

How the Japanese Intelligentsia of the 19th Century Got Educated Based on Books in the Dutch Language (Rangaku)

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Abstract

This study aims to rectify the perception that the Shogunate (the Japanese government of the 19th century) mainly received know-how about medical sciences through their information acquisition via the Dutch presence in Nagasaki. Studies of that time, based on the information acquired from the Dutch are referred to '*Rangaku*' or Dutch Studies. When discussing '*Rangaku*,' the advance of western medical sciences immediately comes to mind as this is the field that is nowadays remembered best for its big advance at that time. Based on the inventory of a cache of more than 1,000 books (discovered in 1954) purchased by the Shogunate and following up on the earlier related studies, this study reports on a simple statistical analysis demonstrating that medical related books and reading materials were merely ranked sixth among the genres while the top ranking was about military sciences. The study introduces three examples that are respectively from three different genres, all of which are significant in the development of the modern Japanese nation.

Keywords: Dutch Studies, Dutch Learning, *Rangaku*, 19th Century, Japan, Medical Sciences, Education

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Introduction

Japan is a country which has been eagerly trying to adopt new knowledge and information from abroad throughout its history (Nishikawa-Van Eester, 2014). Before the Edo era (1603 – 1868), Chinese¹ (Classical Chinese, or *Kan-bun*) was the main language through which the Japanese used to acquire novel cultures and technologies (Shimizu, 2010). It was the language Japan needed as a tool for academic people to access fresh information.

Up till the arrival of the Dutch language in the 17th century, Chinese was still the dominant foreign language for the intellectual and aristocracy (Montgomery, 2000), and Gottliebe reported that “educated” meant, for a long time, being able to read Classical Chinese (*kan-bun*) and write numerous Chinese characters (*kan-ji*) (2005). In the 18th and 19th century, wealthy merchants joined the intelligentsia, enjoying cultural and academic activities (Nishikawa-Van Eester, 2014). This is also related to the historical and social background, being a time in which Japan had its longest period of relative peace across the nation, mainly because of the governmental policies by the Tokugawa Shogunate in the mid-eighteenth century (Jackson, 2016).

In 1600, a Dutch ship named “Liefde” (meaning “love” in English) reached Japan. The Dutch arrived at the end of the Azuchi-Momoyama period (1573 – 1603), when the Spanish and the Portuguese had already established relationships with Japan. However, at the beginning of the Edo era (period), the Spanish and the Portuguese were banned because of their ties with the Christian mission, regarded by the central government as a liability to their rule. After its independence of Spain in 1648, the Netherlands became powerful and it became the only European power that got permission to trade with Japan (Nishikawa-Van Eester, 2019). Except for traditional Chinese Studies (*kan-bun*), Dutch became the first and essential contact language for Japan to engage with the rest of the world.

Rangaku, or Dutch Studies (Dutch Learning) in the 18th – 19th century, and its general perception today

The Netherlands was the only western country that was allowed to operate in Japan during the period of *Sakoku* (isolation policy, literally meaning ‘Closure of Country’ by the government in the Edo era².) The relationship further grew, from simple importing and exporting goods into exchanging knowledge, and ‘Dutch Studies’ began under the reign of the eighth Shogun, Tokugawa Yoshimune, who relaxed the Book Ban in 1720 and encouraged to import Dutch books as information source, still excluding the ones related to Christianity (Japan-Netherlands Exchange in the Edo period, National Diet Library) .

¹ According to Shimizu, the Classical Chinese writing system had been already conveyed to Japan by the 4th – 5th century.

² *Sakoku* means ‘national isolation’ (1639 – 1853). “The 1630s also marked an important dividing line in foreign relations with the issuance of a series of directives enforcing a policy of national seclusion, later called *sakoku* (literally, “closed country”). The seeds of this policy had been sown in trade control and in measures against Christianity by the Nobunaga and Hideyoshi regimes. Hideyoshi, although strongly attracted to trade as a source of national wealth and military strength, had issued an order for the exclusion of the missionaries. Ieyasu, even more strongly attracted by profits, made efforts to trade not only with the Portuguese Roman Catholics but also with Protestant Holland and England, protecting trade with the southern regions by granting special licenses, or *shuin-jō* (“red-seal license”), to oceangoing merchant ships. But Ieyasu’s encouragement of trade was aimed at establishing a *bakufu* trade monopoly... The Dutch and the Chinese were allowed to trade as before, although this trade was restricted and confined to the island of Dejima at Nagasaki”. <https://www.britannica.com/topic/sakoku>

