Mosander became through his discoveries of the new elements lanthanum (1839), didymium (1842), erbium and terbium (1842) a worthy successor of Berzelius. In 1831 Berzelius decided to withdraw from the professorship of chemistry and pharmacy at the Karolinska Medico-Chirurgical Institute in Stockholm, partly because of his desire as secretary of the Academy of Science to devote himself exclusively to his research work and partly in order to give his co-worker Mosander an opportunity to get a position as full term professor, which the latter then held for 26 years until his death in 1858.

Mosander was born in 1797 in the city of Kalmar. Like Scheele he started his career as a pharmacist. At the age of 15 he enlisted as an apprentice at the Owl’s Apothecary in Stockholm and at 22 took up medical studies. In 1824 he was appointed as teacher in chemistry at Karolinska Institutet, the medical school in Stockholm under Berzelius and in 1832 he succeeded him as professor of chemistry and pharmacy.

Although Mosander took over Berzelius’ teaching at the medical school he did not share his teacher’s devotion to physiological chemistry in its broadest sense. Mosander restricted his work mainly to the field of inorganic chemistry and mineralogy. In these fields he became the master’s equal. He spent much of his time organizing the Collection of Minerals at the State Museum of Natural History.

Here follows an English translation of the history of Mosander’s discoveries, written for the Swedish Academy of Science by A. Erdman in 1873.

"In 1803 Berzelius and Hisinger discovered a new metal in a mineral that had recently been found in the Bastnäs copper mine in the Skinnskatteberg district of the province of Västmanland. They called it cerium. The methods of reduction known at that time were not, however, sufficiently effective to enable them to obtain their new substance in a pure metallic state. — After a long interval of time this substance was examined again by Mosander and the success of his efforts is described in a paper in the proceedings of the Swedish Academy of Science for 1826. This paper describes a number of new or previously little known compounds of the metal cerium with other elements.

A few years later in 1829 Mosander made an important contribution to the knowledge of the composition of titanium compounds.

Previous experiments made at the end of the eighteen-twenties had led Mosander to suspect that cerium oxide contained some other substance but
he was unable to separate it. After he had obtained sufficient material, he
took up the investigation again in the middle of the eighteen-thirties and in
1839 had the satisfaction of being able to announce to the scientific world
that the number of known elements had been increased by one more to which
he had given the name lanthanum from the Greek work λανθάνειν, to
conceal, because the presence of this substance in cerium oxide had long
remained a secret.

Mosander's next task was a study of the properties of the new element or
rather of the two separated elements, lanthanum and cerium. These investiga-
tions, which he pursued with all the perspicacity and clear-sightedness that
always marked his scientific activities, took up all the time left over from his
official duties for several years. Some of the results he obtained led him to
suspect that there was also a third element present, that in some experiments
followed the lanthanum oxide and in others was distributed between the lantan-
um and cerium oxides. This third substance he called didymium from
the Greek δίδυμοι, twins, since it followed cerium or lanthanum in cerium-
containing minerals like a twin brother. It took a large number of experiments
over a long period before Mosander finally ventured to announce the discovery
of the oxide of another previously unknown metal at the second Scandinavian
Scientific Meeting in Stockholm in 1842. This was nearly three years after
he had first succeeded in separating it from lanthanum oxide — a strik-
ing instance of the praiseworthy care and reticence which Mosander always
showed in such cases.

The very complex reactions characterizing the recently discovered lathan-
um and didymium and the difficulties that arose in trying to prepare them
in a completely pure state caused Mosander to make similar studies on the
oxide yttria which often accompanies cerium in nature. These experiments
soon led to a result that was just as unexpected as it was gratifying. As a
consequence at the same time as he announced the discovery of didymium
at the 1842 meeting, Mosander was also able to inform the meeting that the
earth that hitherto had been named yttria, "ytterjord" in Swedish, was not a
pure earth but was mixed with another of previously unknown properties.
Continued investigations soon showed that Mosander had in no way allowed
himself to announce any hasty conclusions to his scientific audience but was
fully able to confirm his statement. He was able to announce before the end of
the year that the old yttria which is one of the main components of the mineral
gadolinite from the Ytterby feldspar works near Vaxholm in the Stockholm
archipelago was a mixture of three different earths, two of which were new to
science. He called the elements from which the two new ones derived erbium
and terbium from parts of the name Ytterby. The element in the third earth
was left with the old name yttrium.

