

# To discover, yes, but to publish...?

## Jens Esmark, datolite..and thulite

Geir Hestmark

### Introduction

In August 1806 German geologist Johann Friedrich Ludwig Hausmann (1782-1859), arrived at Kongsberg on a trip through Scandinavia, and here met Jens Esmark (1762-1839) who held a position as Assessor in the central mining administration – the Oberbergamt – and also served as Inspector and lecturer in mineralogy, geology (geognosy) and physics at the Berg-Seminarium, the mining academy established in connection with the Silver Mines at Kongsberg in 1757. In his Scandinavian travelogue Hausmann described Esmark as an excellent geognost, and outstanding in many other skills.

*"Esmark possesses a very instructive collection for the external characters of the minerals for the needs of his lectures, and many splendid Nordic minerals, among which many new are probably present, of which the closer examination and publication every mineralogist so more must be desirous, as Esmark's sharp eye has already demonstrated itself through several interesting discoveries, among others that of the datolite."*

*"Esmark besitzt eine sehr instruktive Sammlung für die äusseren Kennzeichen der Fossilien zum Behuf seiner Vorlesungen und viele treffliche, nordischen Mineralien, unter welche manche neue sich befinden dürfen, auf deren nähere Untersuchung und Bekanntmachung jeder Mineralog um so begieriger seyn muss, da sich Esmark's Scharfblick schon durch mehrere interessante Entdeckungen, wie u. A. durch die des Datoliths bewährt hat." (Hausmann 1811-18, Vol. 2: 38).*

Esmark's discovery of datolite poses a number interesting questions regarding the discovery, credit for and publication of new minerals.

### Collection

The collection of datolite happened on an inspection trip Esmark made from mid-June to mid-July 1804 in the company of his colleague at the Oberbergamt, Assessor Ole Henckel (1748-1824) to the Egeland Iron Work close to Risør town on the south Norwegian coast (Doc 1). The 'discovery' years "1805" or "1806" usually cited for datolite are thus wrong. The Egeland Work also had some mines close to the town Arendal, and Esmark took the opportunity here also to visit the mine Nødebroe, belonging to Eidsfoss Iron Work. The reason for this was probably that silver had been discovered in the Nødebroe mine in 1788, and reported to the Oberbergamt (Doc 2). The Silver Mines at Kongsberg were running up a large deficit, and its leaders were (desperately?) screening other possibilities. The mineral riches of the Arendal iron mines was recently reviewed by (Larsen 2011).

### Discovery and description - in private

To collect a mineral sample is one thing, to realize that you have a *new* mineral is something different. Esmark, who was a skilled mineralogist and pupil of Freiberg professor Abraham Werner (1749-1817), famous for his courses in mineral identification (oryktognosie), may immediately on the spot have realized that he saw something new, indeed this might be the reason for him taking samples. But this is not certain. What *is* certain, is that at least by 17 August 1804 he *had* realized his discovery, because on this date he dispatched to his brother-in-law Gregers Wad (1755-1832), keeper of geological collections in Copenhagen, specimens of some new minerals he had discovered on the voyage (Doc 3). Esmark and Wad were both married to daughters of Oberberghauptmann Morten Thrane Brünnich (1737-1827), who resided at Kongsberg. Brünnich was himself an accomplished mineralogist who against his will had been dispatched by the King to Kongsberg to prove the



economic utility of geological science, and bring the mines to profit. As professor in natural history in Copenhagen Brünnich had originally inspired Esmark to a career in mining. To Wad Esmark reported from his trip:

*"Most honored brother-in-law, I hereby send two minerals recently discovered by me. The greenish one melts easily from the blowpipe to a clear transparent glass, is half hard to a higher degree than fluorite. I found it also crystallized in angled prisms which side planes to angles similar to those of topas and with similar ends. I have it under analysis and found 6 ¾ % crystal water, 34-35% silisium, it also has some lime with some iron. But the amount and whether there are other constituents I do not yet know as I have not finished the analysis. It is from the Nøtebroe mine by Arendal."*