Today, the word ‘*Rangaku*’ is strongly associated with the arrival of a totally new type of medicinal sciences, which is regarded as the starting point of modern western medicine in Japan. This is because of the publication of ‘*Kaitai-Shinsho*’ translated from Dutch into Japanese by Ryotaku Maeno and Gan-paku Sugita in 1774 (See Appendix A). This was originally written in German as ‘*Anatomische Tabellen*’ by Kulmus (1689 – 1745), and later translated into Dutch as ‘*Ontleedkundige Tafelen*’ by DICTEN in 1722 and 1732³.

Sakai reported, in ‘*Journal of the Japanese Society of Medical History*’ in 2010, as below:

The great impact of European medicine was furthered by the publication of “*Kaitai Shinsho*” (1774), meaning “new book of anatomy”, which was a translation of the Dutch book on anatomy “*Ontleedkundige tafelen*” (1734), originally written in German by Johann Adam Kulmus (1689–1745) with title of “*Anatomische Tabellen*” in 1722. The project of translation had been undertaken by Gempaku Sugita (1733–1817) and Ryōtaku Maeno (1723– 1803), when they observed dissection of a female body after execution in 1771 at Kotsugahara in Edo (today called Tokyo). After “*Kaitai Shinsho*”, Japanese doctors frequently attended dissections of executed bodies, and observed precisely the interiors of the cadavers.

We can read a series of episodes concerning the birth of ‘*Kaitai-Shinsho*’ as an epoch-making incident in official high school textbooks for the class of Japanese history. (See the figure below.) As seen on the page, this picture in the right middle gives high school students a tremendous visual impact regarding ‘*Kaitai-Shinsho*’.

ら脱しようとする動きがいくつも生まれた。鎖国のもとにおかれたことから、西洋の学術・知識の吸収や研究は困難であったが、18世紀の初めに天文学者である西川如見や新井白石が世界の地理・物産・民俗などを説いて、先駆けとなった。また將軍徳川吉宗は、漢訳洋書の輸入制限をゆるめ、青木昆陽・野呂元丈らにオランダ語を学ばせたこともあって、洋学はまず蘭学として発達し始めた。

洋学をいち早く取り入れたのは、実用の間(実学)としての医学である。1774(安永3)年、前野良沢や杉田玄白らが西洋医学の解剖書を訳述した『解体新書』は、その画期的な成果であった。ついで大槻玄沢や宇田川玄圃が出て、洋学は各分野でいっそう隆盛をみせ、玄沢の門人稲村三伯は蘭日辞書である『ナルマ和解』をつくった。また平賀源内は、長崎で学んだ科学の知識をもとに物理学の研究を進めた。

1780- 前野良沢
1780- 杉田玄白
1780- 大槻玄沢
1800- 宇田川玄圃
1800- 稲村三伯
1820- 宇田川玄圃
1820- 小園英光
1820- 高野長英
1840- 坪内逍遙
1840- 緒方洪庵

『解体新書』原書はドイツ人クルムスの著した『解剖図譜』をオランダ語訳した『ターヘル・アナトミア』である。図は序図の扉絵。扉絵・解剖図は、平賀源内に絵を学んだ秋田藩士の小野直武が写し描いた。(東京都江戸東京博物館蔵)

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Figure 1: Japanese History B (Senior High) by Yamakawa Shuppansha Ltd (Publisher), 2017

³ Maeno and Sugita translated the 1732 version. <https://www.kohjinkai.or.jp/kurakata/txt/01.html>

Although *Rangaku* brought a large volume and of quality knowledge to Japan in diverse fields, we tend to remember just this picture and the name ‘Kaitai-Shinsho’ to go with it, and memory of the rest of *Rangaku* fades away.

Real *Rangaku*

In 1954, a number of old books, mostly written in Dutch, were coincidentally discovered at a library in Tokyo. It was revealed that those piles of books were purchased by the Shogunate (The Tokugawa administration) in the 19th century, or earlier. A project was launched to classify the books and compile a report. The work resulted in a listing of the collection (See Figure 2).

