

TRANSLATION OF ØRSTED'S UNSIGNED ARTICLE ON "NORDLYSET" (1840)

by Kira Moss

On the translation

The original article on "Nordlyset" – published in *Dansk Folkekalender for 1841* (printed 1840) – is aimed at a rather schooled audience. Nevertheless, it is written in a mostly non-scientific language. My main consideration when translating the text has been how to balance between an easy understanding of an old text for a reader of today and yet retain the impression of the text's peculiarities. Ørsted was a pioneer in adapting scientific concepts to the Danish language, naming for example many of the elements in Danish, as well as contributing with more than a thousand new words and expressions still part of common Danish language. It is remarkable how the first part of the text, dealing with the common features of the northern light is written in a very easily understandable language, whereas the last part of the text dealing with the relation between magnetism and the atmospheric characteristics of the northern light includes more scientific and complex explanations. I hope the translation rather loyally echoes Ørsted's straightforward description of the phenomena as well as rightfully conveying the theory implied at the end of the text.

With these considerations, I have tried to make a direct translation of the main expressions used in the text, but I have chosen to break down the text into many more paragraphs than the original, and certain sentences have been divided, thereby rendering the text more easily accessible for a reader of today. Paragraphs beginning with an indentation are from the original; new lines without indentation are my own. The original's highlighting in bold of personal names and certain other words has been retained. There are, of course, several ambiguities in the text. These have been attempted preserved, not explained. The few comments by the translator are put in square brackets. For further information, please see the [introduction](#) to this volume.

- Kira Moss, October 2020



[p. 171]

THE NORTHERN LIGHT

In the old days, when one's understanding of the relation of nature to the human being was by no means as clear as it is today, almost every uncommon natural occurrence was considered a means used by God in order to announce forthcoming disasters. How often have one not, following solar and lunar eclipses, parhelion, comets and the like, expected war, pestilence, famine, or even the end of the world to occur, and how often haven't these expectations proved unfounded!

Accordingly, even though the northern light is one of nature's most beautiful spectacles, we cannot expect it to be perceived with unprejudiced eyes, especially since it is seen at night, when the imagination is at its most likely to assume supernatural things. To give an example of how superstition can render this kind of phenomenon obscure, we quote some old stories.

In the year 1116, as the story goes, armies were seen in the sky, extending from North to East; this sight lasted long into the night, formidable to watch. – In 1453, a multitude of dogs were seen in the sky. After these, there followed a multitude of wagons and goods, and in the end a large army on horse and on foot, armed with spears and lances. – Even in 1718 and 1729, commoners believed they saw riders racing through the sky with burning torches, battling with each other.

Such narratives from the southern peoples of Europe can be traced back to the very oldest historical epoch. By contrast, our Nordic ancestors, to whom the northern light was an everyday display,

[p. 172]

would impossibly have had such wrong ideas about it. Thus, we can see in *The King's Mirror* [Kongespeilet, Konungs skuggsjá], a book written in Norway between 1140 and 1270, evidence of how the northern light was perceived simply as a plain phenomenon of nature. The following is stated: "*Some say the Northern Light is a glare of the fire that borders the seas in the North and the South. Others say it is a glare of the Sun while it is under the horizon, and finally some say it derives from the ice towards the Pole, which creates the northern light by radiating into the night the light it has absorbed during the day.*"

When viewed alongside the (though wrong, yet sensible) explanations proposed by our unpolished ancestors, the southern civilised peoples with their fanciful beliefs make us smile; but we must marvel at how, as late as the middle of the seventeenth century, we find several natural philosophers that perceived the northern light as nothing short of a miracle. Among others the Jesuit Caspar Schott claims that it is not to be denied that the northern light heralds things to come: firstly, because the historian Josephus and the holy Pope Gregorius had claimed this to be the case, and secondly, because he is afraid of offending God by denying it. Accordingly, he assumes that the northern light is composed of flammable vapours, which God either through an angel or a devil (he dares not decide which) organizes and ignites when he wants to warn mankind of disasters to come.

In more recent times, when enlightenment has become more widespread across all groups of society, such imaginations have for the most part disappeared; nowadays, one restricts oneself to expect bad weather or diseases to follow the northern light. Whether such fears are reasonable will be seen in the following, but before we get that far it is necessary to consider the most important appearances of this natural phenomenon.

The northern light seems most often to commence from a luminous arc rising above the horizon at varying height; it can sometimes appear doubled, at other times tripled. This arc usually appears as a circular arc, at other times a little flattened. However, the famous natural scientist **Hansteen** in Christiania affirms that it up there can be seen every now and then as an entirely flattened circuit. The arc shines most commonly with a white and yellow light; more seldom with a red, blue, and green. Between the arc of light and the horizon one commonly sees a very dark area. This has led to the belief

[p. 173]

that the northern light emanates from heavy, dark clouds; yet, when taking a closer look at this dark area, it is possible to see the most bright stars shining through. Thus, it simply appears being dark, either because of the contrast of the surrounding bright shining arc or because the northern light in some peculiar way prevents the light from penetrating.

