

2019 *Microscopy Today* Micrograph Awards

The inaugural *Microscopy Today* Micrograph Awards competition was a great success. The premise of the competition was that scientific micrographs can be interesting in their own right as images with visual impact. Submissions to the competition came from 24 US states and 16 other countries. The 25 finalist images were shown on the cover of the July issue. In this article we show the first, second, and third prize winners in each category: **Published category**, for micrographs published in the previous year; **Open category**, for unpublished micrographs; and **Video category**, for clips of movies taken through a microscope and animations of reconstructed images. The winner of the People's Choice Award is shown on the cover of this issue. Finalists and prize winners were selected by senior editors and our Celebrity Judge; whereas, the People's Choice Award was selected via public voting at the competition gallery on the MSA website.

Our Celebrity Judge this year was David Scharf. Scharf is a world-renowned photographer who employs the scanning electron microscope (SEM) as his camera. He pioneered techniques for capturing images of uncoated specimens of hydrated insects and flora in a high-vacuum SEM [1]. Some of

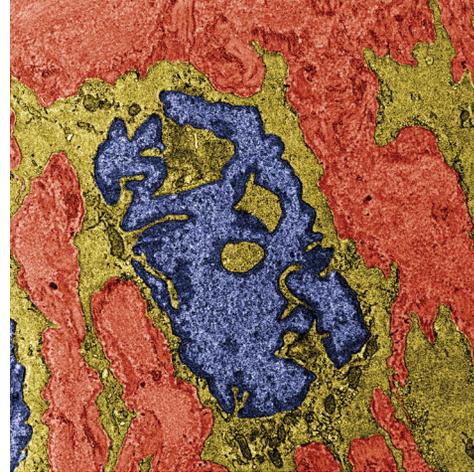
his earliest images were published in *Newsweek* in 1975, only ten years after the introduction of the commercial SEM [2]. In 1976 his images were displayed in a one-man show at the National Academy of Sciences in Washington, DC [3]. A year later he published a book of his micrographs titled *Magnifications: Photography with the Scanning Electron Microscope* [4]. Since then Scharf's micrographs have appeared in many publications including *Time*, *National Geographic*, *Smithsonian*, *Discover*, *Science*, *Nature*, and *The New York Times*. His movies of insects have even appeared in an IMAX production.

The *Microscopy Today* Micrograph Awards competition grew out of an idea by Robert and Camille Simmons. They suggested in 2017 that *Microscopy Today* sponsor a micrograph contest emphasizing both the scientific and artistic merit of micrographs. This concept was developed during 2018 into a set of guidelines for determining what constitutes a winning micrograph. In short, after the scientific relevance of an image has been established, the primary criterion for a winning image in our competition is visual impact—could the image stand on its own as a captivating object without requiring knowledge of the subject. In other words, would it look good on a living room or museum wall.

Published Category



Published 1st Prize. Copepod with epibiotic growth of microalgae living in symbiosis. Focus stacking in dark-field light microscopy using a thick water mount. Published in *Chiiz* photography magazine #17, 2018, 66–69. Image by Håkan Kvarnström, Bromma, Sweden.