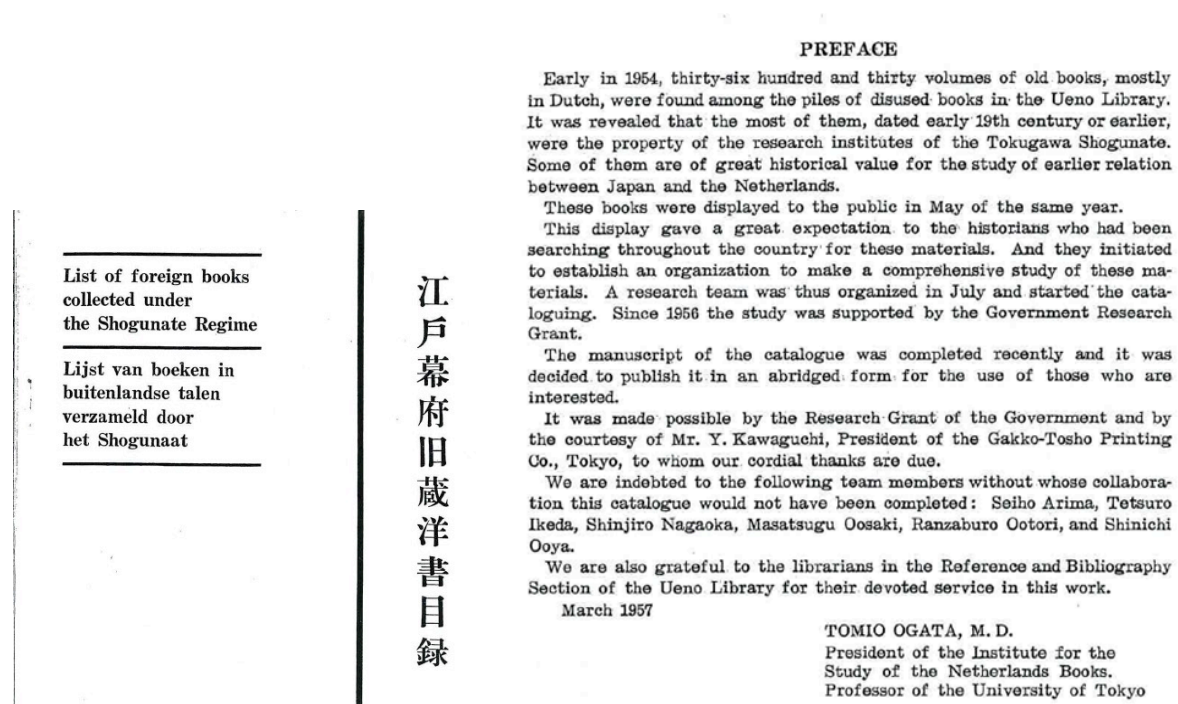


Figure 2: List of foreign books collected under the Shogunate Regime (1957).

This list shows how diverse the fields of the books are, which is far beyond just medical knowledge. In this study, we examined the said list by categorizing mentioned books as much as possible (see Figure 3):

