

JOHAN JACOB NERVANDER, FOUNDER OF THE MAGNETIC-
METEOROLOGICAL OBSERVATORY IN HELSINKI

1805—1848

by

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Abstract

A short biography of J. J. Nervander, a pioneer of geophysics in Finland.

JOHAN JACOB NERVANDER was a man of outstanding talent in his day, a versatile personality, who won fame even abroad as a scientist in physics and geophysics, and who set in motion the continuing work in meteorology and geomagnetism in Finland.

NERVANDER matriculated at the University of Turku at the age of 15, and at first studied the classics, philosophy and history, later mathematics, astronomy, physics and chemistry. He wrote poetry which evidenced exceptionally early maturity. His examination of cand. phil. (B. A.) in 1827 was the most brilliant at the university and aroused the attention of educational circles. NERVANDER continued his studies at the University of Helsinki in physics and in 1829 published a thesis for a doctorate: »In doctrinam Electromagnetismi momenta», in which he measured the influence of the galvanic stream to the magnetic needle with Schweigger multiplier of his own construction with greater accuracy had hitherto been possible. Thereafter he was appointed lecturer in physics and in 1832 assistant in mathematics and physics.

With these scientific merits Dr. NERVANDER received from the university a travelling fellowship for a period of three years. In the autumn of 1832 and the winter of 1833 he stayed in Stockholm and from there went on to Copenhagen, where he met the poet ADAM GOTTLIEB OEHELENSCHLÄGER and Professor HANS CSHRISTIAN OERSTED,

the famous discoverer of electromagnetism. His next stoppingplace was Göttingen, where he worked with the greatest mathematician of the time, CARL FRIEDRICH GAUSS, and with the physicist WILHELM WEBER. They were making experiments on telegraph wire between the physical and astronomic observatories, success was only achieved after NERVANDER's visit. A magnetic observatory based on a new principle was under construction there. During NERVANDER's visit they planned how international collaboration in geomagnetism could be brought about with the main purpose of establishing permanent magnetic observatories in different countries. NERVANDER then stayed for some time in Paris. There he came into contact with the famous physicists ANTOINE CÉSAR BECQUEREL and ANDRÉ MARIE AMPÈRE, and with the great geographer and climatologist ALEXANDER VON HUMBOLDT. In an obituary of NERVANDER we find the following sentence: »Humboldt's dictum that natural science would only achieve usefulness when it could reliably report the forthcoming weather changes, met with a sympathetic hearer in Nervander.»

In Paris, NERVANDER was able to realize his old plan, i.e. to construct a new and better galvanometer, the tangent galvanometer, in which the intensity of the electric current is proportional to the tangent of the deviation angle of the magnetic needle. The elaboration of this instrument: »Mémoire sur un Galvanomètre à châssis cylindrique par laquelle on obtient immédiatement et sans calcul la mesure de l'intensité du courant électrique qui produit la déviation de l'aiguille aimentée» is described 1835 in the journal »*Annales de Chimie et de Physique*.»

In his next place of study, Berlin, NERVANDER's interest in meteorology received a great impetus from the physicist HEINRICH WILHELM DOVE, who as a meteorologist had risen to the first rank at this time. DOVE had studied the temperature, atmospheric pressure conditions and prevalent air currents, and in 1828 had published an interpretation of the weather phenomena in the atmosphere at the meeting-places of cold and warm air masses which he described as the battleground (Kampf) of air currents (i.e. fronts). This important observation was to fall into oblivion for almost 85 years. NERVANDER, however, had accepted the doctrines of DOVE, as became clear from his lecture on »The Weather» in 1847 in Helsinki.

In summer 1835, NERVANDER stayed in Vienna and constructed a better tangent galvanometer, a model which later spread to universities and scientific institutions.



NERVANDER returned to Finland in the beginning of 1836 via St. Petersburg, where he experimented with the new galvanometer in the laboratory of the physician FRIEDRICH LENZ, who was ultimately able to announce to the Imperial Academy of Sciences in St. Petersburg that this new instrument was the most accurate electric current meter. In St. Petersburg, NERVANDER became acquainted with many scientists, among others the pioneer of galvanoplastics, MAURITZ HERMAN JACOBI, the magnetician ADOLF THEODOR KUPFFER, the astronomer WILHELM STRUVE and the chemist GERMAIN HENRI HESS. These scientists later gave valuable help to NERVANDER and through him to science in Finland.

Thus NERVANDER's travels were of extraordinary importance to him in enabling him to get acquainted with the latest researches in physics and

geophysics and to make friends with the most famous scientists in these fields on the continent of Europe. The fruits of these contacts redounded to the notable scientific advantage of Finland.

