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(*b*. Äbo, Sweden [now Turku, Finland], 24 December 1740; *d*. St. Perersburg, Russia, 11 December 1784),

mathematics, astronomy.

Lexell was the son of Jonas Lexell, a city councillor and jeweler, and his wife, Magdalena Catharina Björckegren. He graduated from the University of Äbo in 1760 as bachelor of philosophy and became assistant professor of Uppsala Nautical School in 1763 and professor of mathematics in 1766. Invited to work at the St. Petersburg Academy of Sciences on the recommendation of the Swedish astronomer P. W. Wargentin in 1768, he was appointed adjunct in 1769 and professor of astronomy in 1771. His research soon made him well-known. In 1775 the Swedish government offered him a professorship at the University of Äbo which would permit him to proceed with his work in St. Petersburg until 1780; but Lexell preferred to remain in Russia. He spent 1780-1782 traveling in Western Europe; and his letters to J. A. Euler, permanent secretary of the Academy, contain valuable information on scientific life in Germany, France, and England. (These letters are kept at the Archives of the U.S.S.R. Academy of Sciences, Leningrad.)

After Leonhard Euler's death in 1783, Lexell for a short time held Euler's professorship of mathematics, but Lexell himself died the following year. Lexell was a member of the Academy of Sciences in Stockholm, the Society of Sciences in Uppsala (1763), and a corresponding member of the Paris Academie des Sciences (1776).

At St. Peterburg Lexell immediately became one of the closest associates of Leonhard Euler. Under the famous mathematician's supervision he and W.-L. Krafft and J. A. Euler helped to prepare Euler's *Theoria motuum lunae, nova methodo pertractata* (1772) for publication. Euler's influence upon Lexell's scientific activity was considerable; but the latter's works were carried out independently.

On 3 June 1769 the St. Petersburg Academy conducted observations of the transit transit of Venus at many sites in Russia. Lexell took an active part in the organization and processing of the observations Using L. Euler's method he calculated (1) the solar parallax to be 8″.68 (compared to today's value of 8″.80). No less interesting was Lexell's determination of the orbits of the 1769 comet (2) and especially of the comet discovered in 1770 by Messier (3). Lexellestablished the period of the latter on its elliptical orbit as five and a half years; this was the first known short revolution-period comet. Passing near Jupiter and its satellites the comet exerted no influence upon their motion; Lexell thus concluded that the masses of comets are rather small in spite of their enormous sizes. Lexell's comet, which had not been observed before 1770, has not been seen again; probably it lost its gaseous coat and become invisible. Still more important was Lexell's investigation of the orbit of the moving body discovered by W. Herschel on 13 March 1781 and initially regarded as a comet. Lexell's calculations showed that this heavenly body was a new planet (Uranus), nearly twice as far from the sun as Saturn (4). Moreover, Lexell pointed out that perturbations in the new planet's motion could not be explained by the action of the known members of the solar system and stated the hypothesis that they must be caused by another, more remote planet. This hypothesis proved correct when Neptune was discovered in 1846 on the basis of the calculations of J. Adams and U. Le Verrier.

Lexell's mathematical works are devoted to problems of analysis and geometry. Following Euler he elaborated the method of integrating factor as applied to higher order differential equations (1771). He gave a solution of linear systems of second order differential equations with constant coefficients (1778, 1783); suggested a classification of elliptic integrals (1778); calculated integrals of some irrational functions by reducing them to integrals of rational functions (1785).

Lexell for the first time constructed a general system of polygonometry (5), e.g., of trigonometrical solution of plane n-gons on the given $2n—3$ sides and angles between them, provided that at least $n—2$ elements are sides. These investigations formed a natural sequel to and generalization of the works on trigonometrical solution of the works on trigonometrical solution of quadrangles published shortly before by J.-H. Lambert (1770), J. T. Mayer (1773), and S. Björnssen (1780). Lexell based solutions of all the problems on two principal equations obtained when the sides of a polygon are projected on the two normal (to one another) axes situated in its plane, provided that one of them coincides with some side. From these equations he deduced others effective in the solution of triangles and quadrangles on certain given elements, suggested analogous formulae for pentagons, hexagons, and heptagons and stated considerations relevant to classification and solution of problems in the general case. He also considered, though in less detail, the problem of solution of n-gons on diagonals and on angles they form with sides. After Lexell polygonometry was also worked out by S. L'Huillier(1789).

lexell considerably enriched spherical geometry and trigonometry. Especially brilliant is his theorem discovered no later than 1778 but published only in 1784: the geometric locus of the vertices of spherical triangles with the same base and equal area are arcs of two small circles whose extremities are points diametrically opposite to the extremities of the common base (6).

In his two articles which were published posthumously (7, 8), Lexell established other properties of small circles on the sphere and deduced a number of new propositions of spherical trigonometry in which he generalized Heron's and ptolemy's theorems for the sphere and suggested elegant formulae for defining the radii of circumference of circles inscribed in spherical triangles or quadrangles and circumscribed about them. Works by St. Petersburg academicians N. Fuss and F. T. Schubert on spherical geometry and trigonometry were close to these investigations.

Five unpublished papers on geometry by Lexell are preserved in the Archives of the Academy of Sciences in Leningard (18).

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