

# Aurorae Borealis Studia Classica

Vol. X

An unsigned article on  
*Nordlyset* (1840)

by Hans Christian Ørsted

digitized, with an English translation and introduction  
by Kira Moss

*Aurorae Borealis Studia Classica* (Classic Studies of the Northern Lights) is [a series](#) of digitized texts, with biographical introductions and content summaries, edited by Per Pippin Aspaas and published by [Septentrio Academic Publishing](#), University of Tromsø – The Arctic University of Norway (UiT). The texts as such are already in the public domain; all further content is open-access except when stated otherwise.

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The tenth volume in the series presents a hitherto overlooked item in the oeuvre of the famous discoverer of electromagnetism, Hans Christian Ørsted (1777–1851). A highly influential figure in cutting-edge science internationally, Ørsted was also active as a populariser of various kinds of academic discoveries and theories within nineteenth-century Denmark. However, no separate publication on the aurora borealis by Ørsted has been known until now. It is in one of the many contemporary collections of miscellanies for the general public – namely, in *Dansk Folkekalender* for the year 1841 (printed 1840) – that Kira Moss has discovered his unsigned article on “Nordlyset” [The Northern Light]. In her introduction, Moss presents evidence of Ørsted’s authorship, contextualises the place of the northern lights in Denmark in the period known as Romanticism, and presents a detailed summary of his own theory. As a supplement, she provides a complete English translation of Ørsted’s article.

- The editor

Items digitized for this volume:

\*\*The unsigned article “Nordlyset” as published in *Dansk Folkekalender 1841* (printed 1840) from the Ultima Thule Collection of the University Library at UiT The Arctic University of Norway. Digitized by UiT. See [digitized article](#)

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# HANS CHRISTIAN ØRSTED AND THE AURORA BOREALIS

## Introduction and Summary of Contents of “Nordlyset” (1840)

by Kira Moss

The Danish natural scientist Hans Christian Ørsted (1777–1851) is world famous for giving the first display of electromagnetism in 1820. In Denmark, he was *the* central figure in the natural sciences in the first half of the nineteenth century, heavily influencing other researchers in his own period and onwards. Like virtually all other natural scientists of his time, Ørsted is known to have shown an interest in the aurora borealis, or northern lights.

Since the early eighteenth century, when northern lights were becoming a less rare sight even at southern-European latitudes, the phenomenon had been a popular object of study, not least to the growing number of scholars who preoccupied themselves with the study of electricity and magnetism.

In the first half of the nineteenth century, German Romanticism had a strong impact on natural philosophy and science as well as literature in Denmark. The period saw a growing interest in the mysterious and alluring northern lights both in the field of natural science and folklore. Remarkably often, northern lights would appear in literature, both symbolic and allegorical; occasionally, they were depicted in Danish landscape painting as well. Thus, the inclusion of a popular-science article on the northern lights in one of the many miscellaneous cultural magazines of nineteenth-century Denmark was by no means an anomaly. In this context it is relevant to remember that the phenomenon in this period and before the age of urban light pollution was seen somewhat frequently over Denmark.

Besides working on his own research and serving as a professor at the university in Copenhagen, H.C. Ørsted was highly committed to the spread of knowledge on chemistry and physics. Among many other initiatives, he was the founding father of *Selskabet for Naturlærens Udbredelse* [‘The Society for the Dissemination of Natural Science’] in 1824.

Ørsted did not focus on the northern lights in his own research, but the phenomenon was discussed in all circles – among artists, authors, and philosophers as well as scientists like himself.<sup>1</sup> Moreover, Ørsted had close relations with Johan Ritter (1776–1818), professor in Jena and Christopher Hansteen (1784–1873), professor in Christiania (Oslo), both working extensively on the northern lights and related subjects. That Ørsted should write an article on this intriguing phenomenon for an interested public of laymen is therefore likely.

