The Light FANTASTIC

Biological specimens yield extraordinary images in the hands of talented light microscopists

FROM THE EDITORS

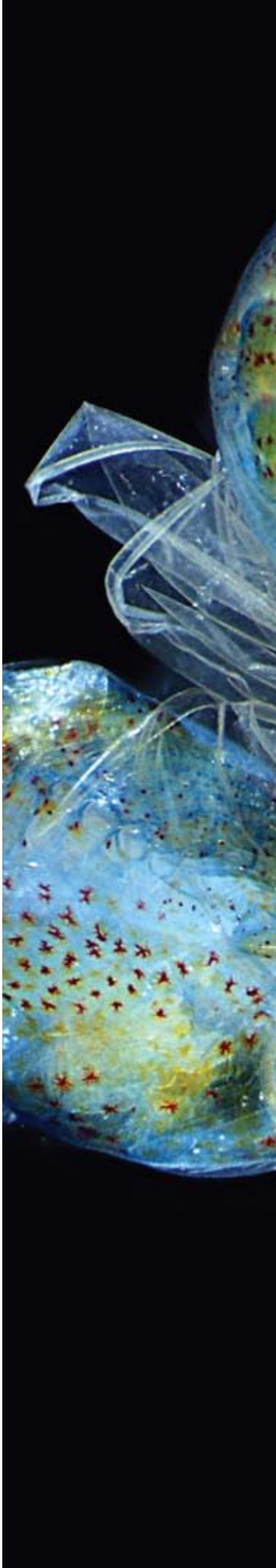
Beauty may be in the eye of the beholder, but it is also in the eye of a honeybee, the eggs of a lobster and the surface of petrified wood—as is evident from a selection of images entered in the 2008 Olympus BioScapes Digital Imaging Competition. In its fifth year, the competition honors superior images of living organisms or their components attained with the help of light microscopy.

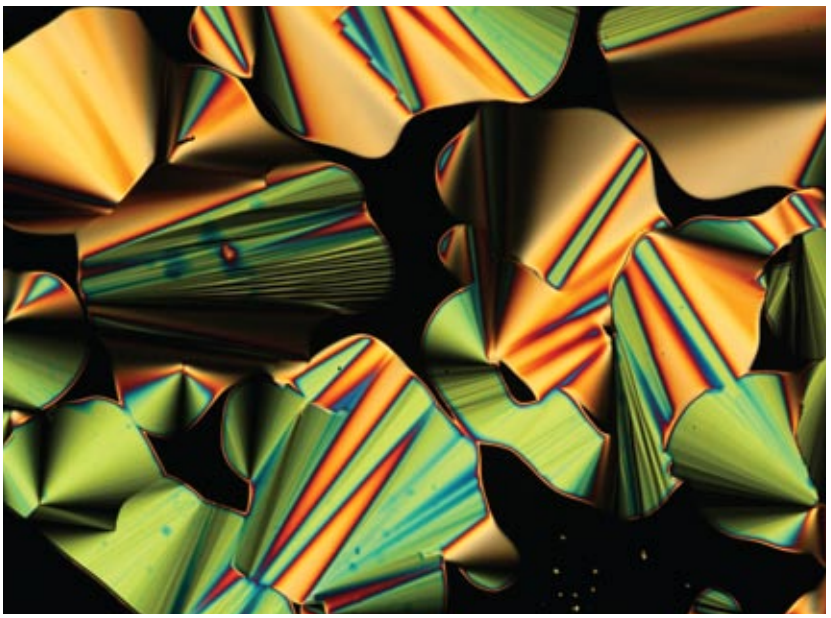
The judges chose 10 winners and awarded honorable mention to many others, evaluating entries based on the scientific value of the images, aesthetics and the difficulty of capturing the information displayed. This year, as in the past, competitors were free to bring out specific features through pseudo-coloring and other computer enhancements.

Here we share our own favorites among the winners and honorable mentions. To see more, visit our Web site at **www.SciAm.com/bioscapes2008**, where we welcome your comments.