Most commonly, the northern light radiates several more or less distinct rays, taking shape either rapidly or slowly, playing in the same colours as the arc, however more frequently than the arc in a sparkling purple colour. Sometimes the rays extend

far onto the southern part of the sky, where they join together in a single point, the so-called crown, slightly south of zenith*.

The crown most frequently has the same colours as the rays and is seen either as a dark spot surrounded by a luminous ring or as a shimmering light surrounded by a halo; yet, although the arc, as well as the rays and the crown, sometimes shines very brightly, it is always possible to see the major stars through them. In addition to the arc and the rays, one sometimes sees another kind of luminous matter with the likeness of thin clouds, which, driven by a strong wind, begin to shine when entering the northern light.

Sometimes the arc is completely absent, and the northern light emerges from a glare encircling the border of the sky, or you only see singular parts of a complete northern light. We have already mentioned how the arc is not always equally high above the horizon, but it is generally true that its height above the horizon increases with the spectator's distance from the equator.

It is generally assumed, as if by a tacit agreement, that the northern light shows itself exclusively at night. However, as several reliable spectators have seen it through the clouds in plain daylight, we must assume that it is only the light from the Sun that prevents us from taking notice of it during the day. Similarly, it has been presumed that it is only exceptionally seen during the summer. Yet, records from a long series of years have shown that it can take place at any time of the year, though it is everywhere more rare in the summer than during wintertime.

[p. 174]

The northern light does not show itself at any place on Earth; it limits itself to cold and temperate regions and not even there is it an equally frequent sight. It is very rare in southern parts of Europe, but becomes more and more frequently seen the closer one gets to the Polar Circle, north of which it will, with high probability, again become less and less frequent. In South America and in Siberia it is far more frequent than at the same latitude in Europe; in fact, in the regions around the Hudson Bay and Greenland it is seen in the winter as soon as the Sun is under the horizon. In the southern hemisphere, one sees a natural phenomenon that displays exactly the same features as the northern light, the only difference being the exchange of the North with the South. We therefore only need to consider the former.

* The point in the sky that is located vertically above us.

Experience shows that here [in Denmark], the uppermost part of the arc of the northern light is almost invariably situated directly above the direction of the magnetic needle. This rule does not only apply to this place, but also to any other region on Earth. Thus, Captain **Parry**, on his journey north of America, found that the magnetic needle turned towards the south, when above a specific line north in The Hudson Bay. However, at these same places the northern light always showed itself in a southerly direction.

There have been many attempts to determine the height of the northern light by means of observations, but the results achieved have been so contradictory (from just above one mile up to 400 miles [Danish mile = 7,5 km]) that we must somewhat doubt their correctness. . This not least when considering that it is not even known whether it is the same northern light that is seen by all, or if it is perhaps more likely that the same northern-light-generating natural process shows every spectator his own northern light, just like a vast thunderstorm can be seen across a substantial part of the Earth, without all spectators necessarily seeing the same lightning.

What makes the measured heights even more improbable is irrefutable facts of the northern light showing itself much closer to the ground. There are reliable observers that have seen the northern light below the clouds (at a height of 2000 feet [Danish foot = 31 cm]). Captain **Parry** observed in Baffin Bay a northern light in-between his ship and the coast, not more than 3000 feet away. From the city of Torshavn on the Faroe Islands a rock situated approximately 3000 feet from the city is often seen through the northern light.

Even if these facts do not demonstrate the impossibility for the northern light to be hovering at very great

[p. 175]

heights, until such a case is proven with certainty it does remain highly unlikely.

One has attributed to the northern light the ability to make a sound. This sound is sometimes compared to a whisper, sometimes to a brook trickling over pebbles, sometimes to a flag fluttering in the wind, sometimes to the flickering of wind in a flame and sometimes to the beating of the wings of a large bird. Amongst the native North Americans, as well as amongst the inhabitants of the Faroe Islands and in Siberia, it is commonly believed that this sound does exist; likewise, there were many in the previous century that claimed to have heard it. However, in later times only very few have heard something of this kind, even though many have paid special attention to this. Among

these few exceptions, Captain **Hood** heard in North America a very noticeable sound, but found it derived from the contraction of the ice in the cold; likewise, Professor **Forchhammer** heard it on the Faroe Islands, but he dares not say for certain whether it derived from the northern light or from the waves of the sea beating against the shores of the islands.

