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also known as **Savasorda**

(*fl*. in Barcelona before 1136)

mathematics, astronomy.

In Arabic he was known as Ṣāḥib al-Shurṭa, “Elder of the Royal Suite,” denoting some type of official position; this title later gave rise to the commonly used Latin name of Savasorda. He was also known as Abraham Judaeus. Savasorda’s most influential work by far is his Hebrew treatise on practical geomerty, the *Ḥibbūr ha-meshīḥah we-ha-tishboret*. Translated into Latin as *Liber embadorum* by Plato of Tivoli, the work holds an unusual position in the history of mathematics. It is the earliest exposition of Arab algebra written in Europe, and it contains the first complete solution in Europe of the quadratic equation, $x^2 - ax + b = 0$.

The year the *Ḥibbūr* was translated (1145) also saw the Robert of Chester translation of al-khwārizmī’s algebra and so may well be regarded as the birth year of European algebra. Thus the *Ḥibbūr* was among the earliest works to introduce Arab trigonometry into Europe, and it was also the earliest to treat of Euclid’s *Book of Divisions*. Leonardo Fibonacci was influenced by Savasorda and devoted an entire section of his *Practica geometriae* to division of figures. Savasorda made a novel contribution when he included the division of geometric figures in a practical treatise. thus effecting a synthesis of Greek theory with the pragmatic aspects of mathmatics.

Savasorda himself recommended Euclid, Theodosius of Bithynia, Menelaus, Autolycus, Apollonius of Perga, Eudemus of Rhodes, and Hero of Alexandria for study in geometry. He knew well alkhwārizmī and al-Karajī. Following Hero and not Euclid he did not accept the Pythagorean figurate numbers in his explanation of plane and square numbers. In general, Savasorda preferred those definitions and explanations that may be aligned more easily and closely with reality.

To understand this approach, it is necessary to go back to the earliest known Hebrew geometry, the *Mishnat ha-Middot* (*ca*. a.d. 150). This work may be considered as a link in the chain of transmission of mathematics between Palestine and the early medieval Arab civilization. The Arab mathematicians al-khwārizmī and al-Karajī, and later Savasorda, followed the methodological lines of this old *Mishna*. Savasorda himself provided a new cross-cultural bridge a thousand years after the *Mishna*. In his *Encyclopedia* there is the same teaching of both theory and practice, including not only the art of practical reckoning and business arithmetic but also the theory of numbers and geometric definition. This book is probably the earliest algorismic work written in Western Europe, but knowledge of the work is not apparent in the arithmetical works of either Abraham ibn Ezra or Levi ben Gerson, although they may practice, the had a common origin.

In the history of decimal theory and practice, the two mainstreams of development in the Middle Ages came from the Jewish and Christian cultures. Savasorda, however, did not belong definitely to any one mathematical group. He spent most of his life in Barcelona, an area of both Arab and Christian learning, and was active in translating the masterpieces of Arab science,. In an apologetic epistle on astrology to Jchuda ben Barsillae al-Barceloni, he deplored the lack of knowledge of Arab science and language among the people of Provence. He wrote his own works in Hebrew, but he helped translate the following works into Latin; al-ʿImrānī’s *De horarum electionibus* (1133–1134), al-Khayyāt’s *De nativitatibus* (1136), and Almansori’s *Judicia seu propositiones*,...(1136). Savaasorda may have worked on translations of the *Quadriparitum* of Ptolemy, the Spherics of Theodosius, the *De motu stellarum* of al-Battānī, and others, with Plato of Tivoli. It is also possible that he worked with Rudolf of Bruges on the *De astrolabia*

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