### H.C. Ørsted as the author of the article

The article “Nordlyset” appeared as the last text in the miscellaneous publication *Dansk Folkekalender* [Danish Almanac for the Public] for the year 1841,<sup>2</sup> an annual publication presenting a wide range of subjects. *Dansk Folkekalender* was published by *Selskabet for Trykkefrihedens rette Brug* [Society for the Proper Use of the Freedom of the Press], a society formed in 1835 with the – partly political – purpose of spreading knowledge among the common public, in this period mostly meaning the upper bourgeoisie. Besides the almanac, the Society published a weekly magazine, *Dansk Folkeblad* [The Danish Public Magazine]. For its first issue, Ørsted wrote a programmatic introduction.<sup>3</sup>

The volume for the year 1841 (printed 1840) was the first issue of *Dansk Folkekalender*. With calendars for each month of the year accompanied by information on astronomy and the seasons, interspersed with a few illustrations and short articles ranging from literature (both poetry and prose) through history and other kinds of scholarship to the natural sciences, it is representative of this genre of popular miscellany. Some of the best-known fairy-tales by H.C. Andersen appeared on print for the first time in *Dansk Folkekalender* and similar, related publications.

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<sup>1</sup> Ørsted was, for example, a close friend of the authors Adam Oehlenschläger and H.C. Andersen, who described the northern lights in their works, as previously described in the series *Aurorae Borealis Studia Classica*, [vol. 9](#) and [vol. 8](#).

<sup>2</sup> “Nordlyset”, in *Dansk Folkekalender for 1841. Udgivet af Selskabet for Trykkefrihedens rette brug*, Copenhagen 1841 (printed 1840), pp. 171–180.

<sup>3</sup> H.C. Ørsted, “Bemærkninger over det indbyrdes Forhold mellem Trykkefrihedslovgivningen og den almindelige Mening”, in *Dansk Folkeblad, udgivet af Selskabet for Trykkefrihedens rette Brug*, 1ste Aarg. No. 1–2, Fredag 29 Mai 1835, pp. 1–7.

The article with the title “Nordlyset” [‘The Northern Light’] was published without mention of an author. Even though a signature or abbreviation was the most common, it was not unseen that factual contributions in such publications were unsigned. The article printed just before “Nordlyset”, with advice on nutrition to children, is an example of this practice. It is not possible from the available sources to explain with certainty why the article on “Nordlyset” has no signature, but there is certainly nothing exceptional in this, nor is there anything controversial in its contents.

In the edition of *Dansk Folkekalender* for the following year, Ørsted contributed with a signed article, “Over Skypompen” [On the Funnel Cloud], a more purely scientific article. Ørsted explains in a note to that article how it has previously been published in Germany and translated into English, and that he has not found a suitable place for a Danish version, until *Dansk Folkekalender*, where it is published with some revisions.<sup>4</sup> In the years that followed, Ørsted wrote many contributions on a range of subjects for different publications targeted at a wider audience. However, many of Ørsted’s lesser writings are normally not included among his canonized works, and not all were signed.

By the 1840s, Ørsted was Denmark’s most high profiled presenter of popular knowledge in chemistry and physics, with impressive numbers of spectators to his public lectures, among them many women. An article on the northern lights written by this particular author was therefore well suited to the ambitions of the editors of *Dansk Folkekalender*. Another indication of his authorship is its overall style and mode of argumentation, which corresponds to similar writings by H.C. Ørsted.

The most conclusive evidence identifying Ørsted as the author of “Nordlyset” is found in a lecture given on 11 February 1855 in Selskabet for Naturlærens Udbredelse by a candidate in high engineering, captain of the artillery Eigil Schiern (1818–1865). In his lecture, as published in *Dansk Maanedsskrift* [Danish Monthly Journal], Schiern gives an elaborate account of the northern lights in general, much like the one given in “Nordlyset” from 1840. Towards the end, Schiern sums up the latest theories, referring explicitly to the late Ørsted: “in his paper on the northern lights in *Dansk Folkekalender* for 1841, Ørsted remarks that [...]”. Schiern then summarizes Ørsted’s theory, or rather conjecture, as described in “Nordlyset”, adding that by 1855 most natural scientists had come to the conclusion that the northern lights probably had a magnetic origin.<sup>5</sup>

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<sup>4</sup> H.C. Ørsted, “Om Skypompen”, in *Dansk Folkekalender for 1842* (printed 1841), pp. 169–187.