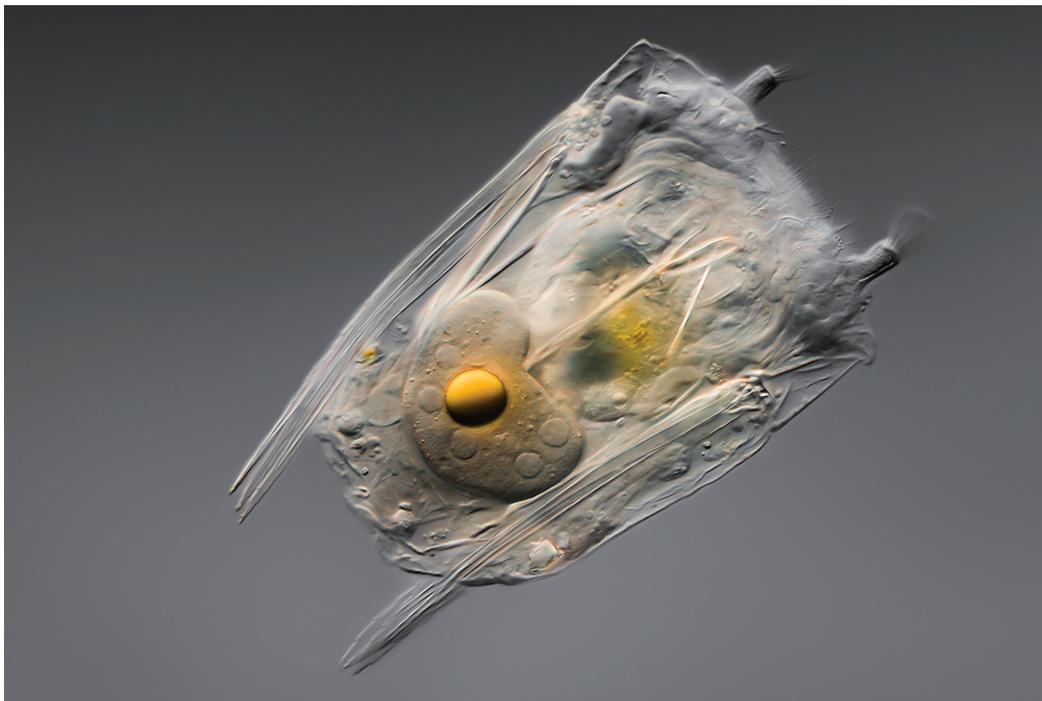


Published 2nd Prize. (left) *Artemia franciscana* (brine shrimp) at 35 days of growth. Specimen taken from a school lab experiment. Dark-field light microscopy. Published in *Microscopy Today* 26(4) 2018, 12–17. Image by Timm Piper, Laboratory for Applied Microscopy Research, Embrach, Switzerland. **Published 3rd Prize.** (right) False-colored transmission electron micrograph of an aortic smooth muscle cell from a mouse with progeria. Progeria is a rare genetic disorder caused by a mutation that results in the production of a mutant form of prelamin A called progerin. This results in nuclear envelopes that are unstable and susceptible to mechanical stress. The nucleus (shown in blue) is severely deformed with large invaginations and tubules throughout. Cytoplasm is colored yellow; extracellular matrix is red. Published on the cover of *Science Translational Medicine*, 10 (Sept 26) 2018. Image by Thomas Weston, University of California Los Angeles, Los Angeles, CA.

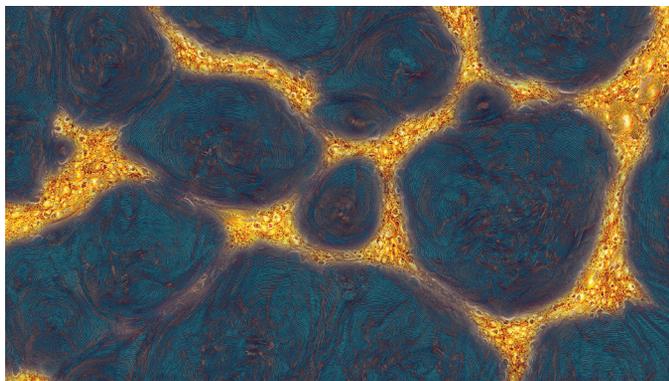
Another goal for our competition is to honor images that may not be eligible or competitive in other micrograph contests. First, all types of micrographs are welcome in this competition, whether they were acquired with a light microscope, electron microscope, scanning probe microscope, or some other microanalytical instrument. Second, some worthy micrographs are published in journals or magazines without a thought of entering them in a competition. By honoring

such images in a separate category, we hope to encourage microscopists to think more about composition and visual impact in experiment planning and during image acquisition. Third, the understanding of mechanisms and processes often requires dynamic imaging acquired with *in situ* microscopes of all types. Also, digital animations of reconstructed three-dimensional datasets, for example from cryo-electron microscopy, are providing new insights into cellular and even

Open Category



Open 1st Prize. Rotifer *Polyarthra* sp. (150 μm long) showing heart-shaped ovary with nuclei and yolk. Focus stacking with light microscopy in differential interference contrast (DIC). Image by Håkan Kvarnström, Bromma, Sweden.