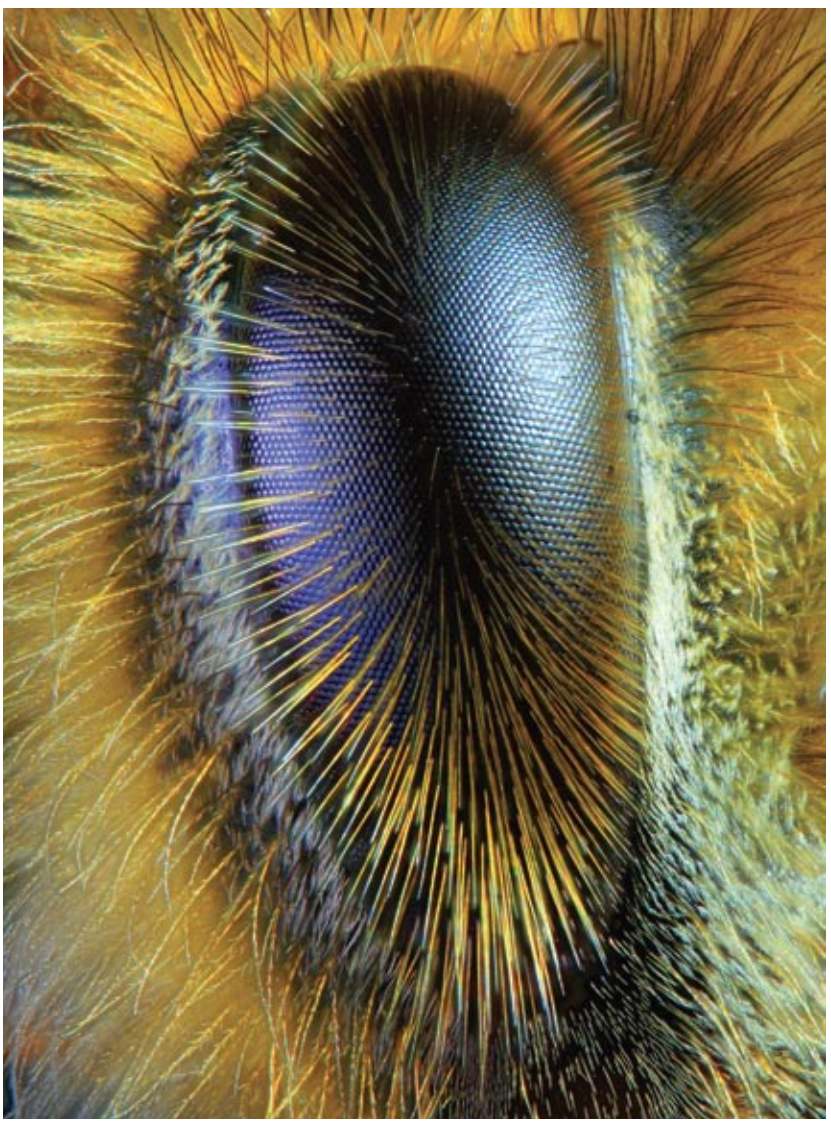
▶ LOBSTER EGGS, two to three millimeters in diameter, sit in goo that keeps them together in water. Tora Bardal of the Norwegian University of Science and Technology (NTNU) in Trondheim enhanced the natural colors with dark-field illumination. The round, bluish regions are eyes. Jan Ove Evjemo of NTNU examined the eggs as part of an effort to optimize breeding techniques for a shrinking lobster population.

◀ AQUATIC PARASITE *Trichodina pediculus,* imaged by Gerd A. Günther of Düsseldorf, Germany, is roughly 0.09 millimeter in diameter, not counting the cilia; it often colonizes hydra. The surface visible here latches onto a host through a central ring of toothlike "denticles."