*"Høystærede kiære Svoger, Hermed sender ieg tvende nylig af mig opdagede Fossilier [...] det grønliges smelter let for Blæserøret til et klart gennemsigtigt Glas, er halvhaard i høyere Grad end Flussspat [...] ieg fandt det ogsaa krystalliseret i skiævt vinklede Prismes hvis Sideflader støder sammen under samme Vinkler som Topasen og med Forandringer paa enden likesom ved den [...] ieg har den under Analyse og fundet 6 ¾ pr. C. Crystallisations Vand, imellem 34 og 35 pr. C. Kisel iord, Kalkiord holder den ogsaa med noget jern [...] men Mængden og om der er andre Bestanddele ved ieg endnu ikke da ieg ikke har endt Analysed, den er fra Nøtebroe Grube ved Arendal." (Doc 3)*

Esmark did not in this letter suggest a name for the new mineral, nor did he describe the geological circumstances of its occurrence.

### **Announcement and description – in public**

The first public announcement and description of the new mineral from Nøtebroe took place in the Danish Science Society in Copenhagen in a meeting on 17 January 1806, where Brünnich read a paper submitted by Esmark on a new mineral called Datolith. This was soon reported in the journal *Kjøbenhavnske lærde Efterretninger* (February 1806) and the *Intelligenzblatt der Jenaischer allgemeine Literatur-Zeitung* (23 February 1806), and thus it could perhaps be argued that these journals contains the 'protologue' of datolite (Anonymous 1806a, 1806b). But these reports contained no *description* of the new mineral and no explanation of the name. On 28 February 1806 Brünnich addressed the same Society with an historical account of the silver vein in the Nøtebroe mine (Anonymous 1806c).

Although these events are briefly noted in the (unpublished) proceedings protocol of the Science Society, neither Brünnich's Nøtebroe paper nor Esmark's datolite paper were *printed* in the proceedings of the Society – or anywhere else – and this has led to much confusion about the discovery and proper citation of the original publication of datolite. Also because bibliographies of Esmark's works - and Esmark himself (!) - lists the paper as if actually published by the Danish Science Society (Doc 4). The citation in the literature list of H. Neumann (1985: 253), "Esmark, J. 1806, *Neu. All. Jour. Chem.* 16, 1- ", is also erroneous, as the author is really Klaproth. The same error in Clark (1993: 173). Some German journals reported that Esmark had sent the paper to the Royal Science Society in Trondhjem, but this is likely a mixup with the Royal Science Society in Copenhagen. On my request the archivists at the Gunnerus Library at NTNU could find no trace of such a publication. Despite some effort, I have not (so far) succeeded in 'unearthing' the original paper, and it is possible that it does not any longer exist. According to the Secretary of the Danish Science Society, there is no manuscript of the datolith lecture in the archives of the Society.

However, some of the contents of Esmark's original paper – his finished chemical analysis, which must have been prepared between August 1804 and January 1806 – was first published by Hausmann in 1810, with due credits (Hausmann 1810: 58). The analysis is: Kieselerde 0,370, Boraxsäure 0,310, Kalk 0,280, Thonerde 0,010 Braunstein, Eisen, Nickel 0,015; Krystallisationseis 0,015. Thus Esmark had identified boron (B) as the third major constituent of the new mineral. The element boron (B) was isolated as late as 1808 by Louis Jacques Thénard (1777-1857) and Joseph Louis Gay-Lussac (1778-1850), but had been



known since medieval times in the form of borax ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ ) and the name is derived from Persian or Arabic. Esmark's paper has not been located in the meagre Hausmann nachlass in Göttingen.