Nieuw handwoordenboek voor de spelling der Nederduitse taal. Zalt-Bommel, 1846. 240 p. 14×12 cm. (N) (a-5) (3450)	Verklaring van het stoomwerktuig. 3de druk. Amsterdam, 1852. 212 p. 23×14 cm. (N) (a-4) (542) (544) (1080) (1125) (1276) (1364) (1478) (1479) (1485) (1536) (1729) (2021) (2122) (2123)
Nieuw Hollandsch-Fransch en Fransch-Hollandsch woordenboek. 2de druk, Leiden, n. d. 525 p. 15×12 cm. (T) (760) (761)	Bosch, D. W. Geschied- en aardrijkskundige beschrijving van Nederlands Oost- en West-Indische bezittingen. 2de druk, Amsterdam, 1856. 200 p. 17×10 cm. (N) (3483-3485) (3154)
Nieuw woordenboek der Nederduitse en Engelsche taal. 4de druk. Nijmegen, 1851. 1254 p. 17×12 cm. (B) (Kana) (82)	Bosch, J. van den Nederlandsche bezittingen in Azia, Amerika en Afrika. 's Gravenhage, Amsterdam, 1818. 309 p. 23×14 cm. (B) (601)
Opstellen met fouten, inzonderheid tegen de spelling der Nederlandsche taal. Zutphen, 1854. 88 p. 19×12 cm. (N) (2556) (2557) (3424)	Bosch, W. De dysenteria tropica. 's Gravenhage, 1844. 335 p. 22×14 cm. (N) (a-5) (1506)
Uitspraak der letters in de Nederlandsche taal. Zutphen, 1854. 60 p. 19×12 cm. (N) (2530-2532) (3419)	Bosscha, H. C. Bedenkingen tegen de wijze van bouwen van pakhuizen. Deventer, 1856. 40 p. 23×14 cm. (N) (2184) (2777) (3220)
Vollständiges Deutsch-Holländisches und Holländisch-Deutsches Taschenwörterbuch. 1 theil: Deutsch-Holländisch. Leyden, 1756. 953 p. 14×11 cm. (Sya) (327)	Bosscha, J. Blikken in het leven der natuur. Leeuwarden, 1860. 284 p. 13×11 cm. (K) (681)
Booms, P. G. Veldtogt van het Fransch-Afrikaansche leger tegen Klein-Kabylië in de eerste helft van 1851. 's Hertogenbosch, 1852. 193 p. 23×13 cm. (N) (a-4) (a-5) (406) (1657)	Het leven van Willem den Tweede; Koning der Nederlanden ex Groothertog van Luxemburg. 2de druk. Amsterdam, 1854. 777 p. 23×15 cm. (N) (2051)
Verhandeling over het schot der draagbare vuurwapens. 's Hertogenbosch, 1855. 74 p. 17×11 cm. (N) (3277) (2561) (2630) (2690) (3232)	Nederlands heldendaden te land. 3 din, 2de druk. 1838-1845. 22×13 cm. (B) (a-3) (325-327)
Boot, G. W. De stereoscoop en zijne verschillende inrichtingen. Wageningen, 1855. 83 p. 22×14 cm. (N) (1504) (2778)	Schets der algemeene geschiedenis en van die des Vaderlands. 11 de druk. Breda, 1863. 269 p. 23×13 cm. (B) (a-4) (388)
Borski, G. van Wierighen Handleiding voor de praktische oefening in de zinsontleding; naar de 2. verb. en verm. uitg. van het werk van den Hoogleeraar T. Roorda: Over de deelen der rede en de rede-ontleding. Delft, 1856. 86 p. 23×14 dm. (B) (N) (a-6) (126) (127)	Bottiger Algemeene geschiedenis voor school en huisgezin, vertaald door W. C. Mauve. [←Ger.] 1* gedeelte. Utrecht, 1856. 237 p. 18×12 cm. (N) (1108) (2033)
Bosch, D. van den De stoommachine van lage drukking voor vaartuigen. Amsterdam, 1845. 16 p. 22×14 cm. (N) (2071) (2133) (2764) (2766) (2767) (2785) (3227)	Boutan, A. Leerboek der natuurkunde en van hare voornaamste toepassingen, vertaald door Dr. J. Bosscha; [←Fr.] 4 din, 2de druk. Leiden, 1867-1870. 23×15 cm. (R) (225-234) (3540-3542) (3577) (3630) (3631)

Figure 3: List of foreign books collected under the Shogunate Regime (1957), pp. 8 – 9.

Simple statistical analysis

First of all, the languages used in the collection were sorted out. Among 1,062 books, 846 were written in Dutch, and 134, translated into Dutch from other languages. All the results are as below:

Language used		
number of books	%	language
846	80	Dutch
134	13	Dutch (translated into Dutch)
44	4	English
23	2	French
7	1	German
2	0	Latin
6	1	Could not be decided from the title

Table 1: Languages used in ‘List of foreign books collected under the Shogunate Regime’

We read in Ogata’s remarks that most of the discovered books were in Dutch, and indeed, 93% (80 + 13) of the whole collection was in the Dutch language.

Then, in a second phase, it was checked what types of books and documents were in the collection (See Table 2 below).

<u>Type of publication</u>		
number of books	%	kind
776	73	book
72	7	dictionary
62	6	report / set of rules
56	5	schoolbook (to be used in class)
31	3	almanac
22	2	magazine
16	2	paper
12	1	chart / graph
10	1	list
4	0	map
1	0	diary

Table 2: Types of publication in ‘List of foreign books collected under the Shogunate Regime’

As seen in the table, most of the publications were categorized in the section of books and dictionaries, which makes 80% together. After that, reports, rulebooks, regulations, and textbooks for class follow.

