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Review of: From Eudoxus To Einstein: A History Of Mathematical Astronomy by C. M. Linton

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BOOK REVIEWS

■ General

Michael Hagner. *Geniale Gehirne: Zur Geschichte der Elitegehirnforschung.* 375 pp., table, notes, bibl., index. Göttingen: Wallstein Verlag, 2004. €38 (cloth).

Michael Hagner's *Geniale Gehirne: Zur Geschichte der Elitegehirnforschung* (which might be translated "Brilliant Brains: Toward a History of Elite Brain Research") treats themes pertaining to the collection, study, description, and cultural meaning of the brains of elite persons from the eighteenth through the late twentieth centuries. It is strewn with learning, wit, and sometimes lofty prose and richly illustrated with seventy-nine illustrations. It is intended for a nonspecialist, though educated, readership and has been widely and flatteringly reviewed in the German-language press.

Hagner's main historical interest is the "idea" or "concept" of the brain of genius. This means the history of interest in and activity around the brains or skulls of elite or extraordinary people (almost exclusively men). Hagner is keen to treat this story not as one of organs, but of the cultural ideas referring to them. Along the way we meet many familiar figures, such as Julien La Mettrie, Franz Joseph Gall, Immanuel Kant, and Cesare Lombroso. But there are also many further actors, not so well known to the general reader, whose role in Hagner's history is equally important, such as the German phrenologist Gustav Scheve. Hagner traces "the concept" of the ingenious brain to the twentieth century: the interest in Lenin's brain; Oskar Vogt's desire to identify peculiar properties in the brains of executed Nuremberg criminals; and the strange fate of Einstein's brain as it traveled about, in pieces, pickled for posterity. As Hagner remarks, the cultural meanings of these fragments of great minds, and the desire to possess them, are not unlike those associated with much earlier practices of cherishing and trading relics of saints.

As his account approaches the present day, Hagner is suspicious of neuroscientific localizations (which he calls, in a brilliant phrase, cyber-phrenology) because he is reminded of the old phrenology. Nevertheless, Hagner's guilt-by-association tactic is weak. There may be similarities, but it does not follow that present-day researchers will fail because their ancestors were naive and expected superficial one-to-one correspondences between brain size and genius. The evident skepticism and denigration of modern neuroscience throughout the book is not supported with any other evidence.

But the real difficulty for readers not brought up in the German-speaking world will be the central role of an apparently reified abstraction that grows through the chapters like a spine. We are no longer accustomed to read about abstract airy nothings like "the European mind." Sometimes one can overlook the "ingenious brain concept" as just a shorthand for the various ways contemporaries thought about the brains of extraordinary people. But often one encounters the "concept" in a way that does not allow for this interpretation. It would be a mistake to assume that different people, across decades and centuries, were all talking about "it" because their interests and ideas were *similar*, even if one influenced another. To distinguish himself from earlier, less enlightened historians, Hagner remarks, "He who only searches for origins and predecessors, will of course find them" (p. 13). Quite true. Searching for "the concept" of the genius's brain is no less self-fulfilling.

Nevertheless, the book's value remains very substantial for both its prodigious research and its acute insights into the content and contexts of the shifting history of ideas about the relationship between the properties of people—their intelligence, mathematical capacity, and so forth—and their brains. No less important for Hagner is the cultural role of the exceptional person—the genius as role model. *Geniale Gehirne* is a splendidly written tour de force and a welcome addition to the literature on the history of brain sciences.

JOHN VAN WYHE

C. M. Linton. *From Eudoxus to Einstein: A History of Mathematical Astronomy*. xii + 516 pp., tables, bibl., index. New York: Cambridge University Press, 2004. $95 (cloth).

It's a long, long way from Eudoxus to Einstein. The path, though demanding, is consistently interesting and rewarding in this book by C. M. Linton. The topics treated in *From Eudoxus to Einstein* are the usual high-relief episodes in the theoretical development of astronomy, but Linton almost always has something fresh to say about them. The focus of the book is theoretical, or mathematical, astronomy in the old-fashioned

sense of planetary theory and dynamics. In keeping with the title of his book, Linton has little to say about techniques of observation; nor is there any attention to physical astronomy or astrophysics.

Linton's topics include the development of geometrical planetary theory (Eudoxus, Ptolemy, Copernicus, Kepler), planetary tables, Newtonian gravitation theory, celestial mechanics, perturbation theory, the stability of the solar system, and the modification of planetary theory brought about by general relativity. These are all subjects with deep mathematical roots, and it is not an easy task to write about them at once accurately and engagingly. Linton's approach to the material is well chosen. There is little mathematical development or argument in the book. Rather, the mathematical results are displayed and discussed in plain language. Clear discussion of mathematical formulas in plain English is a difficult art, and Linton has achieved a high order of conciseness and clarity. Controversial topics—for example, the competing claims of Lorentz, Poincaré, and Einstein over credit for relativity—are discussed dispassionately and evenhandedly. The prehistory of relativity theory is particularly well treated. Since we are now used to hearing cosmologists attempt to place constraints on the theoretical possibilities open to particle physicists, and vice versa, it was particularly amusing to read George Darwin's 1902 comment, about a meeting in Göttingen, that "the greater part of one day's discussion was devoted to the astronomical results which would follow from the new theory of electrons" (p. 456).