<sup>5</sup> Eigil Schiern, “Om Nordlysene”, in *Dansk Maanedsskrift*. Redigeret og udgivet af dr. M.G.G. Steenstrup. Andet bind, Gyldendalske Boghandel, 1855, pp. 1–17, quotation on p. 15: “Ørsted bemærker i sin Afhandling om Nordlysene i *Dansk Folkekalender* for 1841 [...]” (translation by Kira Moss). Claims of consensus for a magnetic origin on p. 16.

## “Nordlyset” (1840): Summary of contents

“Nordlyset” can be divided into three parts. The first part (pp. 171–76) presents general information on the northern lights. The second part (pp. 176–78) deals with a general description of magnetism and electricity ensuring the reader has the necessary basis for understanding the theories of the northern lights. The last part (pp. 178–80) accounts in brief for different explanations of the phenomenon, concluding with the author’s own conjecture. Broken down into even smaller segments, the contents of the article can be summarized as follows.

**Pp. 171–2** [On superstition]: Describes how, especially in southern Europe and as late as the seventeenth century, the northern lights were interpreted as bad omens. In spite of the Enlightenment period, this superstition has not entirely disappeared. Reference to the Jesuit natural philosopher Caspar Schott.<sup>6</sup>

**Pp. 172–3** [On the colours and shapes of the northern lights]: The author mentions arcs and rays etc. and the dark area often seen under the arcs, which cannot be the source of the northern lights as one can see the stars through it. He also describes the corona, and clouds accompanying the light. Reference to Christopher Hansteen.<sup>7</sup>

**Pp. 173–4** [When and where northern lights can be seen]: The author concludes that at least to some extent, the Sun prevents us from seeing the northern lights during daytime. It appears at any time of the year, though rarely in the summer. Moreover, the northern lights are limited to cold and temperate regions, only rarely seen in Southern Europe. There is a similar phenomenon in the Antarctic.

**P. 174** [Short mentioning of the relation to magnetic needle]: Reference to the journeys of Captain William Parry.<sup>8</sup>

**Pp. 174–5** [On the height of the northern lights]: The author refers to different attempts to decide the height of the northern lights. He concludes that it must be rather close to the earth, below 2000 feet (620 m) as it has been seen below the clouds, even though he does not exclude the possibility of future proof of higher elevation. Reference to Captain Parry.

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<sup>6</sup> Caspar (or Gaspar) Schott (1608–1666), German Jesuit, author of several books on mathematics, physics, famous for his works on hydraulic and mechanical instruments. His name is not set in bold letters in the original.

<sup>7</sup> Christopher Hansteen (1784–1873), Norwegian astronomer and physicist known for his work on the mapping of Earth’s magnetic field.

<sup>8</sup> William Edward Parry (1790–1855), naval officer and arctic explorer, especially famous for his voyage in search of the North West Passage in 1819/20.

**P. 175** [On the sound of the northern lights]: Despite some examples of observation from trusted observers, the author concludes that the sound heard in these few cases could as well derive from other sources. Reference to Captain Alexander Hood<sup>9</sup> and Professor Johann Georg Forchhammer.<sup>10</sup>

**P. 175** [Periods of the northern lights]: The author refers to the periodicity described by Hansteen, giving 24 periods from 502 AC to 1803. The author remarks how this might be revised, as the old observations are unreliable.

**Pp. 175–6** [On the relation to the surroundings]: Short paragraph mentioning how the relation between the northern lights and the weather is not yet proven but nevertheless appears indisputable, although not in a way often predicted by superstition. Ørsted states how a thin veil of misty clouds is probably a necessary precondition for the northern lights.

**P. 176** [On the relation of the northern lights to magnetism]: The author begins with a short description of the magnetic needle in general to ensure the understanding of the following. With references to François Arago<sup>11</sup> and Hansteen, the author describes how the northern lights change the deviation of the magnetic needle, or at least makes it unsteady.

**P. 177** [On the question whether northern lights can cause illness]: The author simply asks the reader to consider the consequences of the northern lights causing illness in areas where they can be seen every night.

