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The logarithmic tables of Edward Sang and his daughters. (English) Zbl 1030.01023
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Es geht um die einzelnen Lebensstationen des Edward Sang (1805-1890) aus Kirkcaldy in Schottland, "Teacher of Mathematics and Doctor of Laws in Edinburgh", sowie um seine Arbeiten, u.a.: "Mathematics unconnected with any application but the bulk concern topics in physics, astronomy, and engineering, ranging through flywheels and turning lathes, vibrating wires, toothed wheels, clock mechanisms, meteorological observations, carpet manufacture, railways, achromatic optical lenses, construction of arches, surveying methods, the form of ships' hulls, actuarial calculations, and solar eclipses" (S. 52). Trotz solch hoher Verdienste, trotz persönlicher Ehrungen, starb er finanziell verschuldet.

Sang's logarithmische and trigonometrische Tafeln – er folgte hierbei dem Dezimalprogramm des französischen Bureau du Cadastre unter Gaspard de Prony –, unter Mitarbeit seiner Töchter Flora Chalmers und Jane Nicol zustande gekommen, aber nur zum Teil gedruckt, gingen schließlich 1907 in die Obhut der Royal Society of Edinburgh über; einzelne Institutionen bemühten sich zwar darum, dieses gewaltige Werk herauszugeben, die letzte Initiative erlosch jedoch bei Kriegsausbruch 1914. Nach Meinung des Verf. wurden die Cadastre-Tafeln in Genauigkeit und Ausmaß von Sang überboten. Nicht ermutigend: "...comparisons with other tables were perhaps the only uses ever made of Sang's manuscripts" (S. 73). Trotzdem: "Sang's numerical virtuosity becomes clear when he goes on to describe how to find large divisors which produce very rapid convergence" (S. 75): Zerlegung in Primfaktoren, deren Logarithmen schon bekannt waren, wobei über geeignete Verfahren eine geforderte Genauigkeit schnell erreicht wurde. Während Prony's Projekt wohlwollend öffentlich gefördert worden war, blieb den Sangs der finanzielle Aufwand für diese immense Arbeit, die sie in 27 Jahren während ihrer Freizeit ausgeführt hatten – allein 47 Bände mit bis zu 28-stelligen Logarithmen –, selbst überlassen.

Zwei Fotos und Abbildungen von Titel- und Textseiten lockern den voller Verehrung für Edward Sang, mit Freude am Detail geschriebenen Bericht auf. Ein umfassendes Literaturverzeichnis ist beigegeben.

Reviewer: [W.Kaunzner \(Regensburg\)](#)

MSC:

[01A55](#) History of mathematics in the 19th century
[65A05](#) Tables in numerical analysis

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[Edward Sang](#); [Gaspard de Prony](#); [Pierre Lefort](#); [logarithms](#); [mathematical tables](#); [Scottish mathematics](#)

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References:

- [1] Commissariat of Edinburgh [re Edward Sang.]: (a) "Record of Testamentary Deeds" SC70/4/250, pp. 590-592; (b) "Record of Inventories" SC70/1/293, pp. 227-234: both recorded 13 March 1891
- [2] Internat. Genealogical Index of Old Parish Records. Microfiche. St Andrews & St. Leonards Parish Records for 7 May 1862, Fife
- [3] Edward Sang MSS and related papers. The National Library of Scotland, Edinburgh, Acc. 10780 Nos. 1-89 (89 numbered volumes/folders of tables, correspondence etc., previously held by the Royal Society of Edinburgh). There is an index to these manuscripts and papers. In the text, each reference is given as [S, n] where n is the appropriate number
- [4] Edward Sang MSS. Edinburgh University Library, 40 vols. Gen. 310-349
- [5] ()
- [6] Airy, G.B., On Scheutz's calculating machine, *Philosophical magazine & journal of science*, 12, 225-226, (1856)
- [7] Andoyer, H., *Nouvelles tables trigonométriques fondamentales, contenant LES logarithmes des lignes trigonométriques...*, (1911), A. Hermann et Fils Paris · [Zbl 42.1034.02](#)
- [8] Andoyer, H., *Fundamental trigonometric and logarithmic tables*, (), 243-260 · [Zbl 45.0767.05](#)