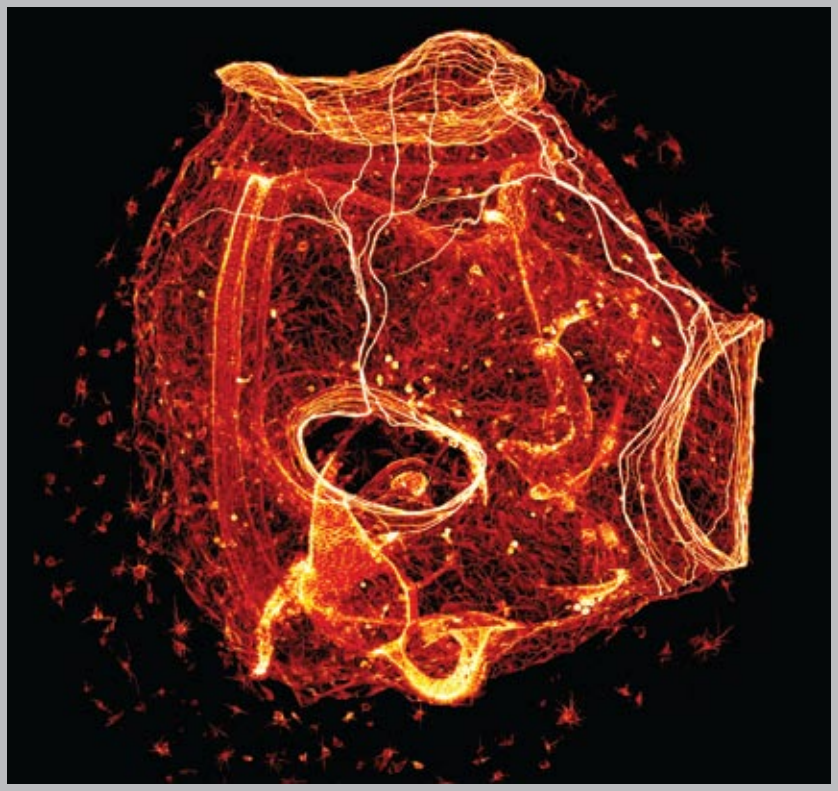


DNA IN WATER can do interesting tricks. Giuliano Zanchetta of the University of Milan in Italy put short single strands of DNA in solution. The sequences joined to form helices; they also stacked end to end with other nano helices and assembled into the liquid-crystalline aggregates captured here. The region shown measures 0.5 millimeter across.

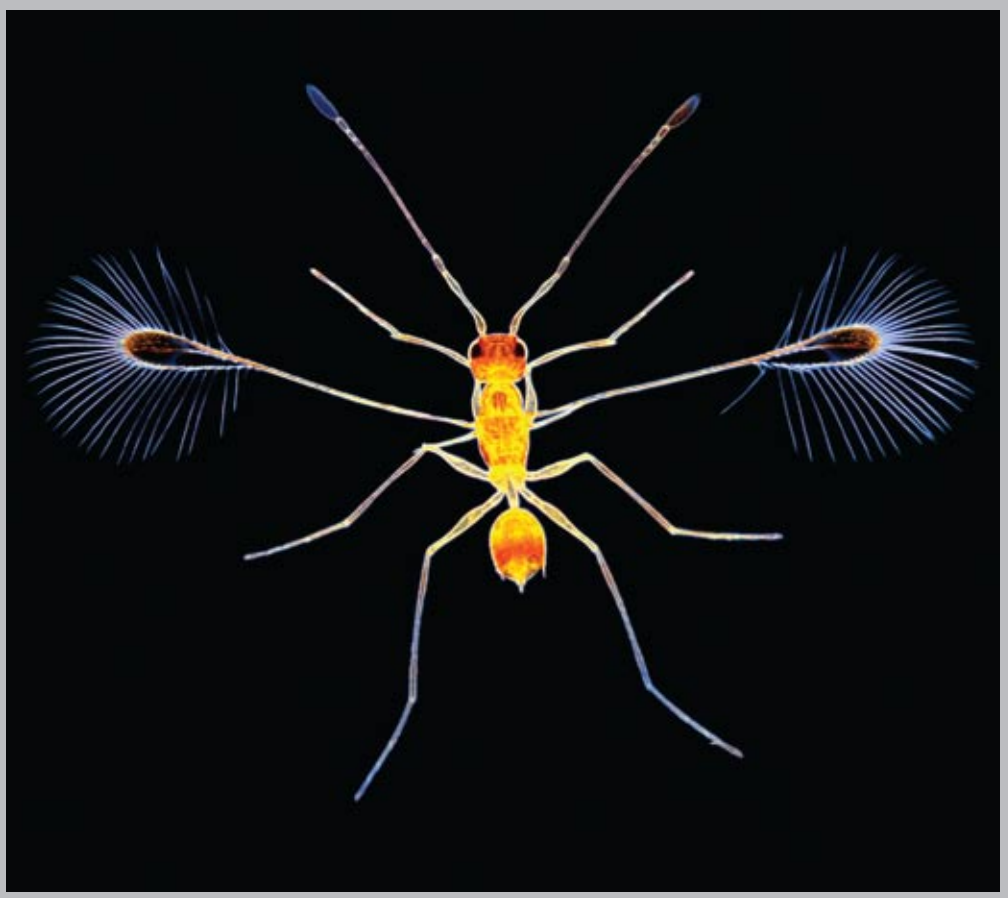


EYE OF A HONEYBEE is approximately five millimeters in diameter. Ralph Grimm of Jimboomba, Australia, combined several images from a digitally recorded stack to make a composite. Grimm relied only on reflected light and did not alter the colors or overall structure. The view, he notes, is "what you'd see if you were really small."