Open 2nd Prize. Solid electrolyte composed of two polymers for a lithium-metal battery. Polymers self-assembled into an ordered lamellar structure (blue). An added lithium salt increases the ionic conductivity but also causes structurally disordered regions (yellow). Scanning electron microscopy image acquired at 2 kV. Image by Alexander Mueller, National Center for Electron Microscopy, Berkeley, CA.



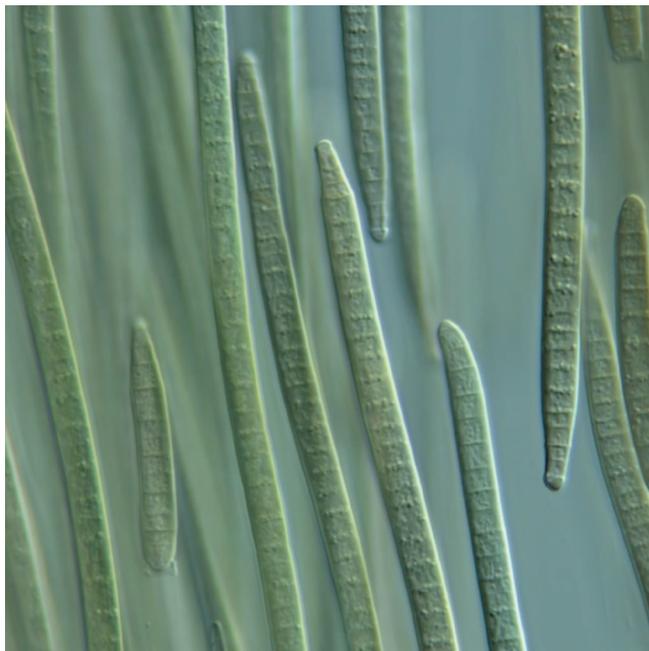
Open 3rd Prize. Head of wasp (*Vespa* sp.), from a genus of social wasps that are widely distributed in the Northern Hemisphere. Focus stacking in reflected visible light micrograph. Autofluorescence of eyes is evident when also illuminated with UV light. Image by Sergii Dymchenko, SDym Photography, Bellevue, WA.

molecular structures. These movie micrographs constitute our third category: video/streaming micrographs.

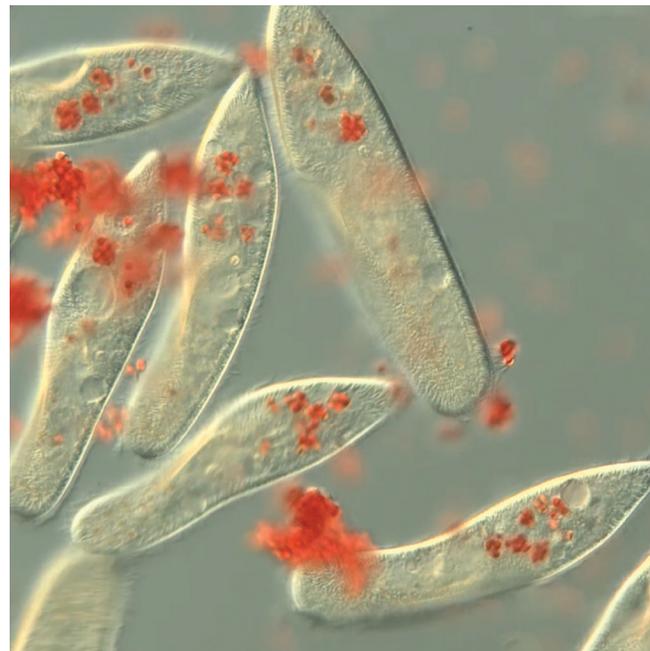
Another consideration in our competition is image quality from a technical standpoint. Image focus is important. With focus stacking software, light micrographs now can be in sharp focus over a considerable depth of field. Lack of image sharpness, and other image defects, is revealed when our judges view submitted images on high-resolution monitors. We request that submitted images have a high enough pixel density to be presented in an 11"×14" format suitable for hanging in an