By the time Esmark's analysis was printed by Hausmann, a more thorough analysis of datolite had however been performed by Berlin chemist Martin Heinrich Klaproth (1743-1817), and presented to the Berlin Academy of the Sciences on 30 January 1806 - only 13 days after Esmark's paper was read in Copenhagen - and speedily published in *Neues allgemeiner Journal der Chemie* in spring the same year - with due credit to Esmark as the discoverer, and Arendal in Norway as the locality (Klaproth 1806). (Raade 1996: 30-31, 86, 99) cites Klaproth (1806) consistently with the erroneous year „1805“. Klaproth's chemical analysis gave: 36.5% silica, 35.5% lime, 24% boric acid, 4% water. The chemical formulae of datolite is now considered to be  $\text{CaBSiO}_4\text{OH}$  (or  $\text{Ca}_2\text{B}_2\text{Si}_2\text{O}_8(\text{OH})_2$ ), with equal amounts of B, Ca and Si. The paper by Klaproth was the first chemical analysis of the new mineral to appear *in print*. Furthermore, the paper contained a list of the external characteristics of the new mineral, prepared by Klaproth's friend Dietrich Ludwig Gustav Karsten (1768-1810), Werner student 1782-86, Professor of Mineralogy at the Bergakademie in Berlin 1789-1810, and this became *the first printed description* of datolite, although Karsten was not listed as co-author of the paper (Klaproth 1806). In a report in the first volume of *Taschenbuch für die gesammte Mineralogie* (1807) it was however listed as 'beschreiben' by Karsten and 'entdeckt' by Esmark (Leonhard 1807).

Klaproth and Karsten did not indicate who had provided them with specimen(s) of datolite, nor did they explain the curious name of the new mineral, nor did they acknowledge that a paper by Esmark had been read in Copenhagen two weeks before their own paper was read in Berlin. Wad had studied with Klaproth in 1793 and Klaproth had earlier praised Esmark's study (1798) of the rocks and minerals of the Carpatheans, so it is possible that Esmark or Wad in 1805 sent specimens to Klaproth. If so, it is strange that Klaproth does not mention this. Klaproth reprinted his datolith analysis in the fourth volume of his *Beiträge zur Chemischen Kenntniss der Mineralkörper* (Klaproth 1807). By that time his analysis had already been noted in several other journals, for instance an anonymous extract in the *Paris Journal de Physique, de Chimie et d'Histoire Naturelle* in June 1806, where Esmark is described as "savant minéralogiste et élève l'illustre Werner" (Anonymous 1806d).

The rapid publication of Klaproth's and Karsten's paper may be the main reason why Esmark did not bother to bring his own original paper to publication. In 1805-1806 he was also extremely busy with his new private mining ventures at Kongsberg, after the King late 1804 decided to close down the Silver Mines from 1805.

Rene-Just Haüy (1743-1822) in Paris who received from Karsten a specimen of datolite with small crystals, presented the first precise measurements of crystal angles and a plate with *the first published illustrations* of 'datholite', in *Journal des Mines*, May 1806, confirming that it indeed was a new mineral but failing to mention Esmark (Haüy 1806). Haüy also presented Klaproth's chemical analysis, and wrote that Karsten had communicated to him that "one" had discovered a new mineral in the vicinity of Arendal, and that "one" had named it *Datolith*. If Haüy knew the discoverer to be Esmark, he was rather unthankful. Esmark had in 1800-1801 provided Haüy with many Norwegian minerals.

Apparently unaware of Haüy's paper, Hausmann, passing through Copenhagen on his voyage to Norway in the summer of 1806, examined the specimens of datolite Esmark had sent Wad, and on 8 July 1806 finished a description including some crystal angles, however not published until 1810 (Hausmann 1810). Here Hausmann cited Klaproth's as well as Esmark's original chemical analysis, the latter he may have obtained from Wad or directly from Esmark when visiting Kongsberg in fall 1806. He also stated the date when Esmark's original paper was read in Copenhagen.