**Pp. 177–8** [On electricity in general]: More thorough explanation of electricity for the reader's understanding of the description of the northern lights as an electrical phenomenon. The author describes how one can create electricity, for instance by vaporisation, and what is understood by an electric current. The author accounts for the nature of lightning and the effect of an electrified body placed in moist or diluted air, where it can easily make a gloom. He mentions, in bold letters, the effect of electromagnetism: "[...] when one conducts electricity through a metal thread along the

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<sup>9</sup> Alexander Hood (1758–1798), who sailed with Captain Cook's second voyage 1772–1775, before becoming a famous naval officer.

<sup>10</sup> Johan Georg Forchhammer (1794–1865), protégé of H.C. Ørsted, famous for his pioneering work in the field of geology in Denmark.

<sup>11</sup> Dominique François Jean Arago (1786–1853), French physicist with important work in for example northern lights science and in the physics of electromagnetism following Ørsted in 1820.

length of the magnetic needle, this is brought out of its position, but if you conduct it [the electricity in the metal thread] across a steel needle this will become magnetic.”

**Pp. 178–9** [On earlier theories of the northern lights]: The author mentions different theories on the northern lights as of an electrical nature. Reference to John Canton<sup>12</sup> and Benjamin Franklin.<sup>13</sup> He also touches upon, and rejects, theories of the northern lights as having a magnetic origin. The author concludes this paragraph with the promise of an assumption different from earlier ones, “we will therefore give an extract of the newer assumptions in one that is different from each of them, but nevertheless bears their common main features.”

**Pp. 179–80** [The author’s own tentative explanation of the origin and nature of the northern lights]: The author concludes the article with a tentative explanation, here simplified. He explains how the northern lights could be the result of an electric current in the atmosphere lighting up particles in the moist or diluted air, like in the physical experiments he described earlier in the article. The electric current in the atmosphere is a result of vaporisation from the seas on the Earth during the daily wandering of the Sun. The restriction of the northern lights to mainly the polar areas, as well as their shapes and movements would then be due to the interaction between the Earth’s magnetism and the magnetism in the particles, created when they are crossed by the electric current. In the end the author nevertheless gives a reservation as to how future knowledge might change this conjecture.

### **The place of the northern lights in Ørsted’s work**

As seen in the above resumé of “Nordlyset”, Ørsted was aware of the various features of the northern lights discussed by other contemporary natural scientists. He touches upon the discussion of height, sound, relation to the weather, especially clouds, as well as older and contemporary reflections and assumptions.

As mentioned, the article was hardly conceived as a scientific work as such, which means the author could allow himself to be somewhat unspecific in its concluding parts, but he must have believed his views to be of sufficient relevance to be presented to the public..

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<sup>12</sup> John Canton (1718–1772), British physicist. Worked to a large extent in electrostatics, claiming some important results, also known for making artificial magnets and demonstrating the compressibility of water.

<sup>13</sup> Benjamin Franklin (1706–1790), American polymath, one of the so-called Founding Fathers of the United States. Famous for proving lightning as electrical in nature. His name is not in bold font in the original.



Ørsted's tentative explanation is in its essence electrical, and as such primarily notable because he describes the northern lights as an effect of an electric current running in the atmosphere. He refers to known light phenomena connected with electricity and dismisses the belief that the formation of the northern lights in its origin was due to Earth's magnetism, by pointing to the fact one had never seen any light phenomena originating directly from magnetism in itself. Nevertheless, he describes the shape and appearance of the northern lights as a result of the relations between the electric atmospheric current, the magnetism of the Earth and magnetism in the particles emitting the light, created in accordance with his discovery of electromagnetism.

Further mention of the northern lights can be found on several places in Ørsted's writings. These short references to the phenomenon indicate the general significance attributed to the understanding of the phenomenon, as is illustrated in these two examples, both with relevance to "Nordlyset" from 1840.

In 1823, Ørsted gave "some remarks on the northern lights" in a paper presented to Det Kongelige Danske Videnskabernes Selskab (The Royal Danish Academy of Sciences and Letters). Ørsted was the secretary of the society, so we can presume he wrote the lines on the lecture himself, in the Proceedings of the Society for 1823:<sup>14</sup>

[Ørsted] has conveyed to the Society some remarks on the theory of the northern light, in which he drew particular attention to how the luminous arc in large northern lights is orientated exactly like would be that of an electrical discharge in a similar relation to magnetism. Moreover, he did not think that we have all the necessary knowledge to form a complete theory of the northern light.