Finally, categorization of topics was conducted. (See Table 3 below).

<u>TOPIC</u>		<u>TOPIC</u>	
157	military sciences	23	astronomy
127	language learning	19	botany / agriculture
116	geography / travel	19	didactics
114	engineering	14	economics / commerce
63	mathematics	10	crafts
60	medical sciences	9	people (biographies)
58	maritime sciences (incl. ship building)	7	administration
47	nature / natural sciences	6	physics
46	history	6	society / sociology
35	chemistry	5	other topics
29	topic could not be decided	5	religion / morality
28	reader / literature	4	biology
25	law	4	philosophy
24	general	2	cooking / housekeeping

Table 3: Topics dealt with in ‘List of foreign books collected under the Shogunate Regime’

In first place, we see 157 books on military sciences and 127 on language learning. It is noteworthy that the categorization of medical sciences (n = 60) appears only after the sections of engineering and mathematics.

Three examples

In the previous section, we saw that

1. Dutch is used in most publications
2. most publications are books
3. 'military sciences,' 'language learning,' and 'geography/travel' are the most dealt with topics
4. 'medical sciences' comes only in the sixth place.

Then, what is actually described in those books? What are those books about? Here three examples are presented, one in the field of military sciences, one in the field of geography, and one in the field of didactics.

Example 1: 'Oorlogs-Vuurpijlen' (1829) from the field of military sciences (Appendix B).

This is written by a Dutch military engineering officer describing the history and use of 'oorlogs-vuurpijlen'.

There is no modern word that is the exact equivalent: 'oorlog' = 'war', 's' = genitive-indicator, 'vuur' = 'fire', 'pijl' = 'arrow', 'en' = plural-indicator.

This is a treatise about the early use of rockets (as in Rocket-Propelled Grenade), including calculations regarding the speed and the targeted location based on the elevation-angle of the launcher etc.

Example 2: 'Algemeene Geographie of Beschryving des Geheelen Aardryks' (1769) from the field of geography (Appendix C).

This book is volume 2 of a 6-volume series on geography. This volume deals with Great Britain, Ireland and the Netherlands.

The meaning of the title: 'Algemeene' = 'General', 'Geographie' = 'Geography', 'of' = 'or', 'Beschryving' = 'Description', 'des' = genitive-case version of definite article, 'Aardryk' = 'Earth', 's' = genitive-indicator

Example 3: 'Handleiding bij het Zangonderwijs in de Lagere Scholen' (1854) from the field of didactics (Appendix D).

This book is describing theory and teaching methods for the use of music teachers in elementary schools.

The meaning of the title: 'Handleiding' = 'Manual', 'bij' = 'for', 'het Zangonderwijs' = 'the Teaching of Singing', "de Lagere Scholen" = "the Elementary Schools"

Discussion

As observed and analyzed, the 'Three examples' demonstrate that the books cover very interesting and unique fields, not only 'medical sciences.' For instance, the first case is a very clear example of a typical document that is very different from the 'medical sciences' books that are assumed by the general public to be the main topic of *Rangaku*.

The other two are unique as well. the second book offered Japan at the time, a closed country, significant geographical, and furthermore, geopolitical information regarding Great Britain,

Ireland, and the Netherlands in Europe. The other books in the series covered other areas of importance. Japan was in the state of so-called ‘Sturm und Drang’ toward the end of the Edo era, which made the government seriously consider reconstructing or changing the entire national system.

The third one was obviously intended for music teachers of European (western) music which is fundamentally different from that of Japan. In 1872, the Ministry of Education of the new (Meiji) government (after the Edo era) announced to implement ‘singing songs’ as an official school subject nationwide because of its supposed effectiveness in raising Japanese people’s awareness for patriotism as taught in a German pedagogical theory (Ishida, 2007).

The common denominators shared by those three books are that they offered Japan of the 19th century valuable information, and that the information was practical and immediately useful. Japan went through one of the major changes as a nation in its history during the period of the end of the Edo era and the beginning of the Meiji. When a nation tries to change itself, it wants and needs some measures that are immediately effective. *Rangaku* was, in that sense, what they used as a major tool to later open the country.