In the mean time, in Paris, the chemist Nicolas Louis Vauquelin (1763-1829) on the urging of Haüy made an analysis of a specimen of datolite Vauquelin had received from Wad's student, Danish mineralogist Neergaard, and this was published in *Annales du Muséum d'Histoire Naturelle* - without any mention of Esmark (Vauquelin 1808). It largely confirmed the previous analyses by Klaproth (and Esmark), with silicate at 37.66%, lime 34%, borate 21.67% and water 5.5%.

Strangely, by 1810 no explanation of the *name* datolite seems yet to have been *published*. Esmark will of course have explained it in the paper read 17 January 1806, but as this paper remained unpublished, people were left to wonder. Around 1820 explanations started to appear in textbooks on mineralogy, e.g. Jameson's *System of Mineralogy*: "The name Datolite refers to the granular concretions which this species exhibits in the massive varieties, and was given to it by its discoverer M. Esmark." (Jameson 1820: 345, note). K. von Leonhard: *Handbuch der Oryktognosie* (1821: 588). "Datolith (richtiger als Datholith), abgeleitet aus dem Griechischen δατεομαι (dateomai, d.i. ich theile, zertheile, sondere ab) und λιθος (lithos, d.i. Stein), mit Rücksicht auf die Verhältnisse der Absonderung."

Complicating the story, was Hausmann's publication in 1808 of a new mineral containing borax which he called *Botriolit*, found in the Kjenlie mine at Arendal (Hausmann 1808). It had escaped the notice of mineralogists because it was similar to brown limestone. Hausmann explicitly notes that a blowpipe analysis by 'the sharpminded Esmark' (*den scharfsinnigen Esmark*) (during Hausmann's visit to Kongsberg in 1806?) of this mineral let one suspect that it contained borax, and this was subsequently confirmed by Hausmann and Gahn in the laboratory at Falun in Sweden. It contained the same elements as datolite, but more lime. Its form was also different, it resembled grapes, and Hausmann accordingly named it 'Botriolit', i.e. grape-stone (*Traubenstein*), from Greek 'botryos' = grape. That Esmark made the first analysis of this mineral was stated also by Klaproth in an analysis published 1810 (Klaproth 1810). Although featured in many 19<sup>th</sup> century mineralogy texts, botryolit has not survived as an independent species and is now considered a botryoidal form of datolite.

In his *Handbuch der Mineralogie* (Hausmann 1813, Vol. 3: 862-863) Hausmann introduced the name 'Esmarkit' collectively for minerals with boron and silica, thus *both* datolith & botryolith, but this did not catch on, perhaps due to the priority of 'datolith'. Robert Jameson in his *System of Mineralogy* (1820) considered 'Esmarkit' a *genus* rather than a species, but preferred to name the genus Datolite (Jameson 1820: 345-350). In Leonhard's *Handbuch der Oryktognosie* (1821: 588) 'Esmarkit' was listed as a synonym of datolith.

### **Type locality and type specimen**

The Nødebros mine is clearly *the type locality* for the mineral datolite. On this there seems to be universal agreement.

In the fall of 1806 Hausmann visited the type locality, and described it in his Scandinavian travelogue (Hausmann 1811-1818, Vol 2:167-168,151). The mine belonged to proprietor Cappelen on Eidsfoss, and although not very well managed, was already famous as the only finding site for datolite. A visit by mineral trader Nepperschmidt had awakened the miners who now besieged Hausmann with offers of specimens. The treasured mineral occurred in veins of variable thickness penetrating the bedrock, mostly hornblende; together with datolite Hausmann found calcite, quartz, phrenite and fluorite. Crystals of datolite were rare, found in small cavities. Based on his own collections of datolith at Nødebroe, Hausmann published a letter to Karsten proposing to distinguish a variety more splintery than the common variety (Hausmann 1809).