exhibition. This is much easier today since the cost of high-pixel-resolution cameras has decreased dramatically over the last decade. An image with only a modest pixel density is not shut out of the competition, but a justification is required to allow the micrograph to be competitive. Nestor Zaluzec created and implemented a cloud-based submission website that not only allows large digital images to be uploaded, but also has convenient features to help judges compare and evaluate images.

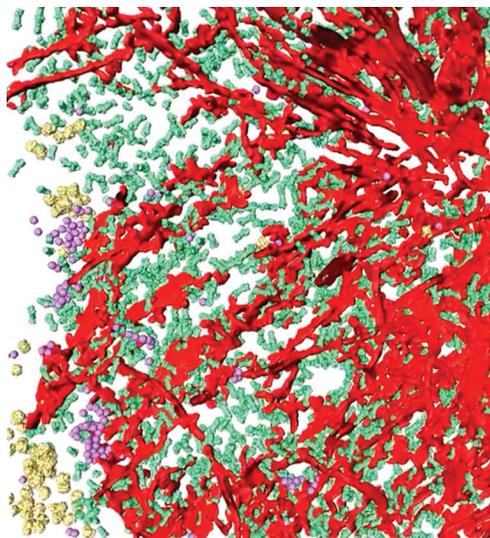
Video Category



Video 1st Prize. Still image of *Oscillatoria* sp. cyanobacteria filaments moving with respect to one another. Light microscopy filmed in time lapse with differential interference contrast (DIC). Image by Gerd Günther, Düsseldorf, Germany. The video is available at: <https://doi.org/10.1017/S1551929519000853>.



Video 2nd Prize. Still image of *Paramecium caudatum* ciliates, fed with Congo red stained yeast to show digestion within the unicellular animal. Light microscopy in differential interference contrast (DIC). Image by Gerd Günther, Düsseldorf, Germany. The video is available at: <https://doi.org/10.1017/S1551929519000853>.



Video 3rd Prize. Still image of tomographic volume and 3D rendering of the neuronal polyGA aggregate inside a cell. Poly-GA ribbons (red), 26S proteasomes (green), ribosomes (yellow), TRiC/CCT chaperonins (purple). Rat neurons were cultured on EM grids and thinned within a cryo-FIB. Tomographic tilt series acquired in a cryo-TEM. Image by Qiang Guo, Max Planck Institute of Biochemistry, Planegg, Germany. The video is available at: <https://doi.org/10.1017/S1551929519000853>.

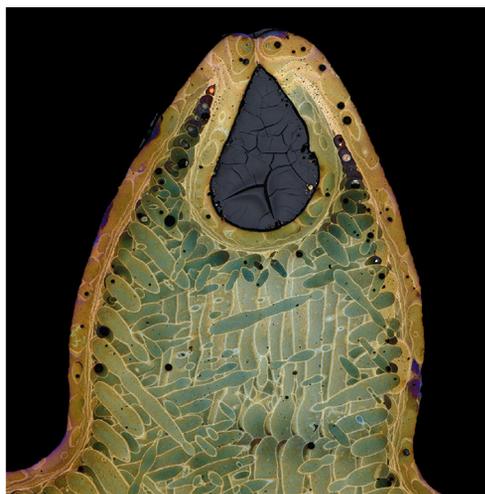


People's Choice Award. Carbon-free martensite, formed by casting a CoFeSi alloy into a copper mold. Several generations of martensite needles are clearly distinguishable, and the former austenite grains can be identified. Metallographic specimen etched with color etching agent V2A-Beize and imaged in reflected light microscope. Image by Felix Trauter, Materials Research Institute, Aalen University, Aalen, Germany.

