



Edoardo Zanon listens as Youngmoo Kim works the keyboard of Leonardo da Vinci's harpsichord-viola.

Dazzled by da Vinci

Designs the Italian genius drew but never built come to life in a new Franklin Institute exhibit.

By Tom Avril
INQUIRER STAFF WRITER

The intricate designs on faded paper are the work of history's most celebrated Renaissance man, depicting flying machines, mechanical animals, artillery, and an odd musical instrument you'd never see in the Kimmel Center.

Leonardo da Vinci did not actually build most of these marvels. Yet, five centuries later, a team of Italian scholars has managed to do so, taking the wooden creations to the Franklin Institute for an exhibit that opened Saturday.

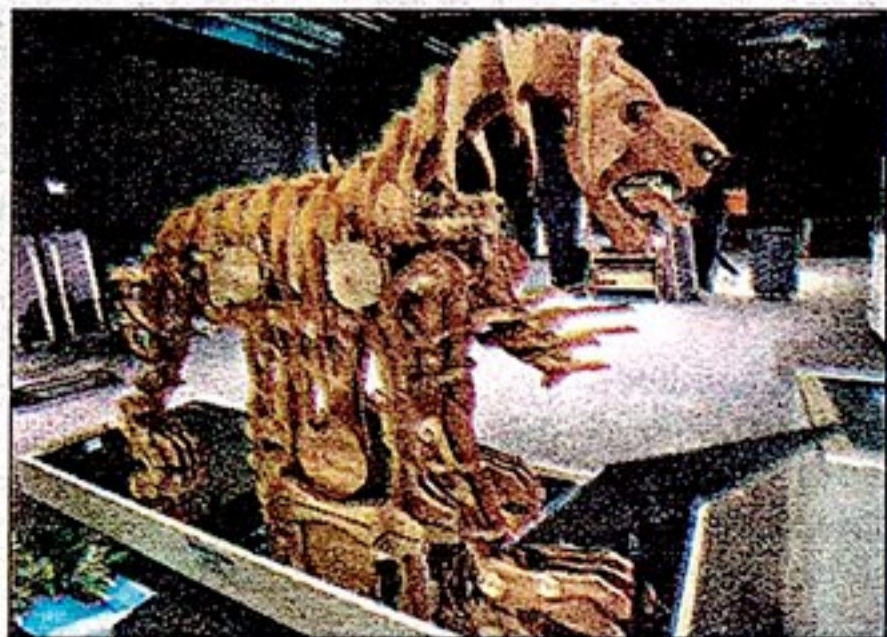
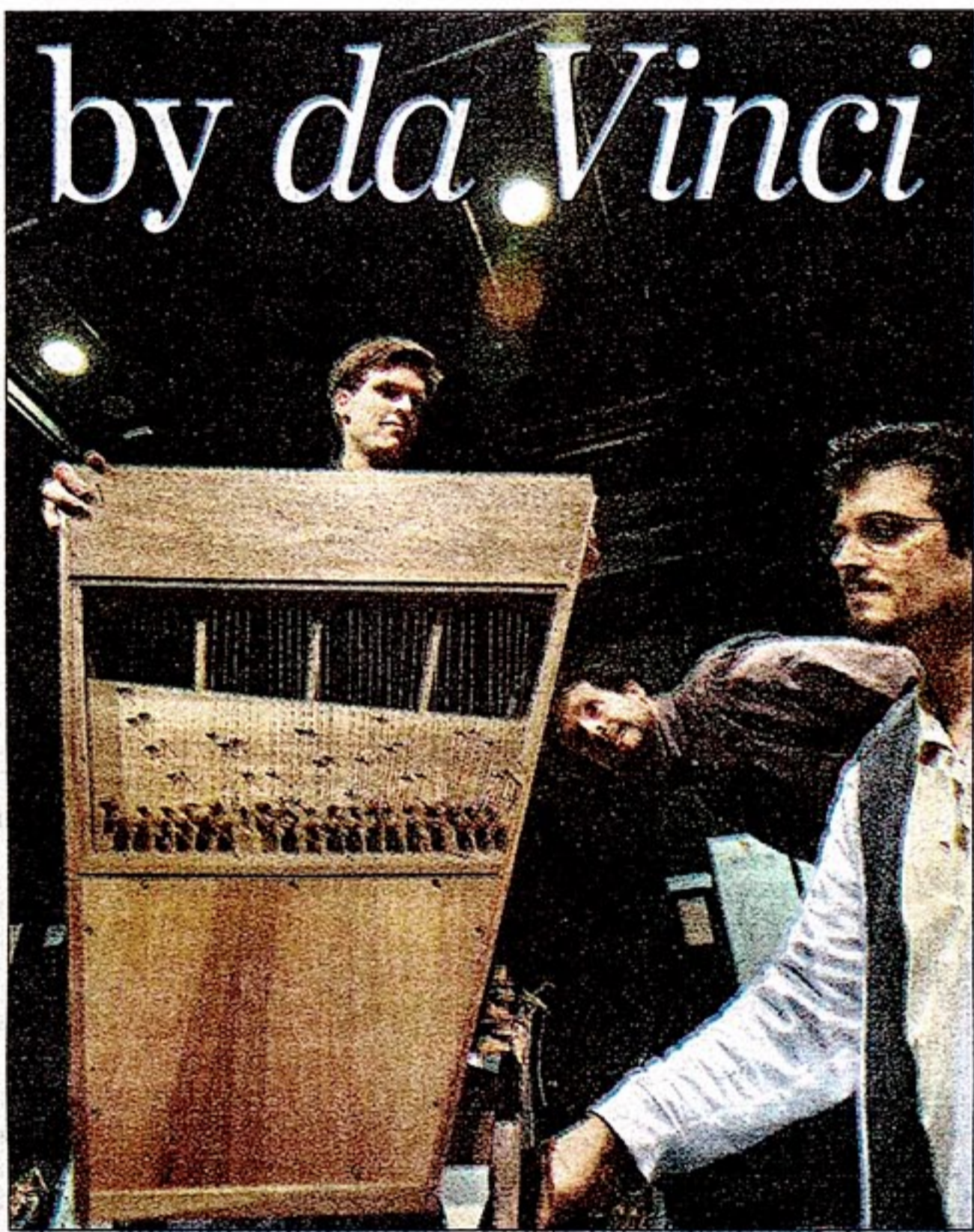
To see a video of the testing of the harpsichord-viola, go to www.philly.com/davinci