This short summary shows how Ørsted considered the northern lights in relation to the magnetism of the Earth, but also how he already in 1823 interpreted the phenomenon in relation to electrical effects solely taking place in the atmosphere.

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<sup>14</sup> "Oversigt over Selskabets Forhandlinger fra 31 Mai 1822 til 31 Mai 1824", in *Det Kongelige Danske Videnskabernes Selskab, Philosophiske og Historiske Afhandlinger*, Anden Deel, Copenhagen 1824, pp. XIII–LIV, on p. XLV: "[Ørsted] har meddeelt Selskabet nogle Bemærkninger over Nordlysets Theorie, hvorved han især gjorde opmærksom paa, at den lysende Bue af de store Nordlys netop har samme Retning som en electrisk Udladning maatte have, der skulde staae i samme Forhold til Magnetismen. Iøvrigt holdt han ikke for at vi endnu have alle de nödvendige Kundskaber, for at danne en fuldstændig Theorie af Nordlyset" (translation by Kira Moss).

Twenty years earlier, in 1803, Ørsted wrote an “Overview of the latest advances in physics” for Friedrich Schlegel’s journal *Europa*. In connection with scientific discoveries on the magnetism of the Earth, he briefly describes the northern lights:<sup>15</sup>

If we exclude the generation of light, which is still to be revealed and perhaps can be shown in the northern lights, we will find all the functions of electricity in magnetism, even though they are inherent in the magnet in a completely different way, in that they cannot be so easily lured out of it.

By 1803, Ørsted was on his way to a new understanding of magnetism, and he was somewhat open to the idea of the northern lights as deriving from magnetism itself, a conclusion he indisputably rejects in the present text from 1840.

## Conclusion

Within the history of theories of the northern lights, it is obviously interesting to see an article by a scientist as important as Ørsted, even if written to a general audience of non-specialists. The article sums up what the author believes are the most relevant facts for a wider – though learned – audience, including the newest findings and exploration reports. Compared with other popular articles on the northern lights from the first part of the nineteenth century, it is remarkable that this text does not include mythology and folklore. Only the superstition of the northern lights as a bad omen is addressed. In this, the author finds occasion to criticise the beliefs of southerners. In this way he to some extent places himself among other Scandinavians who argued that one can only discuss the northern lights when living under it. Instead of including folklore and mythology, so predominant in the works of his contemporaries, Ørsted grasps the opportunity to elaborate on the nature of electrical phenomena and magnetism, echoing his popular talks.

There can hardly be any doubt that Hans Christian Ørsted is the author of “Nordlyset”. In view of the general strong probability of Ørsted being the author to such an article in *Dansk Folkekalender*, the explicit reference to Ørsted by Eigil Schiern seems highly reliable. As explained above, Schiern refers to Ørsted as the author in a public lecture

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<sup>15</sup> Hans Christian Ørsted, “Uebersicht der neuesten Fortschritte der Physik”, in *Europa. Eine Zeitschrift*. Herausgegeben von Friedrich Schlegel. Ersten Bandes zweites Stück, Frankfurt a.M. 1803., pp. 20–48, on p. 34: “Wenn wir also die Lichthervorbringung ausnehmen, die aber gewiß noch zu entdecken ist, und vielleicht in den Nordlichtern aufgewiesen werden könnte, finden wir alle Funktionen der Elektrizität im Magnetismus wieder. Doch sind sie in dem Magneten auf eine ganz andre Weise, indem sie nicht so leicht aus demselben hervorgehlockt werden können” (translation by Kira Moss).

held in Ørsted's own Society for the Dissemination of Natural Science, less than four years after the grand scientist passed away.

This year, 2020, we celebrate the 200 years anniversary of Ørsted's famous display of electromagnetism. In this context, his conjecture on the role of an atmospheric electric current and its resulting magnetizing effect in relation to the magnetism of the Earth, in itself suggested as an electromagnetic effect, is of course interesting in its own right.

- *Kira Moss*, October 2020



Christoffer Wilhelm Eckersberg, "Ørsted", painting from 1822. (Collections of The Danish Museum of Science & Technology)