Conclusion

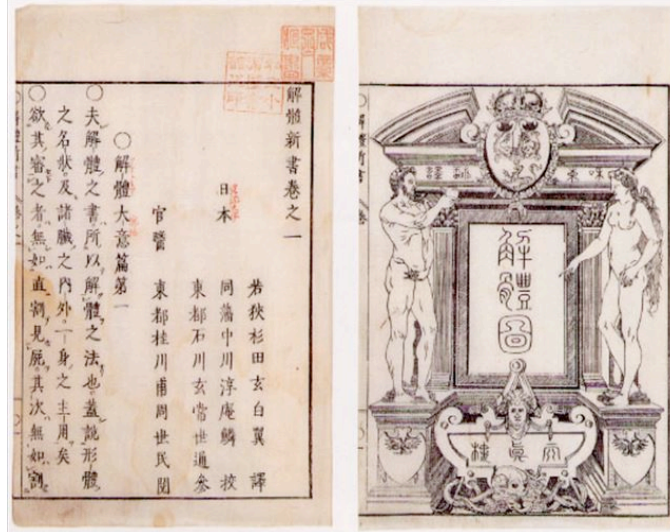
It is interesting to see that the Shogunate purchased such a huge collection of *Rangaku* books covering a wide range of fields offering Japan cutting-edge information, knowledge, culture, and technologies of that time. It is not just about medicine (as most of us remember as the result of *Rangaku*), but we can find many more profound insights.

The study of the mentioned list showed us the variety of books that were imported. The current worldwide drive to digitize old books (partially thanks to Google’s efforts) helps us as researchers to also access the contents of these books without traveling to remote or secluded libraries.

Appendices

Appendix A

‘Kaitai-shinsho’ by Maeno and Sugita, published in 1774 (National Diet Library)



Appendix B (Digitized by Google)

Oorlogs-Vuurpijlen (Military)

STELSEL
DER
OORLOGS-VUURPIJLEN.

NAAR
CONGREVE, MONTGÉRY EN ANDEREN;

VOORZIEN VAN EEN AANHANGSEL OVER HET
PERKINSCHÉ STOOM-GESCHUT.

Met Platen en Tabellen.

Het Hoogduitsche van den Generaal

J. G. VON HOYER

Samgewerkt, uitgebreid en met aantekeningen verrijkt,

DOOR

J. G. W. MERKES,

1stey Luitenant-Ingénieur.

TE 's GRAVENHAGE, BIJ
A. K. L. O. O. T. S.
1829.

Voor de snelheid bij eene elevatie van 30° is:
$$v = \left\{ 2 b^2 \log^2 \frac{am}{am-ct} + \left(\frac{1}{2} b \log \frac{am}{am-ct} - 2 gt \right)^2 \right\}^{\frac{1}{2}} \dots (7)$$

en voor eene elevatie van 60°
$$v = \left\{ \left(\frac{1}{2} b^2 \log^2 \frac{am}{am-ct} \right) + \left(\frac{1}{2} b \log \frac{am}{am-ct} - 2 gt \right)^2 \right\}^{\frac{1}{2}} \dots (8)$$

wijl voor den straal = 1, de $\sin. A = \sin 30^\circ = \cos 60^\circ = \frac{1}{2}$; en $\cos 30^\circ = \sin 60^\circ = \left(\frac{3}{4} \right)^{\frac{1}{2}} = \frac{1}{2} \sqrt{3}$.

Om de geheele worpsverheid des vuurpijls te berekenen, wanneer de elevatiehoek en de durig der drijfsas gegeven zijn, zoo merke men op, dat het eerste deel $x = z \cos A$ is en het tweede deel de abscis eener parabool, welke den vuurpijl doorloopt, wanneer de drijfsas vertceerd is: om dus deze kromme te bepalen, moet de snelheid des pijls op dezen oogenblik en de rigting bekend zijn. De eerste hebben wij reeds gevonden; terwijl de sinus van den hoek welke deze rigting met den horizont maakt $= \frac{v}{v} \cos A$ is; alzoo de sinus en cosinus dezes hoeks door i en k voorstellende en u de snelheid des vuurpijls in de paraboolvormige tak der baan, dan vindt men voor de geheele worpsverheid, na zekeren tijd t ,
$$P = \frac{ku}{\sqrt{g}} \left(\frac{i^2 u^2}{4g} + z \sin A - gt^2 \right)^{\frac{1}{2}} + \frac{ik u^2}{2g} + z \cos A \quad (9)$$