- [9] Anon., 1851. Articles on John Sang. *Fife Advertiser* (29 March 1851), p. 3 col. 4
- [10] Anon., 1887. *Fife Free Press* obituary (16th April 1887)
- [11] Anon, Notes, *Nature*, 10, 471, (1874)
- [12] Anon, Notes, *Nature*, 12, 117, (1875)
- [13] Anon, Correspondance, *Comptes rendus hebdomadaires des séances de l'académie des sciences*, Paris, 1392-1393, (1875) · [Zbl 20.0079.02](#)
- [14] Anon., 1891. [Minutes re pension to Edward Sang and his daughters]. *Transactions of the Royal Scottish Society of Arts for 1888-9* 12
- [15] Anon., 1894. [Minutes re pension to Edward Sang and his daughters]. *Transactions of the Royal Scottish Society of Arts for 1890-91* 13
- [16] Anon, Dr Sang's logarithmic tables, *The Scotsman newspaper*, (1907), Edinburgh, (5 November)
- [17] Babbage, C., *Tables of logarithms of the natural numbers, from 1 to 108,000*, (1827), J. Mawman London
- [18] Baily, F., On mr. Babbage's new machine for calculating and printing mathematical and astronomical tables, *Philosophical magazine*, 63, 355-367, (1824)
- [19] Bathurst, B., *The lighthouse stenvensons*, (1999), Harper Collins London
- [20] Bauschinger, J.; Peters, J., *Logarithmic – trigonometrical tables with eight decimal places, containing the logarithms of all numbers from 1 to 200,000...* 2 vols, (1910), W. Engelmann Leipzig
- [21] Bessel, F.W., *Abhandlung*, ed. by Rudolf Engelmann, 3 vols, (1876), Engelmann Leipzig
- [22] Briggs, H., *Arithmetica logarithmica sive logarithmorum chiliades triginta...*, (1624), Wm. Jones London
- [23] Bullough, R.K., The wave “par excellence”, the solitary, progressive great wave of equilibrium of the fluid—an early history of the solitary wave, (), 150-281 · [Zbl 0644.76018](#)
- [24] Burckhardt, J.K. [J.-Ch.], 1816. *Table des Diviseurs pour tous les nombres du troisième million ou plus exactement: depuis 2028000 à 3036000...* Courcier, Paris
- [25] Burgess, J., On the definite integral $\int_0^1 t e^{-t^2} dt$, with extensive tables of values. [read 1895], *Transactions of the royal society of Edinburgh*, 39, 257-321, (1900), Also issued separately: Robt. Grant, Edinburgh; Williams & Norgate, London, 1898
- [26] Callet, J.F., *Tables portatives de logarithmes...*, 2 vols, (1798), Imprimerie de la République Paris
- [27] (), in press
- [28] Carlyle, T., *Edward Irving*, ()
- [29] Charlton, H.B., *Portrait of a university, 1851-1951*, (1951), Manchester Univ. Press Manchester
- [30] Craik, A.D.D., John west in Scotland and Jamaica, *Historia Mathematica*, 25, 29-74, (1998) · [Zbl 0899.01011](#)
- [31] Craik, A.D.D., Calculus and analysis in early 19th century Britain: the work of William Wallace, *Historia Mathematica*, 26, 239-267, (1999) · [Zbl 0937.01005](#)
- [32] Craik, A.D.D., Geometry versus analysis in early 19th century Scotland: William Wallace, John Leslie and Thomas Carlyle, *Historia Mathematica*, 27, 133-163, (2000) · [Zbl 0963.01009](#)
- [33] Craik A.D.D., 2003. The origins of water wave theory. *Annual Review of Fluid Mechanics*, to appear · [Zbl 1076.76011](#)
- [34] Davidson, A.R., *The history of the faculty of advocates in Scotland 1856-1956*, (1956), The Faculty of Actuaries Edinburgh
- [35] Davis, H.T.; Fisher, V.J., *Tables of mathematical functions*, 3 vols, (1963), Principia Press, Trinity University San Antonio, TX
- [36] Emmerson, G.S., *John Scott Russell: A great Victorian engineer and naval architect*, (1977), John Murray London
- [37] Fletcher, A.; Miller, J.C.P.; Rosenhead, L.; Comrie, L.J., *An index of mathematical tables...*, 2 vols, (1946), Neill & Co Edinburgh · [Zbl 0061.29802](#)
- [38] Fletcher, A.; Miller, J.C.P.; Rosenhead, L.; Comrie, L.J., *An index of mathematical tables...*, 2 vols, (1962), Addison-Wesley Reading, MA
- [39] Glaisher, J.W.L., *Report on mathematical tables*, (), 1-175 · [Zbl 0141.03804](#)
- [40] Glaisher, J.W.L., *Logarithms and computation*, (), 63-80 · [Zbl 38.0226.01](#)
- [41] Grattan-Guinness, I., Work for the hairdressers: the production of de Prony's logarithmic and trigonometric tables, *Annals of the history of computing*, 12, 177-185, (1990) · [Zbl 0706.01003](#)
- [42] Grattan-Guinness, I., Work for the hairdressers: de Prony's project for making tables in the 1790s, (), in press · [Zbl 1057.01003](#)
- [43] Horsburgh, E.M., *Napier tercentenary celebration. handbook of the exhibition of Napier relics and of books, instruments, & devices for facilitating calculation*, (1914), For The Royal Society of Edinburgh Edinburgh · [Zbl 45.0072.05](#)
- [44] Hutton, C., *Mathematical tables; containing common, hyperbolic and logistic logarithms...*, (1785), Longmans & Co London, 10th Edition: 1846
- [45] Kargon, R.H., *Science in Victorian Manchester: enterprise and expertise*, (1977), The Johns Hopkins Univ. Press Baltimore, London
- [46] Knott, C.G., (), (1905), W. & R. Chambers London, Edinburgh, Last edition as:

- [47] Knott, C.G., Dr Edward Sang's logarithmic, trigonometrical, and astronomical tables, *Proceedings of the royal society of Edinburgh*, 28, 183-196, (1908), Partly reproduced in *Horsburgh* [33, 38-47]
- [48] ()
- [49] Knott, C.G., Edward sang and his logarithmic calculations, (), 261-268
- [50] Lardner, D., Babbage's calculating engine, *Edinburgh review*, 59, 263-327, (1834)
- [51] Lefort, P.A.F., *Description des grandes tables...*, *Annales de l'observatoire impérial de Paris*, 4, (1858), Additions 123-150
- [52] Lefort, P.A.F., Note sur LES deux exemplaires manuscrits des grandes tables logarithmiques et trigonométriques, calculées au bureau du cadastre, sous la direction de prony, *Comptes rendus hebdomadaires des séances de l'académie des sciences*, Paris, 46, 994-999, (1858)
- [53] Lefort, P.A.F., Observations on Mr Sang's remarks relative to the great logarithmic table compiled at the bureau du cadastre under the direction of M. prony, *Proc. R. soc. Edinburgh*, 8, 563-581, (1875), (Communicated by Mr Sang, who has translated the paper from the French). In original French, followed by English translation
- [54] Legendre, A.-M., *Exercices de calcul intégral...* vol. 3, (1816), Courcier Paris
- [55] Legendre, A.-M., *Traité des fonctions elliptiques et des intégrales eulériennes...* vol. 2, (1826), Huzard-Courcier Paris
- [56] MacMahon, Percy A., Review of Edward Sang's 7-place logarithms, *Nature*, 97, 499, (1916), ["P.A.M."]
- [57] Napier, J., A description of the admirable table of logarithms invented by that honourable John nepair..., (1616), Nicholas Okes London, Translated into English by... Edward Wright
- [58] Napier, J., *Mirifici logarithmorum canonis constructio*, (1619), Andrew Hart Edinburgh
- [59] Newton, J., *Trigonometria britannica, or the doctrine of triangles... A table of logarithms... thereto annexed*, (1658), R. & W. Leybourn London
- [60] Nicol, W., *The planter's kalendar: or, the nurseryman's and Forester's guide*...\$, edited and completed by E. sang, (1820), Edinburgh, n.p
- [61] Oliphant, M.W., *The life of Edward Irving, minister of the national scotch church*, London, 2 vols, (1862), Hurst & Blacket London
- [62] Panteki, M., William Wallace and the introduction of continental calculus to Britain: A letter to George Peacock, *Historia Mathematica*, 14, 119-132, (1987) · [Zbl 0623.01005](#)
- [63] Peebles, D.B., "Edward sang" (obituary, with List of writings), *Proceedings of the royal society of Edinburgh*, 21, xvii, xxxii, (1897)
- [64] Peters, C.F.W., *Astronomische tafeln u. formeln*, (1871), W. Mauke Hamburg
- [65] Poggendorff, J.C., *Biographisch-literarisches handwörterbuch zur geschichte der exacten wissenschaften...*, (1904), J.A. Barth Leipzig
