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Ceredi's Pump

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Ceredi's Pump

Ingenieurwesen und Philosophie sind getrennte Wissenschaften – sollte man meinen. Doch das Beispiel der Neuerfindung der Archimedischen Schraube zeigt, dass die Philosophie sehr wohl einen Einfluss auf die Technik haben kann.

The common mythology says that engineering and philosophy are separate disciplines. To believe that, we have to close our eyes to the way machines shape themselves to our outlook. The truth is, technology and philosophy each *bend* to fit one another.

Here's an example: Archimedes *invented* a really clever pump in the third century BC. It's been used all over the world ever since. It looks like a *tube coiled* around a long axle. You *tilt* the axle and put its lower end in water. Then you turn it. The open end of the tube picks up water and, as the coil turns, water passes from one *loop* to the next until it comes out at the upper end.

It's a very *subtle gadget*. It's not, as one author put it, something that would be created spontaneously by *peasants*. Archimedean pumps were widespread in the Classical world. Roman authors described them. Well, they tried to. We've just seen that they are not easy to describe.

Archimedes' pump did poorly in the High Middle Ages. Europeans had just rediscovered Aristotle and had strongly *bought into* his science. Aristotle clearly separated motion into two kinds – straight line motion and *rotary* motion. An Archimedean pump used rotation to move water upward along an axis. Because it mixed the straight-line and rotary motion, it made engineers of the late Middle Ages and early Renaissance very uncomfortable.

By 1565 those pumps were so little known in Europe that an *agricultural* engineer named Giuseppe Ceredi received a patent for one. Ceredi systematically described the installation of *arrays* of these pumps for both *irrigation* and *drainage*. Naturally we wonder how he could get a patent for a device that was known in books.

But then we compare Ceredi's dimensioned drawings, flow calculations, and economic analysis with the almost unreadable Roman descriptions. Ceredi may or may not have found the idea in the old literature. But, whether he did or not, he had to do a great deal on his own to make it work.

Ceredi clearly had a right-brain ability to visualize, coupled with a left-brain ability to

	deep-rooted
	*see list
	fight
	*see list
curved	
designed	
	*see list
	omen
pipe winded ... tip	
	pretence
spiral	
clever mechanism	
farmers	
believed	
turning	
farm	
collections ... watering	
dewatering	

execute and organize detail. That's what it took for him to overcome a philosophically *ingrained* resistance to an idea. After Ceredi, these pumps quickly gained acceptance across southern Europe. He'd broken the *straitjacket* of an old way of thinking.

A few years later, Galileo took up full-scale *combat* with Aristotelian ideas of motion. When Galileo wrote his theory of the *pendulum*, for example, he first had to break with old ideas about falling. Aristotle would've said that the weight on a pendulum was simply an object experiencing great difficulty in falling.

So Ceredi's *reinvention* of Archimedes' pump was, in fact, a *harbinger* – so much more than mere means to a practical end. It really was a *stalking-horse* for a major philosophical revolution. ■

Prof. Dr. John Lienhard, University of Houston

<i>agricultural</i>	landwirtschaftlich
<i>array</i>	Anordnung, Reihe
<i>bend, to</i>	biegen, falten
<i>buy into, to (bought, bought)</i>	Glauben schenken
<i>coil, to</i>	aufwickeln, winden
<i>combat</i>	Kampf, Gefecht
<i>drainage</i>	Entwässerung
<i>gadget</i>	Apparatur, Gerät
<i>harbinger</i>	Omen, Vorbote
<i>ingrained</i>	tief verwurzelt
<i>invent, to</i>	erfinden, ausdenken
<i>irrigation</i>	Bewässerung
<i>loop</i>	Schlaufe, Schleife
<i>peasant</i>	Bauer
<i>pendulum</i>	Pendel
<i>reinvention</i>	Neuerfindung
<i>rotary</i>	Dreh-, rotierend
<i>stalking-horse</i>	Vorwand
<i>straitjacket</i>	Zwangsjacke
<i>subtle</i>	raffiniert, scharfsinnig
<i>tilt, to</i>	kippen, neigen
<i>tube</i>	Röhre, Schlauch

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