Raade in his treatment of minerals originally described from Norway does not cite any type material for datolite (Raade 1996: 30-31), and in general the type question for minerals is often difficult (Embrey & Hey 1970, Dunn & Mandarino 1987, Raade 1996: 12). For something to be called a *holotype*, the describer must have designated this single specimen as the one the description is based on, something Esmark is unlikely to have done as he probably had sampled more specimens, and we do not (yet) have his original paper. In this particular case it is also a problem that the first *published description* is not the discoverer's but that of Klaproth and Karsten, and indeed in the collection of Klaproth's minerals purchased in 1817 by Museum für Naturkunde in Berlin is a single, beautiful specimen with crystals of datolith (Catalogue No. Probe 2007-02502, see <http://www.ltypmineral.uni-hamburg.de/link/en/datolite.html>, where it is labelled as 'vermutl. T', i.e. 'presumably the type')(Fig.1). The label is according to curator Dr. Ralf-Thomas Schmitt at the Berlin museum, Klaproth's own, and reads: "Datolith. Nödebroe-Grube, bei Arendal." There is no indication of collector, year of collection etc. This specimen looks like a display specimen, possibly purchased from a mineral dealer, and is probably not the one used for chemical analyses?



**Fig. 1. The datolite specimen from Klaproth's collection, MFN, Berlin, Catalogue No. Probe 2007-02502.**

In 1826 Esmark sold his private mineral collection to the University of Christiania (Oslo), and his specimens are now in the Museum of Natural History, University of Oslo, including several specimens of datolite from the type locality. Furthermore, in the collection of Esmark's son, Hans Morten Thrane Esmark, donated to Tromsø Museum in 1872 and still kept separate at the Museum, there are no less than five specimens of datolite from the type locality. And in the Copenhagen Geological Museum there are also several specimens of datolite from the type locality. Several of these specimens in Oslo, Copenhagen and Tromsø can probably compete with the Berlin specimen if we accept that the reading of Esmark's paper on 17 January 1806 constitutes a 'protologue' (i.e. first description) although it was never published. So, the jury is still out...

Anyway: In 1809 a new locality for datolith was discovered in Gaisalpe, Sonthofen in Bayern, and described in Leonhard's *Taschenbuch* in 1811 (Uttinger 1811). In 1823 Armand Lévy examined some crystals from Seisser Alpe in Tyrol labelled 'datolith', but thought their crystal form deviated so much from those previously given for datolite that he proposed the name 'Humboldite' if future chemical analysis confirmed difference from datolite (Lévy 1823). This expectation did not come through.

Throughout his life Esmark probably enjoyed seeing datolite discovered in ever new countries and localities, although his name was not often remembered on these occasions; most of these papers are cited in Luedecke's large monography on datolite (Luedecke 1888). Esmark's handling of the datolite was unfortunately symptomatic of his cavalier or reluctant communication and exploit of own discoveries. While Klaproth, Karsten, Haüy,



Vaquelin and Hausmann cashed in the credits of scientific publication and future citations, and Nepperschmidt couped the commercial trade, Esmark was left with little but honorary mention, and often not even that. This pattern would repeat itself throughout his scientific career.

In August 1810 he discovered a pink new mineral on a voyage in Telemark, and again rapidly described it in a letter to Wad in fall 1810, and *en passant* in a travelogue published in 1812. He did not name it, and only in 1820 this mineral started to appear in British textbooks under the name 'thulite', later reduced to a variety of zoisite. Esmark never claimed (or received) credit or priority for thulite, and it is still an open question who invented the name. But samples from the type locality in Sauland in Telemark can be found in mineral collections all over Europe. I explore this history in another paper.

In 1823 Jens Esmark made his greatest discovery: the ice age, but again completely failed to assert his priority when this idea really took hold in the 1830s.

## References

Archive material is cited as 'Doc 1', 'Doc 2' etc to avoid a paper with footnotes.

