Segner, János-András (Johann Andreas von) | Encyclopedia.com

(*b*. Pressburg, Hungary [now Bratislava, Czechoslovakia], 9 October 1704; *d*. Halle, Germany, 5 October 1777)

mathematics, physics.

Segner was the son of Miklós Segner, a merchant. He was educated in the Gymnasiums of Pressburg and Debrecen and then at the University of Jena (1725–1730), from which he received the M.D. Simultaneously he also studied physics and mathematics and in 1728 he published a work containing a demonstration of Descartes's rule of signs for the determination of the number of positive and negative roots of an algebraic equation when all roots are real; later he devoted another article to the derivation of this rule (1758). Segner practiced medicine in Pressburg and Debrecen for a short time. He went to Jena in 1732 as assistant professor and in 1733 became extraordinary professor of mathematics. In 1735 he was named ordinary professor of mathematics and physics at Göttingen; and from 1755 until his death he held the same chair at the University of Halle. He was a foreign member of the Berlin (1746) and St. Petersburg (1754) academies of science.

Segner's invention of one of the first reaction hydraulic turbines, named for him, was of outstanding importance. It consists of a wheel rotating under the action of water streaming from parallel and oppositely directed tubes. He wrote of this invention in a letter to Euler dated 11 January 1750, and in the same year he described in detain the construction and action of his machine, which he later improved; further improvements in construction were added by Euler. Segner's letters to Euler give detailed evidence of the progress of early work in the theory and construction of reaction hydraulic turbines (Euler's letter to Segner are lost). Segner's wheel is now used for horticultural irrigation and serves as a demonstration device in schools. Segner generally spent much time constructing and perfecting scientific devices, from a slide rule to clocks and telescopes.

While studying the theory of tubes, Segner introduced the three principal axes of rotation (axes of inertia) of a solid body and offered first considerations on this problem. Euler made considerable use of this discovery and, referring motion to principal axes of inertia, deduced his important equations of the motion of a solid body (1765).

Segner also wrote on various problems of physics and mathematics. He defended Newton's theory of the emanation of light (1740), developed an original graphic device for the construction of roots of algebraic equations (1761), and presented a recurrent solution of Euler's famous problem of the number of possible dissections of an *n*-gon into triangles by means of noncrossing diagonals (1761). In mathematical logic Segner developed Leibniz' ideas and was one of the first to make extensive use of an entire system of symbolic designations to formalize logical conclusions; he did not, however, confine himself to classical syllogistics.

Segner wrote a number of mathematical manuals, proceeding, to a certain extent, from Euler's works and using his advice, which were popular in their time.

BIBLIOGRAPHY

I. Original Works. Bibliographies of Segner's works are in Poggendorff, II, cols, 892–894; and C. von Wurzbach, ed., *Biographisches Lexikon des Kaiserthums Oesterreich*, XXXIII (1877), 318–320. His writings include *Dissertatio epistolica ... qua regulam Harriotti, de modo ex aequationum signis numerum radicum eas componentium cognoscendi demonstrare conatur* (Jena, 1728); *Specimen logicae universaliter demonstratae* (Jena, 1740); *Programma in quo computatio formae atque virium machinae nuper descriptae* (Göttingen, 1750); *Programma in quo theoriam machinae cujusdam hydraulicae praemittit* (Göttingen, 1750); *Specimen theoriae turbinum* (Halle, 1755); *Cursus mathematicus*. 5 vols. (Halle, 1758–1767); and *Elementa analyseos infinitorum*, 2 vols. (Halle, 1761–1763).

II. Secondary Literature. See *Allgemeine deutsche Biographie*, **XXXIII** (1891), 609–610; **M** . Cantor, *Vorlesungen über Geschichte der Mathematik*, **III-IV** (Leipzig, 1900–1908), see index: *Leonhardi Euleri Opera omnia*, fourth series, *Commercium epistolicum*, I. A. Juškerič, V. Smirnov, and W. Habicht, eds. (Basel, 1975), 403–426; Jakusc Istvàn, "Segner Andràs," in *Fizikai szemle*, **5** (1955), 56–65; N. M. Raskin,:Voprosy tekhniki u Eylers" ("Technical Problems of Euler"), in M. A. Lavrentiev, A. P. Youschkevitch, and A. T. Grigorian eds., *Leonard Eyler. Sbornik statey*... (Moscow, 1958), 509–536; and F. Rosenberger, *DieGeschichte der Physik in Grundzügen* II (Brunswick, 1884), 345.

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