Both are engineers at Drexel University and classically trained musicians. Their main object of interest was Leonardo's harpsichord-viola, a wild hybrid of an instrument that is played while walking — deriving its power from the motion of the musician's leg.

"This is amazing," said Youngmoo Kim, an assistant professor of electrical and computer engineering and a trained vocalist.

"It's fascinating to actually see it built in person," said colleague Andrew McPherson, a music composer and post-doctoral researcher in engineering.

A painter, inventor, sculptor, and musician — See **DA VINCI** on B6



Andrew McPherson tries out the harpsichord-viola under the tutelage of Zanon (center) and Mario Taddei at the Franklin Institute.

A mechanical lion is one of Leonardo's ideas recently made real.

The great kite is one of Leonardo's proposed flying machines.

Staff photographs by Sharon Gekoski-Kimmel

Building to da Vinci's code

DA VINCI from B1
cian, Leonardo still inspires such reactions nearly 500 years after his death. He immersed himself in the study of everything from architecture to anatomy, equally at home designing churches and dissecting bodies.

Among his devotees are the three men behind the exhibit, Massimiliano Lisa, Mario Taddei, and Edoardo Zanon. They created a Milanese company, Leonardo3, to research their famed countryman and market the fruits of their work through exhibits, books, and multimedia.

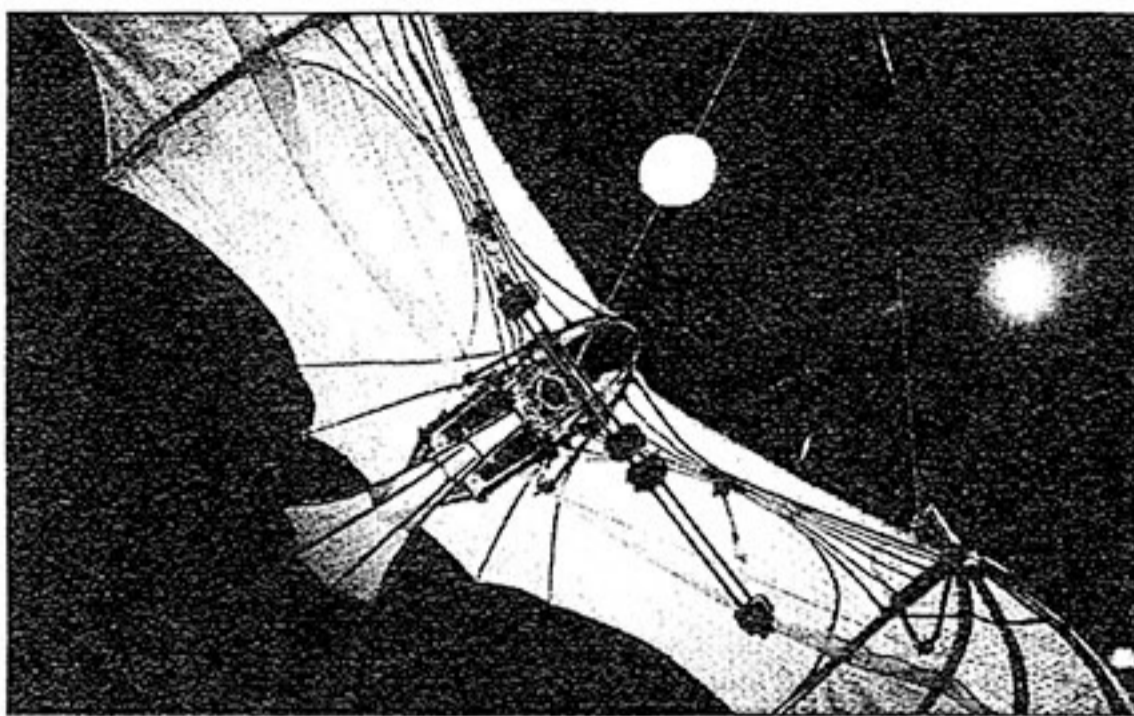
Taddei and Zanon, who studied industrial design, engaged the Drexel visitors last week in a spirited conversation that darted between the realms of engineering and music. They took apart and examined the harpsichord-violin, which has a handcrafted wooden keyboard on top and a row of strings inside, and they discussed the forces and tensions involved.

