By Jonathan Briggs

Pipettes reflect two generations of design innovation

The iMac of pipettes subtracts pain and adds style to the job

The world is full of irksome products that don't always do what they're supposed to. For example, why is it so hard to find a VCR that can be programmed to record by the average human, and why does pipetting have to be painful?

We may have to wait a while for that VCR, but the painless pipette is here. But why has a well-designed pipette been so hard to find?

Emil Scordato, an engineer who designed and developed products from pipettes to coagulation analyzers for more than 50 years is eminently qualified to answer that question. "Often engineers and designers go too far," Scordato said. "They take something manual and put a motor on it — like an electric fork to twirl your pasta. Until recently, with the advent of ergonomics, they ignored how the product fits the body. Users were supposed to fit themselves to the product."

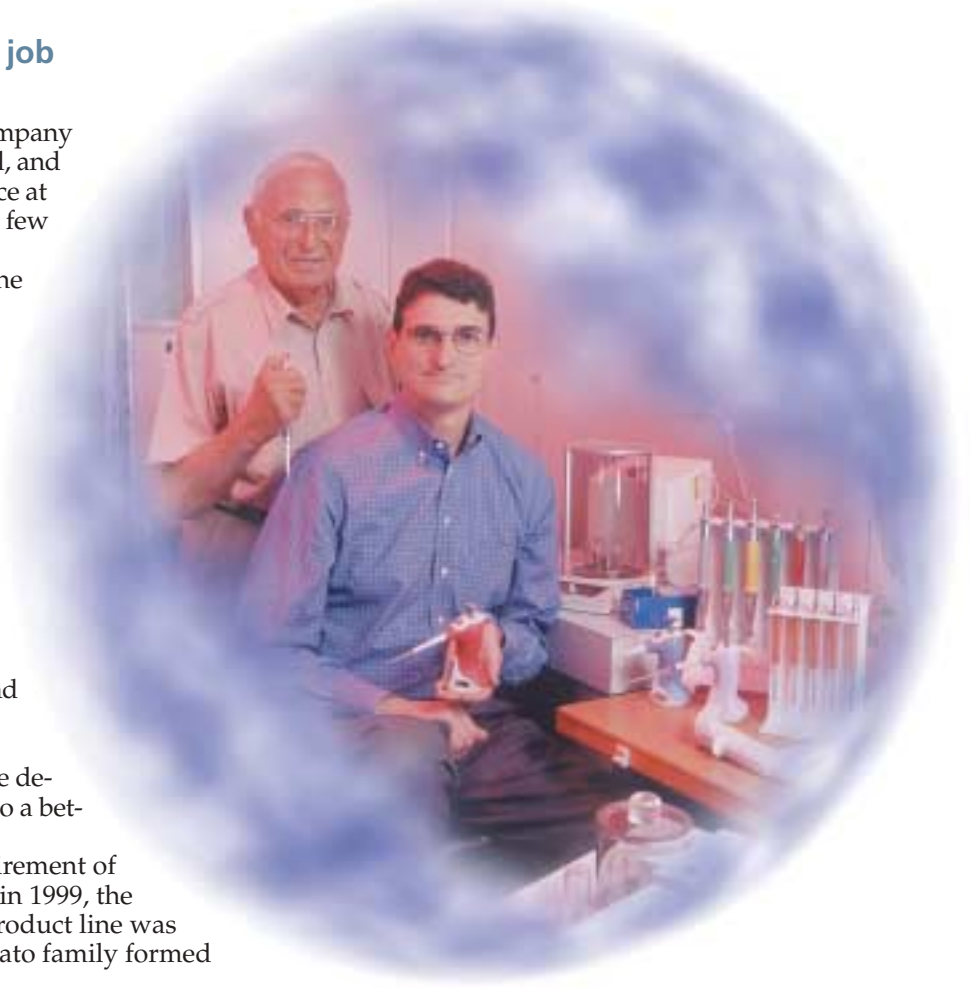
As the founder of Medical Laboratory Automation in Pleasantville, N.Y., Scordato helped develop some of the most successful automated laboratory analyzers on the market. For example, he was part of the team that developed the first photo-optical coagulation analyzer, Electra 500, which came out in the late 1960s.

He also was instrumental in improving the pipette that technicians used in conjunction with the Electra. He based his improvements on how pipettes were actually used rather than on features that engineers wanted to show off. These innovations included metal for durability, color coding the sorting of tips in racks and mechanical de-tippers. Notice — no motors.

"Automation is supposed to save work. That's why we put the tips in a rack and color-coded them. That way technicians wouldn't have to reach into a bag and search for the right one. We added the de-tipper to make it possible to use the pipette with just one hand and reduce the risk of contamination," Scordato said.