ANONYMOUS (1806a). Kjøbenhavnske lærde Efterretninger for Aar 1806. In list of contents: "J. Esmarch's opdagede Datolith", and in No. 5, p. 80: "I Videnskabernes Selskabs Forsamling Fredagen den 17de Januar forelæste Hr. Oberberghauptmand Brünnich en af Hr. Oberbergamts Assessor Esmark indsendt Afhandling om en af Hr. Oberbergamts Assessoren ved Nødebroe Grube i Nærheden af Arendal opdaget nye Steenart, Datolith kaldet."

ANONYMOUS (1806b). Intelligenzblatt der Jenaischer allgemeine Literatur-Zeitung No. 19 (23 February 1806), p. 156. "Hr. Esmarck, Oberbergassessor zu Kongsberg, hat bey Arendahl ein neues Mineral, das er Datolith nennt, gefunden, und darüber an die norwegische Gesellschaft eine Abhandlung eingeschickt."

ANONYMOUS (1806c). Kjøbenhavnske lærde Efterretninger for Aar 1806, p. 176.

ANONYMOUS (1806d). Note sur la Datolithe. Journal de Physique, de Chimie et d'Histoire Naturelle LXII : 472-473.

CLARK, A. (1993). Hey's Mineral Index. London : Chapman & Hall.

CLEMENT, A. (1928). Breve fra og til Gregers Wad 1790-1812. København: H. H. Thieles Bogtrykkeri.

DOC 1. Riksarkivet, Oslo, Oberbergamtet, Sesjonsprotokoller 0035 (1802-08), OBA meetings from 13 June to 14 July 1804, Esmark and Henckel explicitly noted as absent on inspection of Egeland jernverk.

DOC 2. Riksarkivet, Oslo, Privatarkiv 171 Brünnichs Samling. Fol. No. 106. Norske Jernverker, pp. 81-86. Copy of report 5 September 1788: Uslers beretning om en sølvanvisning i Nødebroe Grube ved Arendal.

DOC 3. Geologisk Museum, Copenhagen, archive. Jens Esmark, letter to Gregers Wad, 17 August 1804. Also printed in A. Clement: Breve fra og til Gregers Wad 1790-1812 (1928), pp. 102-103.

DOC 4. Kungliga Svenska Vetenskaps-Academien, Stockholm, "Inkommande skrivelser från personer utan eget arkiv" (tidigare "MS"), Jens Esmark [Vitae] Christiania 15 October 1825. The same is claimed by his son H. Esmark: Biographie over Jens Esmark, Nasjonalbiblioteket, Ms. fol. 4107 II 6.

DUNN, P.J. & MANDARINO, J. A. 1987. Formal definitions of type mineral specimens. *American Mineralogist* 72: 1269-1270.

EMBREY, P. G. & HEY, M. H. (1970). "Type" specimens in mineralogy. *Mineralogical Record* 1: 102-104.

HAUSMANN, J. F. L. (1808): Vorläufe Notiz von einigen neuen nordischen Fossilien. *Efemeriden der Berg- und Hüttenkunde* (ed. Carl Erenbert Freiherrn von Moll), Vol. 4: 390-405. Nürnberg.

HAUSMANN, J. F. L. (1808). Resultate geognostischer Beobachtungen, angestellt auf einer Reise durch einen Theil von Dänemarc, Norwegen und Schweden und der k. Societät der Wissenschaften zu Göttingen vorgelegt. (Dated Braunschweig den 7 Dec. 1807). *Neue Jahrbücher der Berg- und Hüttenkunde*. Nürnberg. Steinische Buchhandlung. Vol. 1: 1-48.

HAUSMANN, J. F. L. (1809). Auszüge aus Briefen. I. Herr Hausmann an den Geh. Rath Karsten. I. Den Salit Augit und Datolith betreffend. *Magazin für der Gesellschaft naturforschender Freunde zu Berlin*, Vol. 3: 157-159.

HAUSMANN, J. F. L. (1810). Beiträge zur Oryktognosie, von dem Kammersekretair Hausman [sic] zu Braunschweig. I. Bemerkungen über den Datolith, von Nödebroe-Grube bei Arendal in Norwegen. (Kopenhagen, den 8. Jul. 1806). *Beiträge zur Naturkunde* 2: 53-59. Kiel: August Schmidt.

