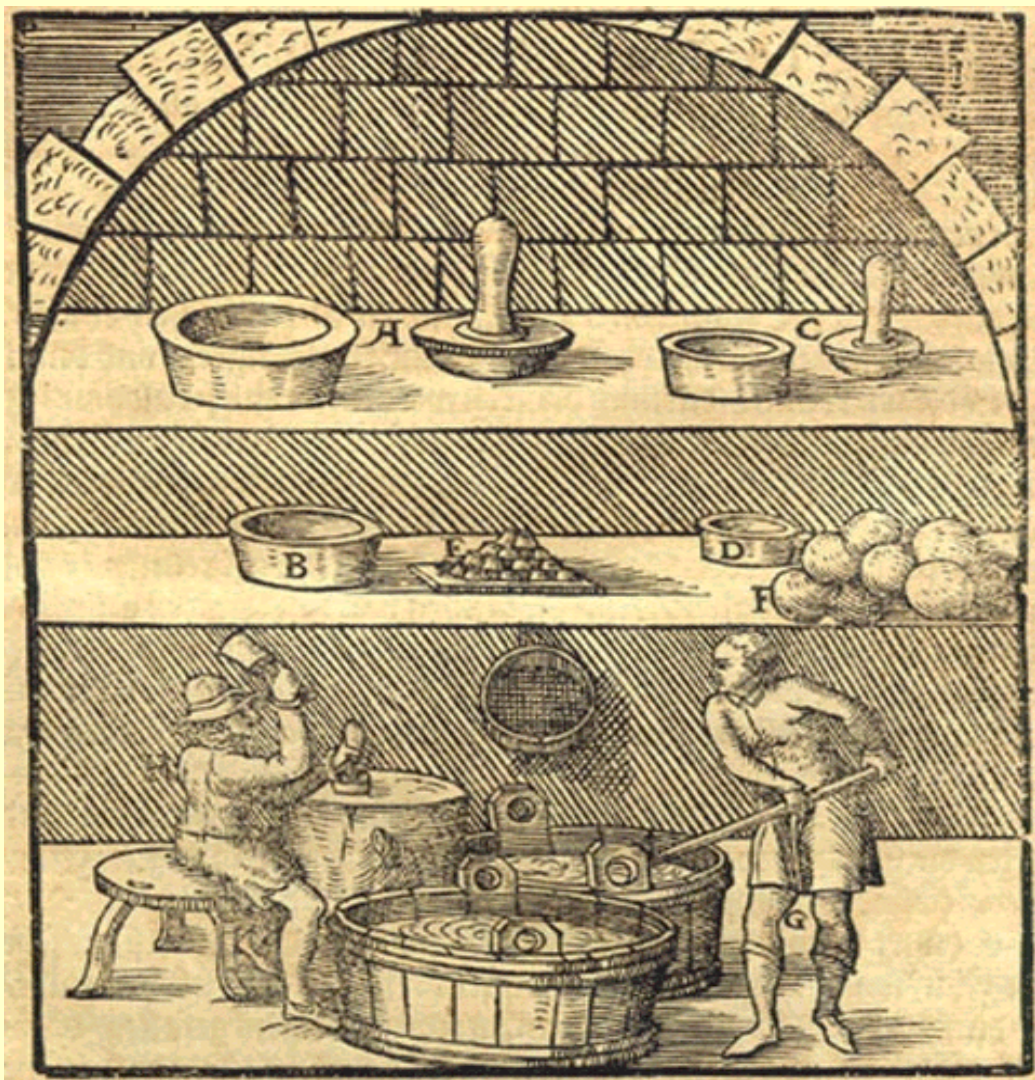
Das <u>Kappel</u> n Futter	A	The cupel mould set
Die Kappel zu den Kupffer Proben vnd geringen Erzen	B	Cupels for Copper Assays and lean Ores
die Kappel zu den geringen Silbern oder Gekornen / vnnd gemeinen Erztproben	C	Cupels for low-grade Silver or Granules / and for ordinary ore Assays
Die Kappel zu den gemeinen Silberproben / die nach dem Gewicht Probirt werden	D	Cupels for ordinary silver Assays / assayed by Weight
die Kappel zu den brandt Silber Proben	E	Cupels for fine Silver Assays
wie die Kappeln auff einander gesetzt werden	F	how Cupels are stacked on each other

(‡) Full Long Title of "DAS GROßE PROBIERBUCH":

Beschreibung allerfürnemisten mineralischen Erztz vnnd Berckwercks arten / wie dieselbigen / vnd eine jede in sonderheit / jrer Natur vnd eygenschafft nach / auff alle Metalla probirt / vnd im kleinen feur sollen versucht werden / mit erklärung etlicher fürnemer nützlicher Schmelztwerck / im grossen Feuer auch scheidung Goldts / Silbers vnd anderer Metalln / Sampt einem Bericht deß Kupffer saigerns /.

Messing brennens / vnd Salpeter siedens / auch aller saltzigen Minerischen proben / vnd was den= en allen abhengig / in fünff Bücher verfast / Dergleichen zu vorn niemals in Druck kommen.
Allen Liebhabern der Feuerkünste / jungen Probirern und Berckleuten zu nutz / mit schönen Figuren und abriß der Instrument / trewlich und fleissing an Tag geben.

LAZARUS ERCKER (III)



Washing **ASHES**
for **CUELS** &
moulding them

Die Cappeln Futter A C die Cappeln so darinnen gemacht worden
B D die auff einander gesetzten Cappeln E Die geschlembten Aschen fu-
geln F Der Aschen schlember G Der Cappeln schlager H

05

Die Kappeln Futter	A C	Cupel Moulds
die Kappeln so darinnen gemacht worden	B D	Cupels as were made therein
die auff einander gesetzten Kappeln	E	Cupels stacked on each other
Die geschlembten Aschen kugeln	F	The Lumps of washed Ashes
Der Aschen schlember	G	The Washer of Ashes
Der Kappeln schlager	H	The Cupel pounder

LAZARUS ERCKER (IV)



CUPELLING, PARTING, performing a DENSITY ASSAY

Ein Probirofen darfür ein Probirer probirt/ A. Das eyserne Blech/dar
auff die Proben gegossen werden/ B. Das hülzern Instrument / durch wel
ches spalt man in Ofen sieht/ daß das Feuer di Gesicht kein schaden thu/ C.
ein Scheidköbllein zur Goldtprob auff einem Füßlein stehend / D. Der das
güldig Silber im Wasser wiegt/ E.

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Ein Probirofen
darfür ein Probirer probirt/

A

An assay Furnace,
therein an Assayer makes assays

Das eyserne Blech/
darauff die Proben gegossen werden/

B

The iron Sheet /
whereon Assays are poured out

Das hülzern Instrument/
durch welches Spalt man in Ofen sieht/
daß das Feuer di Gesicht kein schaden thu/

C

The wooden Implement /
with a Slit through which to look into the
Furnace /
so that Fire causes no damage to the Face

ein Scheidköbllein zur Goldtprob
auff einem Füßlein stehend/

D

A parting Flask on its small Stand
for assaying Gold

Der das güldig Silber im Wasser wiegt/

E

Man weighing auriferous Silver in Water