- [66] Sampson, R.A., *Bibliography of books exhibited at the Napier tercentenary celebration*, July 1914, (), 177-242
- [67] Sang, E., *Solution of algebraic equations of all orders...*, (1829), Edinburgh, n.p
- [68] Sang, E., Notice of a dioptric light erected at Kirkcaldy harbour. with a description of the apparatus for cutting the annular lens to the true optical figure, *Edinburgh new philosophical journal (N.S.)*, 25, 249-254, (1838)
- [69] Sang, E., *Essays on life assurance*, (1840), W.F. Watson for the author Edinburgh, Ibid. "reprinted from *Trans. Vol. 1 of the Royal Scottish Society of Arts*", 1852
- [70] Sang, E., *Life assurance and annuity tables with a copious collection of rules and examples*, (1841), Ballantyne & Hughes, for the author Edinburgh, Ibid. as Vol. 1, *One life...*, with new Vol. 2, *Two Lives...* Layton, London, 1859
- [71] Sang, E., *A new general theory of the teeth of wheels*, (1852), Black Edinburgh
- [72] Sang, E., *Elementary arithmetic*, (1856), Blackwood Edinburgh, London
- [73] Sang, E., *The higher arithmetic*, (1857), Blackwood Edinburgh, London
- [74] Sang, E., *Five place logarithms arranged by E. sang*, 16°, (1859), Edinburgh, n.p
- [75] Sang, E., *Appearance of the Sun during the eclipse of July 18, 1860, as it will be seen from London [with a sliding diagram]*, (1860), Single folio sheet London, n.p
- [76] ()
- [77] Sang, E., *A treatise on the valuation of life contingencies, arranged for the use of students*, (1864), Edinburgh, n.p
- [78] Sang, E., *Tables for the mutual conversion of solar and sidereal time*, (1868), Blackwood Edinburgh
- [79] Sang, E., *Address to the actuarial society of Edinburgh* (5th November, 1868), (1868), Constable Edinburgh
- [80] Sang, E., *A new table of seven-place logarithms of all numbers from 20000 up to 200000. prepared under the auspices of the managers of the associated life insurance offices in Scotland*, (1871), C. & E. Layton London, 2nd Edition: Elmslie Sang, Edinburgh, 1878. 2nd Edition improved: Williams & Norgate, London, 1883. 3rd Edition: Layton, London, 1915
- [81] Sang, E., *Account of the new table of logarithms to 200,000*, *Transactions of the royal society of Edinburgh*, 26, 521-528, (1872) · [Zbl 03.0567.01](#)
- [82] Sang, E., *Specimen pages of a table of the logarithms of all numbers up to one million... shortened to nine figures from the original calculations to fifteen places of decimals*, 16 pp. pamphlet, (1872), Edinburgh, n.p
- [83] Sang, E.; Hancock, W.J., *Discussion, Institute of actuaries journal, On the use of M. Thomas de Colmar's arithmometer in*