HAUSMANN, J. F. L. (1811-1818). Reise durch Skandinavien in den Jahren 1806 und 1807. 5 vols. Göttingen: bei Joh. Friedr. Röwer.

HAUSMANN, J. F. L. (1813). *Handbuch der Mineralogie* Bd. 3.

HAÜY, R. (1806). Note sur la Datolite. *Journal des Mines*, 19 (No. 113, May 1806): 362-364 + Pl. V.

JAMESON, R. (1820). *A System of Mineralogy, in which Minerals are arranged according to the Natural History Method*. 3rd edition. Vol. 1. Edinburgh: Printed for Archibald Constable & Co.

KLAPROTH, H. M. (1806): Chemische Untersuchung des Datoliths. *Neues allgemeines Journal der Chemie* 6: 107-110.

KLAPROTH, H. M. (1807): Chemische Untersuchung des Datoliths. In. H. M. Klaproth: *Beiträge zur Chemischen Kenntniss der Mineralkörper*. 4: 354-360.

KLAPROTH, H. M. (1810). Chemische Untersuchung des Botryolith. In. H. M. Klaproth: *Beiträge zur Chemischen Kenntniss der Mineralkörper*. 5: 122-125.

LÉVY, A. 1823. Account of a new Mineral. [Humboldite]. *The Annals of Philosophy* (New Series), 5: 130-134.



LARSEN, K. E. 2011. Mineralene i Arendals skarn-jernmalm-forekomster; mer enn 200 års mineralogy-historie. In: F. S. Nordrum & A. O. Larsen: Kongsberg Mineralsymposium 2011. Bergverksmuseets Skrift nr. 46: 57-82.

LEONHARD 1807. [Note] Taschenbuch für die gesammte Mineralogie mit Hinsicht auf die neuesten Entdeckungen, Erster Jahrgang (1807), pp. 262-263. „Entdeckt: von Esmark bei Arendal in Norwegen unter bis jetzt nicht bekannten Verhältnissen des Vorkommens \*): beschrieben von Karsten im neuem allg. Journ. Der Chemie VI. S 108)“. The note\* says: „Talkblättchen und späthiger Kalkstein finden sich an denen in meiner Sammlung befindlichen Stücken. d. H.“ The latter initials means „der Herausgeber“, i.e. Leonhard himself. The name ‚datolith‘ is not explained in this note.

LUEDECKE, O. (1888). Ueber Datholith. Eine mineralogische Monographie. Zeitschrift für [die gesammte] Naturwissenschaften, 61 (4te Folge, Vol. 7): 235-404 + Tab. IV-IX.

NEUMANN, H. (1985). Norges Mineraler. NGU Skrifter 68.

RAADE, G. (1996). Minerals originally described from Norway. Including notes on type material. Norsk Bergverksmuseum Skrift nr. 11. Kongsberg.

UTTINGER, (1811). [Letter to editor dated] Sonthofen in Schwaben im März 1810 [&] Beschreibung des Datoliths von der Geisalpe bei Sonthofen. The latter title is heading p. 369. Under main heading 'Korrespondenz', in C. Leonhard (ed.): Taschenbuch für die gesammte Mineralogie, mit Hinsicht auf die neuesten Entdeckungen. Vol. 5: 365-369. According to this paper Uttinger first misidentified the mineral, but chemist Gehlen in München analysed it for him, found boracic acid and this settled the issue.

VAUQUELIN, N. L. (1808). Analyse de la Datholithe ou Chaux Boratée-Siliceuse de M. Haüy. Annales du Muséum d'Histoire Naturelle, 11 : 89-92.

**Reference to this article :**

**Hestmark, G. (2012) : To discover, yes, but to publish...? Jens Esmark, datolite..and thulite. Norwegian Mining Museum, Publication No. 49, 45-52.**