From all these reports it is impossible to extract any conclusion. However, it seems probable that one should have registered this phenomenon more often if it indeed derived from the northern light, and even then, one could not be completely certain that this was the case, as this sound might just as likely derive from movement of the air in the upper regions [of the atmosphere] or from other similar causes.

It has been observed that the northern light is not equally frequent at all times; these fluctuations were therefore assumed to be periodical. **Hansteen** believes he has detected 24 such periods from 502 BC until around 1830, in such a way that the frequency of the northern light is now on the rise. From this assumption, each period should have a duration of approximately 97 years. However, since one has had to use old, unclear, and fanciful reports for these calculations, it may well be that in the course of time another result will be reached.

After we now have considered the most important features of the northern light, we will proceed to talk about its influence on our surroundings. Its connection with the weather is still not completely clarified, but according to the records it seems to be confirmed that low and calm northern lights predict stable weather conditions, whereas high and fluttering ones are usually followed by strong, most

[p. 176]

often south-westerly winds. On the other hand, the common belief in this country that the northern light predicts severe winters and cool summers has not been confirmed.

However, it is not certain that the weather is an effect of the northern light. The opposite seems far more likely to be the case, as the old belief that the northern light can only show itself at a clear sky has proven completely false. It is much more reasonable to assume that a thin veil of misty clouds is a precondition for its appearance; at least such a veil has been seen in conjunction with almost every northern light observed.

We all know how a magnetized steel needle, when suspended in such a way that it can freely turn back and forth, will position itself approximately north–south. The arc between the real north and the point on the sky to which the needle points, is called the

deviation of the magnetic needle; thus, a magnetic needle suspended in this way is called a deviation needle.

If, on the other hand, a magnetic needle is suspended so that it can freely move up and down, it will not stay horizontal, but will point downwards at the north end. The angle between the horizon and the magnetic needle is called the inclination of the magnetic needle; thus, a magnetic needle suspended in this way is called an inclination needle.

These preliminary remarks were necessary in order to proceed with a discussion of the relation between the northern light and magnetism. We have already mentioned how the middle part of the northern light arc is usually situated straight above that point on the sky towards which the deviation needle points. To this we can add that the crown, in the places where observations of that sort are made, almost always has shown itself on the point in the sky towards which the upward end of the inclination needle points. However, the relation between the northern light and magnetism is not simply an apparent one. It has become clear that the northern light changes the deviation of the magnetic needle or at least makes it restless.

The French natural scientist **Arago** has made records of abnormal movements of the magnetic needle. More often than not, northern lights have been observed simultaneously, if not in France, then at least in other places, for instance in England and Scotland. On one occasion, **Arago** in Paris and **Hansteen** in Åbo [Turku, Finland] observed uncommon oscillations of the magnetic needle whilst a northern light was observed in Christiania [Oslo]. The conclusion from all observations appears to be that the south end of the inclination needle follows

[p. 177]

the crown when it moves to another location, and that the middle of the northern light arc and the northern point of the deviation needle will move in opposite directions. If, however, the arc is right in front of the magnetic needle, this will only oscillate very quickly.

A further possible question is whether the northern light can cause diseases, a belief that is quite common in our country, without ever having been confirmed. In this respect, we need simply to refer to the countries in which the northern light shows itself every night and then ask what consequences it would have had if every northern light caused illness or other disasters.

Virtually every single natural scientist nowadays believe that the northern light has an electrical origin. Thus, it is necessary to briefly explain the nature of electricity before we present the most important of the various attempts that have been made to explain the formation of the northern light. Electricity is an activity or force of nature; it can, with more or less ease, be awoken in all bodies. One can electrify bodies by different means, for example by rubbing, by heating and cooling, by vaporisation or condensation of steam, even by the mere touch. Yet it is only by the first method that it is possible to generate a perceptible electricity without special apparatus. This is seen easily by rubbing woollen cloths against a lacquer or glass rod.

An electric body attracts light bodies such as dust, bits of cork and the like, but repels them again when they have received the electricity of the body. If some sort of nonelectrical body is made to approach an electrical one, a spark between the two will appear, making a peculiar sound. Both these experiments can be shown with a lacquer or glass rod; the latter only when one has rubbed very heavily and finds oneself in complete darkness. However, it is not necessary to rub for a long time in order to produce a spark that can be heard. By the so-called electrifying machines one can produce sparks that are visible even in the brightest sunlight, though these sparks cannot be compared with the electrical spark shown to us by nature, namely, **lightning**.