- actuarial and other computations, Institute of actuaries journal, Institute of actuaries journal, 16, 265-269, (1872), With: [Major-General] Hannyngton
- [84] Sang, E., On last-place errors in Vlacq's table of logarithms [read 1874], Proceedings of the royal society of Edinburgh, 8, 371-376, (1875) · [Zbl 07.0726.02](#)
- [85] Sang, E., Remarks on the great logarithmic and trigonometrical tables computed by the bureau du cadastre under the direction of M. prony. [read 1874], Proceedings of the royal society of Edinburgh, 8, 421-436, (1875) · [Zbl 07.0726.03](#)
- [86] Sang, E., Reply to M. Lefort's observations (with a postscript by M. lefort), Proceedings of the royal society of Edinburgh, 8, 581-587, (1875) · [Zbl 07.0726.05](#)
- [87] Sang, E., Progressive lessons in applied sciences, 3 vols, (1875), London, n.p
- [88] Sang, E., The mate's companion. showing the Sun's declination and the equation of time during each Roman year... projected by E. sang. single folio on canvas, (1879), London, n.p
- [89] Sang, E., On the need for decimal subdivisions in astronomy and navigation, and on tables requisite therefor, Proceedings of the royal society of Edinburgh, 12, 533-544, (1884) · [Zbl 17.1160.04](#)
- [90] Sang, E., On the construction of the canon of logarithmic sines, Proceedings of the royal society of Edinburgh, 12, 601-619, (1884) · [Zbl 17.1160.05](#)
- [91] Sang, E., On the relation of science to the useful arts, Transactions of the royal scottish society of arts for 1884, 11, 146-156, (1887)
- [92] Sang, E., An elementary view of the strains on the forth bridge due to the shifting load, Transactions of the royal scottish society of arts for 1885, 11, 187-207, (1887), + plates. Comment thereon by D.B. Peebles, *ibid.* 256
- [93] Sang, E., Investigation of the action of Nicol's polarising eyepiece [read February 20, 1837], Proceedings of the royal society of Edinburgh, 18, 323-336, (1892)
- [94] Sang, E., On the extension of Brounker's method to the comparison of several magnitudes, Proceedings of the royal society of Edinburgh, 18, 341-348, (1892)
- [95] Scheutz, G.; Scheutz, E., Specimens of tables, calculated, stereomoulded and printed by machinery, (1857), Longman London
- [96] Sharp, A., Easy and compendious methods of making logarithms..., (), (1717), Richard Mount & John Sprint London
- [97] Shortrede, R., Logarithmic tables to seven places of decimals containing logarithms of numbers from 1 to 120,000, numbers to logarithms from .0 to 1.00000,\$...\$, (1844), Adam & Charles Black Edinburgh, later editions: 1849, 1858
- [98] Smith, A., An inquiry into the nature and causes of the wealth of nations, (1776), W. Strahan & T. Cadell London
- [99] Steinhauser, A., Hilfstafeln zur präcisen berechnung zwanzigstelliger logarithmen zu gegebenen zahlen und der zahlen zu zwanzigstelligen logarithmen, (1880), Wien, n.p
- [100] Stokes, G.G.; Miller, W.H.; Wheatstone, C.; Willis, R., Report of committee appointed by the council [of roy. soc. lond.] to examine the calculating engine of M. scheutz, Proceedings of the royal society of London, London, Edinburgh & Dublin philosophical magazine & journal of science (4th ser.), 11, 540-548, (1856), reprinted in:
- [101] Swade, D., The cogwheel brain: charles babbage and the quest to build the first computer, (2000), Little, Brown & Co London
- [102] Swade, D., The "unerring certainty of mechanical agency": machines and table-making in the nineteenth century, (), Forthcoming · [Zbl 1065.01010](#)
- [103] Swan, W., Presidential address for 1882, Transactions of the royal scottish society of arts, 11, 1-7, (1887)
- [104] Swokowski, E.W.; Olinick, M.; Pence, D., Calculus, (1994), PWS Publishing Co Boston
- [105] Thompson, A.J., Logarithmetica britannica; being a standard table of logarithms to twenty decimal places of the numbers 10,000 to 100,000. 2 vols, (1952), Cambridge University Press Cambridge, reprinted 1967 · [Zbl 0059.11303](#)
- [106] Thompson, D'A.W., Fifty years ago, in the royal society of Edinburgh, Proceedings of the royal society of Edinburgh, 54, 145-157, (1934)
- [107] Vega, G.v., Thesaurus logarithmorum completus..., (1794), Weidmann Leipzig
- [108] Vlacq, A., Arithmetique logarithmique..., (1628), Rammasenius Gouda
- [109] West, J., Mathematical treatises, containing I. the theory of analytic functions, II. spherical trigonometry, with practical and nautical astronomy... edited (after the Author's death)... by the late sir John leslie... accompanied by a memoir of the life and writings of the author by edward sang, F.R.S.E., (1838), Oliver & Boyd Edinburgh, Simkin, Marshall & Co, London

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