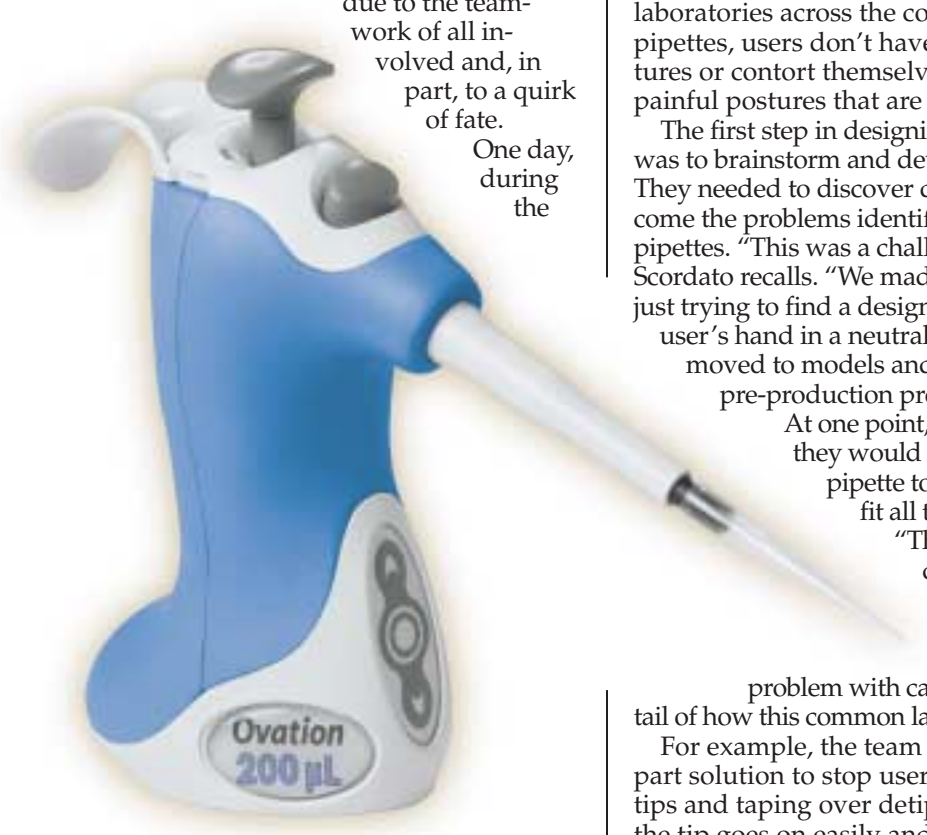
In the 1980s, Emil's son, Richard Scordato, also an engineer, joined his father at MLA to help develop the Electra 700 coagulation analyzer. The popular device offered many breakthrough features. Its success was due to the teamwork of all involved and, in part, to a quirk of fate.

One day, during the design process, a company technician became ill, and Richard took his place at the hospital lab for a few days. This allowed Richard to observe the lab routine and watch how work was accomplished. "I got to wear the shoes of the user," said Richard. He and his MLA colleagues then translated his observations into the design of the 700. The result was a faster analyzer that was more reliable and easier to use. Taking time to examine the process as well as the desired end result led to a better solution.



Father and son engineers, Emil and Richard Scordato, designed the Ovation BioNatural Pipette to work with rather than against human anatomy.

Following the retirement of the senior Scordato in 1999, the MLA coagulation product line was divested. The Scordato family formed VistaLab Technologies, Inc., a privately-held company in Pleasantville, N.Y., focused on developing liquid handling devices. One of Richard's first projects was to look again at ways to improve pipettes. Using a cross-disciplinary approach that included the help of international design firm Frog Design and Ergonomic Technologies of New York City, Richard and his experts set out to develop a better pipette. The result is a device that could well become the laboratory equivalent of a carpenter's best hammer or a chef's best knife.



The Ovation BioNatural Pipette

Ovation BioNatural Pipette

Called the "Ovation BioNatural Pipette," VistaLab's newest invention is designed to be accurate, safe and comfortable. The pipette was recently introduced to clinical and biotechnology laboratories across the country. With these pipettes, users don't have to circumvent features or contort themselves into unnatural, painful postures that are potentially harmful.

The first step in designing the perfect pipette was to brainstorm and develop an initial design. They needed to discover design solutions to overcome the problems identified with standard pipettes. "This was a challenge," the younger Scordato recalls. "We made dozens of sketches just trying to find a design that would put the user's hand in a neutral position. Then we moved to models and then to high-quality pre-production prototype models."

At one point, the team realized that they would need 35 versions of the pipette to have hooks that would fit all the human hand sizes. "This led to the perfect compromise — an adjustable hook," said Richard. Step-by-step, the team solved each problem with careful attention to the detail of how this common lab tool is actually used.

For example, the team came up with a two-part solution to stop users from pounding on tips and taping over detipping buttons. First, the tip goes on easily and makes an audible "click" when in place. The click lets users know it is on tight. Second, they added a spring-loaded mechanism to take tips off. Users can gently push the release with their thumb, and the stored energy in the spring pops the tip off.

Prototype tested in lab

After extensive research, redesigns and consultation with working laboratorians, a final prototype was ready for testing. To see just how well they had solved the pipette problems, Richard and his team compared their prototype against several standard pipettes. While experienced laboratorians performed typical tasks such as tipping, aspirating, dispensing and detipping, the team measured the pipettors with electromyography, which showed the force exerted by users' muscles, and electrononiometry, which looked at wrist and shoulder postures, joint flexion/extension and arm bone angle deviations.

The careful observation, research, and extensive design iterations paid off. The tests showed that ergonomic stress levels associated with the use of the prototype pipette were significantly reduced compared to those with traditional, axial-design devices. Improvements in upper extremity postures reduced the effort required to use the Ovation pipette, and the natural grip lowered wrist flexion and extension levels and reduced forearm rotation and wrist radial deviation. Finally, the effort required to depress the plunger and to tip and detip the pipette was reduced.

In addition to practical considerations such as ergonomics and functionality, this is one good-looking pipette. In fact, laboratorians are not the only ones to appreciate the effort that went into the design. The Industrial Designers Society of America recognized the pipettes with their 2001 Gold award.

"The prototypes we took into labs were all beige, and often there was no reaction," Richard said. "But once people saw the finished product and the colors that Frog design picked, they would stop what they were doing and pick up the pipettes. Often the response was, 'Oh, yeah,' or 'I love it.' That was very rewarding." CLP

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