A completely different kind of electric light is seen when a highly electrified body is placed in moist or diluted air. This will then surround itself with a pale glowing light that has a strong resemblance to the northern light. Nevertheless, not all electricity

[p. 178]

is of the same nature, as one can easily be convinced, for if a light body is suspended in a silk thread and is given electricity by means of a rubbed lacquer rod, it will be repelled no matter how often one approaches the lacquer towards it. If on the other hand a rubbed glass rod is placed in its proximity, it will be attracted with much force and not be repelled until it has received the electricity of the glass. These two contrasting kinds of electricity are always awakened simultaneously, so that the rubbed body receives the one and the body used for the rubbing receives the other. Water, vaporizing from earth or a saline solution receives the electricity of the lacquer, while the vapours receive that of the glass. When electricity is conducted through a metal thread along the length of the magnetic needle, this is brought out of its position, but **when it [i.e., the electricity in the metal thread] is conducted across a steel needle, this will become magnetic**. It has been agreed to name such a flow of electricity an electric current.

In the old days, the northern lights were almost invariably considered to be burning vapours and many fanciful tricks were needed to explain the forming and ignition of these. The last attempt to implement this explanation method was done about twenty years ago and was conducted very subtly, yet not gaining many supporters.

It was not until about a hundred years ago that **Canton** put forward the assumption that the northern light was of an electric origin, presuming that electricity was awakened by the strong alternation between cold and heat near the poles, from where it was flowing from cloud to cloud. Benjamin Franklin believed electricity was awakened close to equator from the movement of the sea, whence it flowed towards the poles in the form of northern lights. As he gained many supporters, this was for a long time the common assumption.

One has also wanted to ascribe a magnetic origin to the northern light, believing in this manner to be capable of explaining it as the radiation of some magnetic light. However, as one has not discovered any light phenomena created directly by magnetism, one cannot assume the presence of such a thing [as magnetism] in order to explain with ease an event in nature. It has also been believed that the northern light consists of luminous magnetic clouds. But these would then have consisted of metallic vapours, which would hardly have been able to stay suspended in the air for such a long time.

Even though one can single out several unreasonable or improbable elements in the mentioned methods of explanation,

[p. 179]

there has not been constructed a single explanation that is adequate in all respects. However, the more recent explanations all have so much in common with each other and with the peculiarities of the northern lights that one could at least believe to be on the right path. We will therefore give an extract of the more recent conjectures pieced together in the form of a new conjecture, one that is different from each [of the other recent explanations], but nevertheless bears their common main features.

The daily wandering of the sunlight across the Earth creates heating and evaporation, later cooling and condensation of the vapour, and as all these acts of nature create electricity, an electric current must flow around the Earth from east to west. If the Earth is capable of being magnetized, which we must necessarily assume, then there must in close proximity to the poles of the Earth be formed a magnet pole, a place where the agency of magnetism is especially noticeable.

At the same time as the dampness of the Earth evaporates, the air will absorb the vapours and thus also an electricity opposite that of the Earth. The same thing is happening when the vapours are condensed; there will thus run in the air an electric current quite the opposite to that of the surface of the Earth, which one commonly expresses by saying it goes in the opposite direction. As this electric current runs in fairly heavily diluted air, it can easily produce phenomena of light either by radiating into space or by moving from one damp particle to another. Furthermore, it will cause all the bodies it flows across to become magnetized and to place themselves parallel to the inclination needle, and as they are illuminated create the rays of the northern light.

When one from the ground observes all these rays running parallel to the inclination needle it will look like they are meeting at the same place on the sky to which it [i.e., the needle] points; this apparent branching point will create the corona. If on the contrary one looks towards the North, it will appear like all the rays are meeting in one point arranged like the spokes in a wheel. How the dark space and the arc are formed one can, on the other hand, not explain from the given data, at least it has not yet been done in a satisfying manner. As the electric current in the air has the opposite nature to the one creating the magnetism of the Earth it will weaken its effect, and it will look like

[p. 180]

the northern light repels the magnetic needle.

The electric current in the air will be strongest at times when it freezes in the night and is hot in the day, that is in April and October; but experience shows how the northern light is at its most frequent in precisely these months. One could perhaps expect the northern light, if this explanation is correct, to show itself equally frequent across the entire Earth. However, close to the poles the difference in temperature during night and day is so insignificant that the electric current cannot be present there, in the warm zone it is destroyed by frequent thunderstorms, and as the created electricity is more powerful over land than over sea, the large stretches of land in North America and Siberia must also have northern light most frequently, which is precisely in accordance with what experience tells us with regard to the distribution of the northern light.

If this view is not satisfactory in all aspects, it nevertheless seems to be sufficiently reasonable, so that we at least must assume that the northern light is created from the electricity emerging from the daily wandering of the Sun over the Earth. We must therefore leave it to the future either to extend this conjecture to cover all the phenomena of the northern light, or in its place to present another and better.