These prizes were presented at a ceremony on August 7 during the 2019 M&M meeting in Portland, OR. The success of this first *Microscopy Today* Micrograph Awards competition is evident in the strong group of finalists and prize winners.

The editors of *Microscopy Today* thank the all entrants into this year's competition and welcome submissions to the next competition. The submission website will re-open on October 1, 2019, and close on February 21, 2020.

Special Honors



Special Award for Metallography. Gearwheel of AISi10Mg made by additive manufacturing (selective laser melting, laser bed fusion) (left). Cross section (right) shows microstructure with solidification structure and laser traces. Metallographic preparation, color etching with Murakami's reagent, bright-field light microscopy. Image by Gaby Ketzer-Raichle, Materials Research Institute, Aalen University, Aalen, Germany.

References

- [1] D Scharf, *Microscopy Today* 25(1) (2017) 12–15.
- [2] "Small Wonders of a Magic Eye – Images of D. Scharf," *Newsweek*, March 3, 1975, 52–53.

- [3] D Scharf, "A Closer Look," one-man exhibition at the National Academy of Sciences, November 17, 1975 to January 31, 1976.
- [4] D Scharf, *Magnifications: Photography with the Scanning Electron Microscope*, Schocken Books, New York, 1977.

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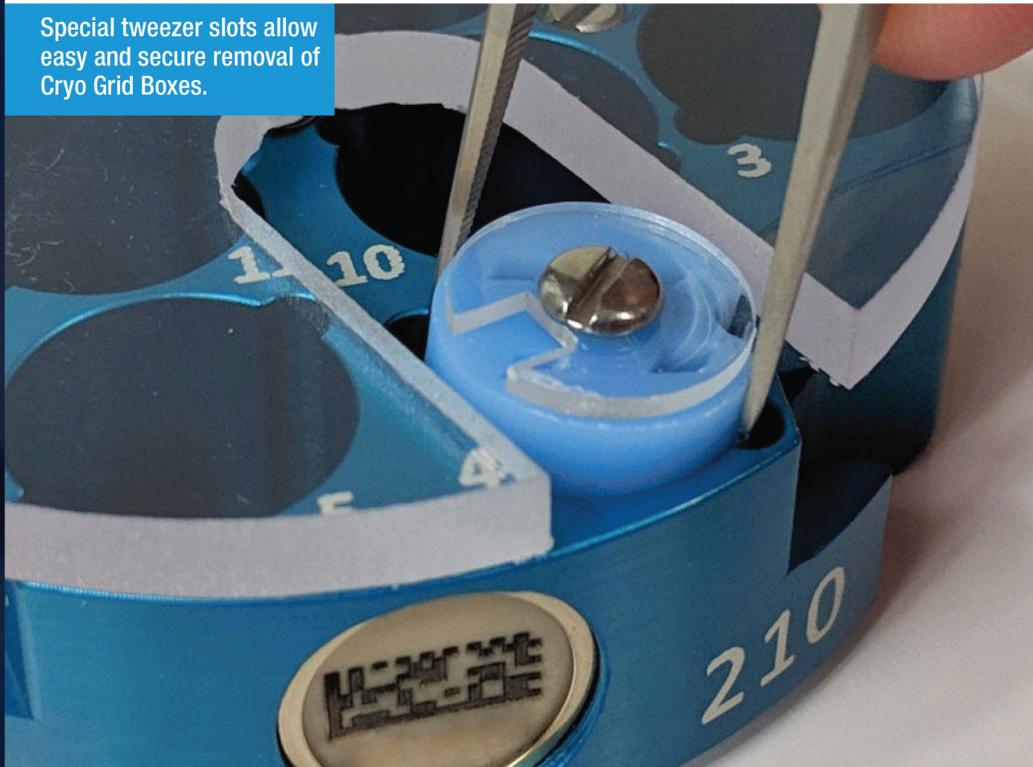
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