"It is very difficult to make an instrument like this in the time of Leonardo," Zanon said. "Also in this time."

That's partly because of its intricacy, and because a portion of Leonardo's design has been lost.

So the Italian scholars had to make a few educated guesses.

Kim, whose work at Drexel includes robotics and the en-



SHARON GEKOSKI-KIMMEL / Staff Photographer

A mechanical bat is one of the models built from Leonardo da Vinci's designs and on display at the Franklin Institute.

hancement of music appreciation through digital technology, was appreciative.

"It's phenomenal that you were able to build this from this design," Kim said. "I'm blown away."

Though visitors will not be allowed to operate the models — which include a mechanical bat, a great kite, a multicannon gunship, and a self-propelled cart — Kim and McPherson were permitted to have a brief jam session on the harpsichord-violin.

Unlike a regular stringed instrument, on which a musician brings the bow back and forth, Leonardo's contraption has a circular "bow" — a loop of fabric that travels continuously in one direction when the musician is walking.

When a key is pressed, the corresponding string is

pushed forward so that it touches the moving bow. The musician can play several notes at a time, the sound lasting as long as each key is held down.

The idea was to marry the advantages of two kinds of instruments — one that can play multiple notes at a time, and one on which the notes can be "shaped," as with a viola or violin.

"We have 500 years' or more hindsight to examine this instrument, but it's amazing how much he got right," Kim said.

McPherson, who has invented his own hybrid instrument — an electronically augmented acoustic piano — smiled as he worked his leg back and forth. The internal mechanism was a little noisy, but he managed a series of clear notes and chords.

"It's such a cool idea," McPherson said. "I feel like if I had a lot of practice, I could get some interesting articulations and shapes by how I moved my leg."

In addition to the wooden models, the exhibit includes numerous touchscreen displays featuring sophisticated animations of the models as well as reproductions of Leonardo's manuscripts.

Two other intriguing exhibits have come to city science museums to ease the woes of winter.

Saturday, the same day the Leonardo show opened, was the opening of "Secrets of the Silk Road" at the University of Pennsylvania Museum of Archaeology and Anthropol-

The Exhibit

"Leonardo da Vinci's Workshop" is at the Franklin Institute through May 22. Hours are 9:30 a.m. to 5 p.m. Sunday through Thursday and 9:30 a.m. to 8:30 p.m. Friday and Saturday.

Daytime tickets, which include general admission to the institute, range from \$17.50 to \$24.50. After 5 p.m. Friday and Saturday, tickets are \$10 for adults and \$6 for youths, and do not include general admission. A limited number of free tickets and discounts are available to institute members.

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On Jan. 29, "Bizarre Beasts Past and Present" opened at the Academy of Natural Sciences, featuring lifelike models of such bygone creatures as a shovel-tooth elephant and a shark with a circular, sawlike array of teeth.

It's an exhibit that Leonardo might have liked.

Taddei, scientific director of the Leonardo exhibit, recalled how the painter-inventor was a master of observation, learning much about how the world works by spending time outdoors. Taddei said he wished people today could do the same but that the distractions of the 21st century got in the way.

"There is, how do you say, too much information," Taddei said. "We are not able to find the beautiful ways that Leonardo found to study nature."

Nevertheless, he said, Leonardo's ideas were accessible to anyone.

"Leonardo, of course, is a genius," Taddei said. But "it's not so big you cannot reach it."

Now, if only he had invented a device to remove snow.

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