The inscription on a medal struck by the Swedish Academy of Science in
1869 in honour of Mosander, 'Coacta disjungit semina terrarum' referred to
all of these discoveries."

New findings were later added to those of Mosander. Thus Auer von Wels-
bach resolved in 1885 the earth didymia into two different oxides, praseodymia
and neodymia. The names of the earths erbia and terbia were later interchan-
ged. In 1878 Marignac dissolved the erbia from the gadolinite into erbium and

ytterbia, and from the latter Nilsson separated in 1879 a new element, scandium, the second newly discovered element which fitted into Mendelejev’s periodic system on the place of ekabor. After removal of ytterbia and scandia from the erbia Cleve in Uppsala found in the same year another two new oxides thulia and holmium. As to the names of these two elements, the last ones in a series of 22 elements discovered between 1730 and 1879 in Sweden, Cleve suggested thulium, deriving from Thule, the ancient name of Scandinavia, and holmium, from the latinized name of Stockholm in whose vicinity occur so many minerals rich in yttria.


### ELEMENTS DISCOVERED BY OLD SWEDISH CHEMISTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Element</th>
<th>Symbol</th>
<th>Year</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Georg Brandt</td>
<td>Cobalt</td>
<td>Co</td>
<td>1735</td>
<td></td>
</tr>
<tr>
<td>Axel Fredrik Cronstedt</td>
<td>Nickel</td>
<td>Ni</td>
<td>1751</td>
<td></td>
</tr>
<tr>
<td>Carl Wilhelm Scheele</td>
<td>Fluorine</td>
<td>F</td>
<td>1771</td>
<td>Isolated by Moissan 1801</td>
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<tr>
<td></td>
<td>Oxygen</td>
<td>O</td>
<td>1772</td>
<td>Priestley 1774</td>
</tr>
<tr>
<td></td>
<td>Chlorine</td>
<td>Cl</td>
<td>1774</td>
<td>Isolated by S.</td>
</tr>
<tr>
<td></td>
<td>Molybdenum</td>
<td>Mo</td>
<td>1778</td>
<td>Isolated by Peter Jakob Hjelm 1782</td>
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<tr>
<td></td>
<td>Tungsten</td>
<td>W</td>
<td>1781</td>
<td></td>
</tr>
<tr>
<td>Johan Gottlieb Gahn</td>
<td>Manganese</td>
<td>Mn</td>
<td>1774</td>
<td>Isolated by G., discovered by Bergman and Scheele</td>
</tr>
<tr>
<td>Anders Gustaf Ekeberg</td>
<td>Tantalum</td>
<td>Ta</td>
<td>1802</td>
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<tr>
<td>Jöns Jacob Berzelius</td>
<td>Cerium</td>
<td>Ce</td>
<td>1803</td>
<td>Simult. with Klaproth</td>
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<tr>
<td></td>
<td>Selenium</td>
<td>Se</td>
<td>1817</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thorium</td>
<td>Th</td>
<td>1828</td>
<td></td>
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<tr>
<td>Johan August Arfwedson</td>
<td>Lithium</td>
<td>Li</td>
<td>1817</td>
<td></td>
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<tr>
<td>Nils Gabriel Sefström</td>
<td>Vanadium</td>
<td>V</td>
<td>1830</td>
<td></td>
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<tr>
<td>Carl Gustav Mosander</td>
<td>Lanthanum</td>
<td>La</td>
<td>1839</td>
<td>Divided by Auer v. Welsbach into Praseodymium, Pr and Neodymium, Nd in 1878</td>
</tr>
<tr>
<td></td>
<td>Didymium</td>
<td>–</td>
<td>1842</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erbium</td>
<td>Er</td>
<td>1843</td>
<td></td>
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<tr>
<td></td>
<td>Terbium</td>
<td>Tb</td>
<td>1843</td>
<td></td>
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<tr>
<td></td>
<td>Yttrium</td>
<td>Y</td>
<td>1843</td>
<td>(Gadolin 1794)</td>
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<tr>
<td>Lars Fredrik Nilsson</td>
<td>Scandium</td>
<td>Sc</td>
<td>1879</td>
<td></td>
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<tr>
<td>Per Teodor Cleve</td>
<td>Holmium</td>
<td>Ho</td>
<td>1879</td>
<td>Isolated by Holmberg 1911</td>
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<tr>
<td></td>
<td>Thulium</td>
<td>Tm</td>
<td>1879</td>
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