In Helsinki, NERVANDER worked out the construction of a new improved galvanometer which was later built in St. Petersburg through his friends in 1838 and was presented to the Academy of Sciences. Professor LENZ had given a description and sketch of the instrument in 1842—1843, but had left the theoretical treatment to the inventor. NERVANDER also constructed a portable geomagnetic instrument probably for field observations, but it was impossible to obtain absolutely ironfree copper for it from the wellknown chemical laboratory of Professor JONS JACOB BERZELIUS in Stockholm.

At that time the chief of the magnetic observatories in Russia, Prof. KUPFFER, proposed to NERVANDER that a magnetic observatory should be founded in Helsinki. NERVANDER accepted the proposal with pleasure, because such a plan has occurred to him during his period of travel study. Thereupon KUPFFER made a petition in this matter to the Chancellor of the University of Helsinki, who was the legal Crown Prince of Russia (and later the Emperor ALEXANDER II). At the suggestion of GAUSS and VON HUMBOLDT, the Russian scientists helped NERVANDER in that realization of the plan and with unusual alacrity the Emperor NICHOLAS I in March 1838 graciously agreed to the foundation of the Magnetic Observatory as part of the University of Helsinki. Dr. NERVANDER was appointed Extraordinary Professor of Physics and Director of the observatory. This was an epoch-making decision for Finland. A new and wider field of scientific work was open to NERVANDER.

The new observatory was built in 1840 outside the town in the park at Kaisaniemi. On the same site there stands today the Bureau of the Finnish Meteorological Office which is the outcome of the continuous development of this science in Finland. The magnetic observatory with its instruments was organized in the same manner as the observatory of Göttingen. In 1841 through the help of KUPFFER 12 assistants were appointed to the new observatory for observation and preparation of the material. Visual observations were made during each hour, 6 in geomagnetism and 3 in meteorology. Thus the institution received the name Magnetic-Meteorological Observatory.

Besides his current official work, NERVANDER carried on scientific researches. He made a detailed analysis of the diurnal variation of the magnetic declination and of the air temperature. By his temperatur studies,

he proved that there exists a seven-year cycle in the freezing and break-up of the ice of the Neva and some rivers in Finland. This result led him to study the temperature variations in connection with the sun's rotation and sunspots. From the long series of temperature data of Paris and Innsbruck he could calculate the length of the sun's rotation period at 27.27 days which was a little longer than the value of LAUGIER, 27.23 days, deduced from the velocity of sunspots. When his Russian colleagues were informed of this new result, they announced it with satisfaction at a meeting of the Academy of Sciences considering that a sun phenomenon had now been determined by means of the most uncertain of the sciences, meteorology, with greater accuracy than from direct astronomical measurements. This fact can be regarded as a consequence of the variable heat of the sun's surface. NERVANDER could later confirm the result from other temperature series. On this argument he based his hypothesis that the sun is a variable star.

At the height of his scientific activity 1842—43, his work for the establishment of the observatory was almost at a standstill. At last, in summer 1844, the regular observations were fully under way. The data was also so quickly prepared that in spring 1846 Nervander could propose to the Finnish Scientific Society the publication of the first yearbooks under the title, »Observations faites à l'Observatoire Magnétique et Météorologique de Helsingfors.» The first section, »Observations Magnétiques juillet 1844—février 1848» was published in 1848 and received a prize from the Academy of Sciences in St. Petersburg. The second part »Observations Météorologiques juillet 1844—février 1848», was printed some years later.

In March 1848 an unexpected accident occurred. Prof. NERVANDER contracted smallpox and died on March 15th. Thus Finland lost a famous scientist, a talented poet and one of her most outstanding experts in literature and art. The severest blow was to the young Magnetic-Meteorological Observatory. NERVANDER also devoted himself uninterruptedly to the work of Finnish Scientific Society, which he and other scientists had founded in 1838. He collaborated in 1845 in the realization of phenological observations and in 1846 on his initiative a net of 5 permanent meteorological stations, the first in the country, was organized. Further, he was one of the founders of the Suomalainen Kirjallisuuden Seura (Finnish Society of Letters).

The famous Finnish statesman, NERVANDER's permanent friend, J. W. SNELLMAN wrote in his obituary: »In private life NERVANDER

was a humane personality thinking and acting with generosity, who had for every promising student an open regard, indefatigable goodwill and a helping hand. In his personal relations too he was just as obliging and selfsacrificing.»