

## Seeking the auroras of the Valkyries

The late-twelfth-century chronicles of Gervaise of Canterbury record the sworn statements of five men who claimed to have seen one of the "horns" of the crescent moon "split in two ... spewing out over a considerable distance fire, hot coals and sparks." In 1976, a researcher concluded that the men may in fact have witnessed an actual event: the outpourings from a meteorite impact, just over the lunar horizon, that created a crater now known as Giordano Bruno (SN: 12/18/76, p. 390).

One common inspiration for such dramatic accounts has been the aurora, a spectacular sight in the northern skies (and on rare occasions as far south as Mexico), which has evoked in its observers images ranging from disembodied heads to the watchfires of the gods. Diverse and exotic interpretations can be found in the lore and writings of North American Indians and medieval Frenchmen, Eskimos and Scandinavian explorers.

Early Norse literature, not surprisingly, contains its share of references to the aurora, certainly a common enough theme in the region's poetry today. And yet, in the view of two Norwegian researchers, there are actually fewer such references in the old writings than has been supposed. The question, according to A. Brekke of the University of Tromsø and A. Egeland of the University of Oslo, is why?

A case in point is the classic "Poetic Edda," a collection of poems about gods and heroes possibly begun as early as A.D. 700 but probably dating largely from about 1000 to 1100. Translating the old Norse even into modern Norwegian is difficult enough, and Brekke and Egeland maintain that the mistaken impression of numerous auroral references was compounded by the romanticism of nineteenth-century translators who saw them at every turn, fancying reflections from the shields of the Valkyries to represent the northern lights. Even in recent years, the researchers note, the word "Bifrost" — the mythical bridge leading to Asgard, home of the Norse gods — has been taken to refer to the aurora, when in fact it was identified in a book from about 1250 as representing the rainbow. One poem describes a love affair involving a goddess linked in past studies with the aurora, whereas modern scholars believe that it alludes merely to "the germination of seeds in the spring." In short, Brekke and Egeland aver, though there are a few ambiguous terms that could be rendered in such terms as "flames thrown in the air," a close look at the "Edda" reveals that "nowhere in these poems is the aurora directly named."

A work that does make direct reference to the phenomenon is "The King's Mirror,"

written as a conversation between father and son, probably at some time between about 1230 and 1263 by an unknown person believed to have lived in central Norway, south of the Arctic Circle.

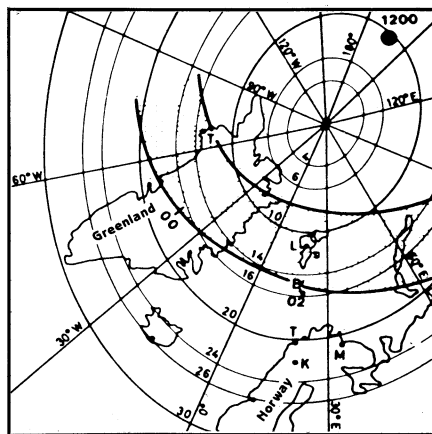
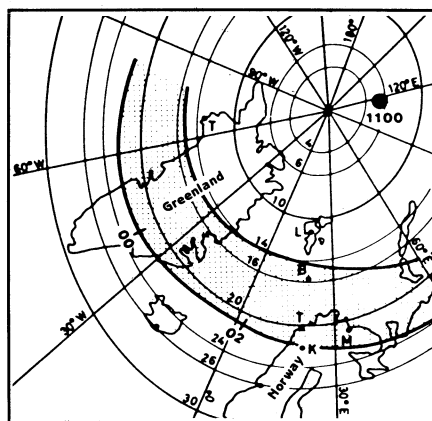
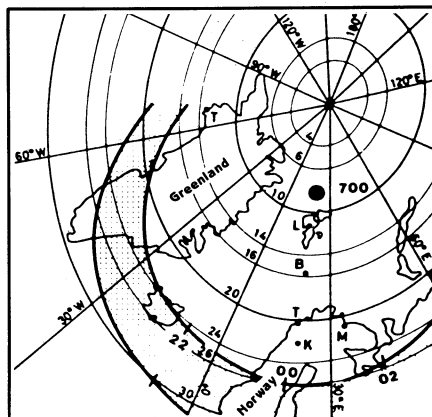
"That matter ... which the Greenlanders call the northern lights (*nordurljos*) I have no clear knowledge about," said father to

son. "I have often met people who have spent a long time in Greenland, and they do not seem to know definitely what it is either." Still, he said, there were theories. "Because some believe that fire circles about the ocean and all the bodies of water that stream about on the outer sides of the globe, and since Greenland lies on the outermost edge of the earth to the north, they think it possible that these lights shine forth from the fires that encircle the outer ocean. Others have suggested that during the hours of night, when the sun's course is beneath the earth, an occasional gleam of its light may shoot up into the sky; for they insist that Greenland lies so far out on the earth's edge that the curved surface which shuts out the sunlight must be less prominent there. But there are still others who believe (and it seems to me likely) that the frost and the glaciers have become so powerful there that they are able to radiate forth these flames."

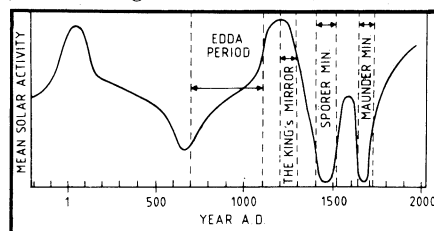
The aurora, clearly enough, but Brekke and Egeland note that the author apparently never saw one himself, and perhaps thought it to be a uniquely Greenlandic phenomenon, never occurring in Norway at all. Why the strange lack of auroras in the old Norse sagas? Can it be that there were simply none to be seen?

Quite possibly, the two modern Norwegians note. Auroras tend to be seen along the night half of an oval that surrounds the earth's magnetic pole. Over the centuries, the pole "wanders," shifting the auroral arc along with it. Another variable is the strength of the planet's magnetic field, whose strengthenings cause the arc to contract to more northerly latitudes, and such contractions are further enhanced when the amount of solar activity (source of the charged particles that generate the aurora) is low. Citing various sources for chronologies of polar wandering (from archaeomagnetic data), field strength (from paleomagnetic measurements) and solar activity (from carbon-14 studies), Brekke and Egeland conclude that, indeed, the auroras may have been largely out of sight of the early authors.

Their analysis, reported to the recent Baltimore meeting of the American Geophysical Union, suggests that the auroral arc was just brushing northern Norway in about A.D. 1100, while the "Edda's" authors may have been in southern Norway, Iceland and England, where the aurora would have been a rare phenomenon. A century later, in the years approaching the presumed time of "The King's Mirror," the arc would have missed Norway completely, passing only through north-central Greenland, far even from the Norwegian settlement at Greenland's southern tip. How the "Mirror's" author would have heard of the aurora in central Norway is thus unclear, though Brekke and Egeland suggest that less-stable (non-dipole) components in the geomagnetic field might have contributed to a then-rare southward sighting. □



*Locations of auroral arc in A.D. 700, 1100 and 1200 (above) suggest that auroras may have been rarely seen by early Norse chroniclers. Locations were plotted from solar-activity data (below), magnetic-polar tracings and field-strength studies.*



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