In a work of such scope, the author naturally has had to rely on the secondary literature, which he has surveyed with admirable thoroughness. Readers who want a detailed technical account of some development in mathematical astronomy will often be able to find an entrée to the primary as well as the secondary literature in Linton's book. However, the bibliography is restricted almost entirely to English-language publications, which means that important works have sometimes been overlooked. Thus there is no mention of Michel-Pierre Lerner's masterful history of the planetary orbs (*Le monde des spheres*, 2 vols. [Les Belles Letters, 1996]). And the author has not always made use of the most recent work. For example, in the discussion of Ptolemy's star catalogue there are no references to work published after 1998.

A work of such scope will also inevitably entail a few slips. Thus Linton says that the title of Ptolemy's *Almagest* is a medieval Latin corruption of the Arabic word for "the greatest" (p. 61); *al-megiste* is actually the Arabic definite article attached to the Greek word for "greatest." The figure on page 91 showing Thabit ibn Qurra's theory of the trepidation of the equinoxes misrepresents Thabit's theory. On page 452 Linton says, "George Fitzgerald suggested in *The Ether and the Earth's Atmosphere* (1889)" that motion through the ether might produce a longitudinal contraction of objects—thus giving the impression that there was a book of this title. Fitzgerald's suggestion was actually presented in the form of a short note in *Science* (G. F. Fitzgerald, "The Ether and the Earth's Atmosphere," *Science*, 1889, *13*:390).

Still, the merits of the book are considerable and easily outweigh the minor inaccuracies. Particularly strong are the chapters devoted to the eighteenth- and nineteenth-century development of celestial mechanics. This is a technically difficult, and some would say dry, subject. But great things were at stake, including the validity of Newton's law of gravitation and the stability of the solar system. Linton displays a knack for clear explanation of the most important developments and for making them matter to the reader. I also thoroughly enjoyed the section of the book's final chapter devoted to Einstein's steps toward the new theory of gravity, from the equivalence principle of 1907 to the final equations of 1915. Linton does as nice a job as one could wish of explaining what was at stake, as well as what went right and what went wrong along the way.

Within the limitations of the survey genre, Linton has done an excellent job. I came across something new to me in every chapter and was constantly impressed by the clarity of Linton's exposition. Professional astronomers are likely to find the book engaging. Professional historians of astronomy will find it an indispensable resource.

JAMES EVANS

Arnaud Maillet. *The Claude Glass: Use and Meaning of the Black Mirror in Western Art.* Translated by **Jeff Fort.** 300 pp., illus., table, index. New York: Zone Books, 2004. $26.95 (cloth).

If you have never heard of the Claude glass, Arnaud Maillet's book might possibly lead you to believe that this largely forgotten optical device changed the world. This feat is accomplished by expanding the definition of the Claude mirror beyond the small, tinted convex mirror used as an aid in painting. Maillet's topic encompasses a

A history of mathematical astronomy. C. M. Linton. Since man first looked towards the heavens, a great deal of effort has been put into trying to predict and explain the motions of the sun, moon, and planets. Developments in man's understanding have been closely linked to progress in the mathematical sciences. Whole new areas of mathematics, such as trigonometry, were developed to aid astronomical calculations, and on numerous occasions throughout history, breakthroughs in astronomy have only been possible because of progress in mathematics. This book describes the theories of planetary m] The history of mathematical astronomy is hard to write. The technical requirements alone are daunting, and the diversity and depth of content to be covered forces difficult choices. How closely does one stick with the historical texts?Â Nevertheless, the progress from Eudoxus's model of concentric spheres to a fully-realized and accurate epicyclic planetary model in Ptolemy's Almagest is covered faithfully, reflecting well the views of mainstream historians on the contributions of all figures, particularly Hipparchus and Ptolemy. It is refreshing to see that the actual mathematics (in modern transcription) is here as well: we find enough of Aristarchus's method for determining relative distances between the Earth, Moon, and Sun, for instance, to really understand it. Request PDF | On Mar 1, 2006, James Evans published From Eudoxus to Einstein: A History of Mathematical Astronomy | Find, read and cite all the research you need on ResearchGate.Â This new concept of relations will open a huge gate in the mathematical domain and it can resolve many complicated problems that are difficult or almost impossible to solve with the traditional trigonometry, and it can describe a huge number of multi form periodic signals. The most remarkable trigonometry branches are the "Elliptical trigonometry" and the "Rectangular trigonometry" introduced by the author and published by WSEAS.