**ALGEMEENE
GEOGRAPHIE,
OF
BESCHRYVING
DES GEHEELEN
AARDRYKS;**

Behelzende het Merkwaaardigste, dat tot deze Weetenſchap behoort, als de Verdeeling der Gewesten in byzondere Staaten, Koningryken, Vorſtendommen, Republieken, enz.; derzelver Ligging, Grenzen, Grootte, Zeën, Baaijen, Meiren, Rivieren, Bronnen, Havens, Kaſpen, Geflochtenis van Lucht en Grond, Bergen, Bergwerken, Gewaſfen, Dieren, Steelen, Veiſingen, Kefteelen, Vleeken, Dooſen, voornaame Gebouwen en Zelzaamheden; eene beknopte Verhandeling van derzelver oude en hedendaagſche Inwooneren; van hunnen Aart, Zeden en Gebruiken; van de gewichtige Staatsveranderingen der Ryken en Staaten; van derzelver Regeeringsvorm, Goudſchiffen, Krygsmagt, Inkomſten, Koophandel, Fabrieken, Staat der Geleerdheid; eene maſtkuende Bericht van de Riddersorden; Geflachtlyken van thans regeerende Koninglyke en Vorſtylike Huizen; Lyſten der beſte Landkaarten, der Hoogſcholen; enz.

*Eerſt ontvoorep en merklyk voorgezet door den beroemden
JOHAN HUBNER.*

Daarna in het Nederduyſch Verzaald, met Invoeging van al het Merkwaaardige van den Franſchen Druk. Vervolgens met eene gantsch nieuwe Befchryving der Nederlanden en doorgaans met nieuwe Aantekening verrijkt, door den Heer
W. A. BACHIE NE.

Ten Predikant te Kullenburg, thans Hoogſtrent in de Sterre- en Aardrykskunde en Predikant te Maasricht.
En nu op nieuw over het geheel verbeterd, vermeerdert, tot den tegenwoordigen Tyd voorgezet, en met eene Algemeene Inleiding tot de Aardryksbefchryving voorzien, door

ERNST WILLEM CRAMERUS.

Met een Stel LANDKAARTEN van een gantsch nieuw Ontwerp.
T W E E D E D E E L.
Bevatende GROOT-BRITANJE, IERLAND
en de NEDERLANDEN.

TE AMSTELDAM,
By PIETER MEIJER, op den Dam.
MDCCLXIX.

GROOT-BRITANJE beftond, voorheen, ook uit twee byzondere Koningryken, Engeland en Schotland, inſgelyk ieder zyn byzonder Parlement hebbende; maar, onder de Regering van Koningin Anna, zyn zy, in den jare 1706., tot één Koningryk gebragt, onder den naam GROOT-BRITANJE. Het Parlement van Schotland werd aan dat van Engeland ingelyfd, waardoor de byzondere Regering van Schotland is opgehouden: gelyk wy in 't vervolg breder zullen melden.

Het Koningryk GROOT-BRITANJE beftaat dan tegenwoordig uit ENGELAND en SCHOTLAND, noemende de Engelfchen, ter onderscheiding, het eerſte ZUID- en het laaſte NOORD-BRITANJE.

HANDLEIDING

BIJ HET

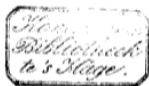
Z AN G O N D E R W I J S

IN DE

L A G E R E S C H O L E N ;

DOOR

B. BRUGSMA.



TE GRONINGEN, BIJ
H. J. SCHIERBEEK.
1854.

2^e CURSUS.

1. Toepaſing van het dus ver geleerde op het Notenſtelſel.

1. Kennis van de noten, de verſchillende ſleutels en de ſchalen voor de verſchillende toonſoorten in de Harde- of Duur- klankbladder.

Vioel- of Sleutel.
 Bas- of Sleutel.
G A B c d e f g a b c d e f g a b c d e f g m.
 Groot octaaf. Klein octaaf. Een geſtroopt octaaf. Twee geſtroopt oct.

Discant-Sleutel.
Alt-Sleutel.

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