Published in *Leonardo,* Journal of the International Society For the Arts Sciences and Technology. Vol.17, Number 4, 1984. Vladimir Tamari was Leonardo's International Co-Editor (Middle East).

The Genius of Arab Civilization, 2nd Ed. J. R. Hayes, ed. MIT Press, Cambridge, Mass., 1983. 260 pp., illus. Paper. ISBN: 0-262-58063-2.

The subtitle of this collection of scholarly essays is "Source of Renaissance". Between the seventh and thirteenth centuries there flourished a vast world state, united under the banner of Islam and using the Arabic language. The civilization that emerged from this period possessed intellectual and scientific achievements that anticipated by centuries, and influenced, later developments in Europe.

The Genius of Arab Civilization describes how the small tribe into which the prophet Mohammed was born provided the inspiration and political vision and the supple expressiveness of the Arabic language to create a new world out of the older Greek, Roman and Persian civilizations. Most surviving works of Greek philosophers were translated into Arabic in such centers as Dar Al-Hikma (House of Wisdom—mid-ninth century, Baghdad), and many of these works found their way to Latin Europe via the Arabs. But this is far from the whole story. The fourteen contributors to this book show the unique Arab synthesis of older sources (including the Indian and Chinese) in such fields as philosophy, medicine, physics and poetry.

For example, the greatest optical scientist of the centuries between the ancient Greeks and the Renaissance was al-Hassan bin al-Haytham (d.1040) who rejected Plato's theory that occular beams emitted from the observer's own eye made vision possible. Al-Haytham (known in the West as Alhazen) firmly established the experimental method and, using the *camera obscura,* demonstrated how a distant large object emits light that enters the tiny pupil of the eye. His work on optics, *Kitab al-Manazir,* was printed in Latin in Basle as late as 1572. One modern writer laments the "patriotic chauvinism" and prejudice that has fostered the notion that optics came to the West directly from the Greeks, disregarding the role of the Arabs [1].

Achievements as varied as the discovery of the circulation of the blood, decimal fractions, the treatment of smallpox, travel to China, and even Dante's *Divine Comedy* all have Arab prototypes. We still use words of Arab origin reflecting those achievements: algebra, algorithm, zero, alkali, alcohol, alizarin, soap, check, admiral. Even the word lens, which is derived from the name of the lentil bean it resembles, reflects the older Arabic usage, *adasa.*

The modern concept of "good functional design" owes a lot to this period. The average Arab sought to surround himself with beautifully made objects placed in well-designed structures, and the high standard of living allowed the invention of what we might today call high-tech toys. Badi' az-Zaman al-Jazari (twelfth to thirteenth centuries) compiled and beautifully illustrated *The Book of Ingenious Mechanical Devices,* full of water clocks, fountains, automata, and the like[2]. One device was of the "foremost importance in the development of the steam engine and pumping machinery." It was a two-piston reciprocating pump in which circular motion was converted to linear motion. Another device employed a conical floating valve, one of the earliest examples of a closed-loop feedback control system, a startlingly modern concept. Conical valves were first mentioned in the West by da Vinci, and it is speculated that the Renaissance master could have had access to Latin versions of al-Jazari's book.

In one of the specialized essays that focus on particular persons or events, R. B. Winder wryly comments that "if al-Jazari, like Leonardo, had devoted some of his genius to the construction of machines of war, his name would be well remembered in the West today" (p. 216). This remark is unfair to Leonardo. The Arab civilization survived despite the conflict and war that are all too common in any age. The Arabs had their own share of eccentric professors, fickle rulers, and all-too-human dreamers. Consider al-Jahiz, a scholar whose name means "popeye", who perished when a bookshelf toppled over him. Hunayn ibn Ishaq, the renowned physician, went to prison rather than comply with his prince's request to provide him with poison. Or consider al-Haytham himself, who spent his old age in disgrace for his failed plan to regulate the flow of the Nile and made his living copying works by Euclid.

Still, those centuries differed from our world in important ways. A bedrock of faith allowed the Arab to believe in a good universe created by Allah, in which people felt at home. This world view allowed amazingly confident flights of imagination within a holistic approach to nature and society. Intuition, followed by refinement of perception and concept, characterized the spirit of the times, unlike the tight hypotheses in need of proof that often lead to aridity and inhibition and color so much of our own world today.

1. D. J. Lovell, "Optical Anecdotes", SPIE, Box. 10 Bellingham, Washington.
2. D. Hill, *The Book of Knowledge of Ingenious and Mechanical Devices* (Boston: Dordrecht, 1974).

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