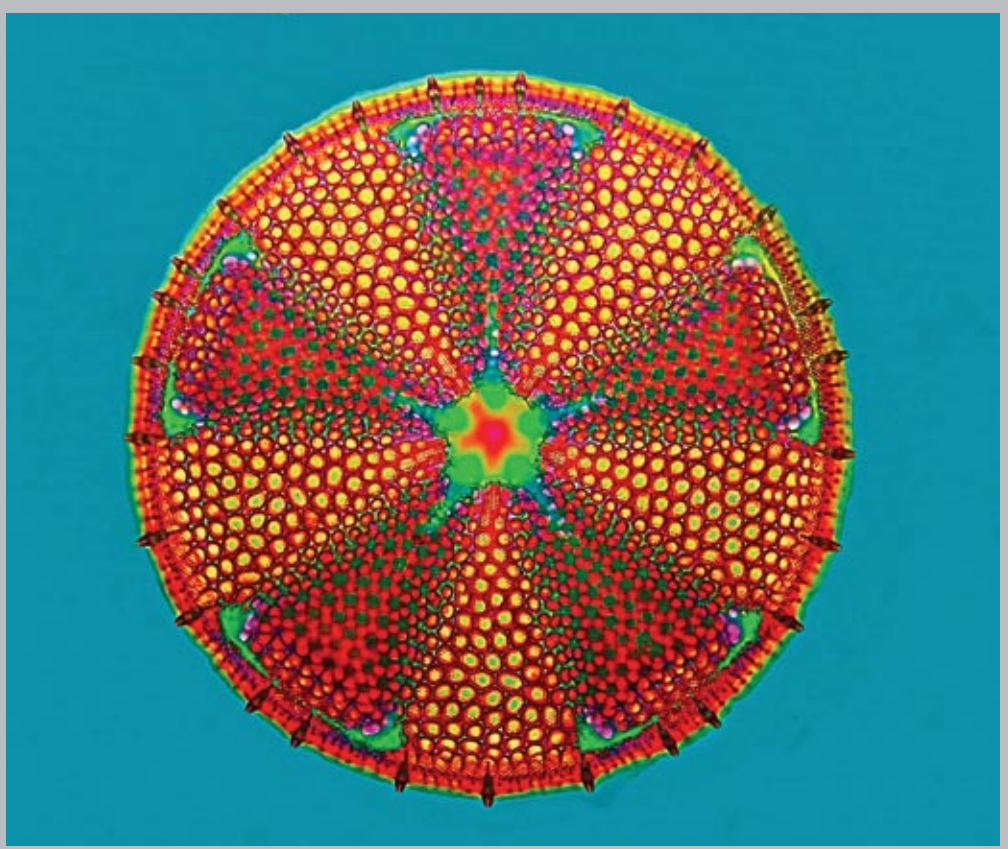
LIVE DAPHNIA, some 0.2 millimeter long, peeks out of an image rendered with dark-field illumination by Earl K. Nishiguchi of Hawaii. Remarkably, Nishiguchi, who has won many honors for his micrographs, got the shot with a 16-year-old microscope that sits in his kitchen.



JUVENILE SEA SQUIRT is forming rings of muscles around its openings. The upper orifice is akin to a mouth; the others eject filtered seawater. Michael T. Veeman of the University of California, Santa Barbara, stained for the protein actin and merged 153 optical sections produced by confocal microscopy. The star-shaped cells around the organism help to build an outer coat. Their shape, Veeman says, suggests they may also have a role in sensing the environment or in self-defense.



FAIRY FLY, a parasitic wasp that deposits its eggs in those of other insects, is approximately 0.2 millimeter long with a wingspan of perhaps three millimeters. It lacks true wings but manages to fly using its feathery appendages. Spike Walker, a freelance photomicrographer in Staffordshire, England, took first prize for the image, made with dark-field illumination to enhance contrast but without stains or color filters.



FOSSIL MARINE DIATOM named *Actinoptychus heliopelta Grunow,* a single-celled alga, lived approximately 20 million years ago, leaving behind its glass (hydrated silica) shell, roughly 0.14 millimeter in diameter. Stephen S. Nagy of Montana Diatoms in Helena brought out its symmetry—and won third place—by combining a stack of five exposures at different focal planes using a procedure called Jamin-Lebedeff interference contrast; the colors reflect relative differences in thickness.

"ROADS" in this 1.5- by 2.5-centimeter section of petrified wood consist of agatized rock that filled in some cracks. Thomas P. Shearer of Duluth, Minn., a pathologist's assistant with a passion for rocks, created the image, earning second prize. He avoided glare by applying double polarization, in which polarizing filters are placed both on lights and on the lens. The same technique, he says, turns out to dramatically improve the clarity of pathology specimens viewed under a microscope.

For more information about the Olympus BioScapes competition, visit **www.olympusbioscapes.com**