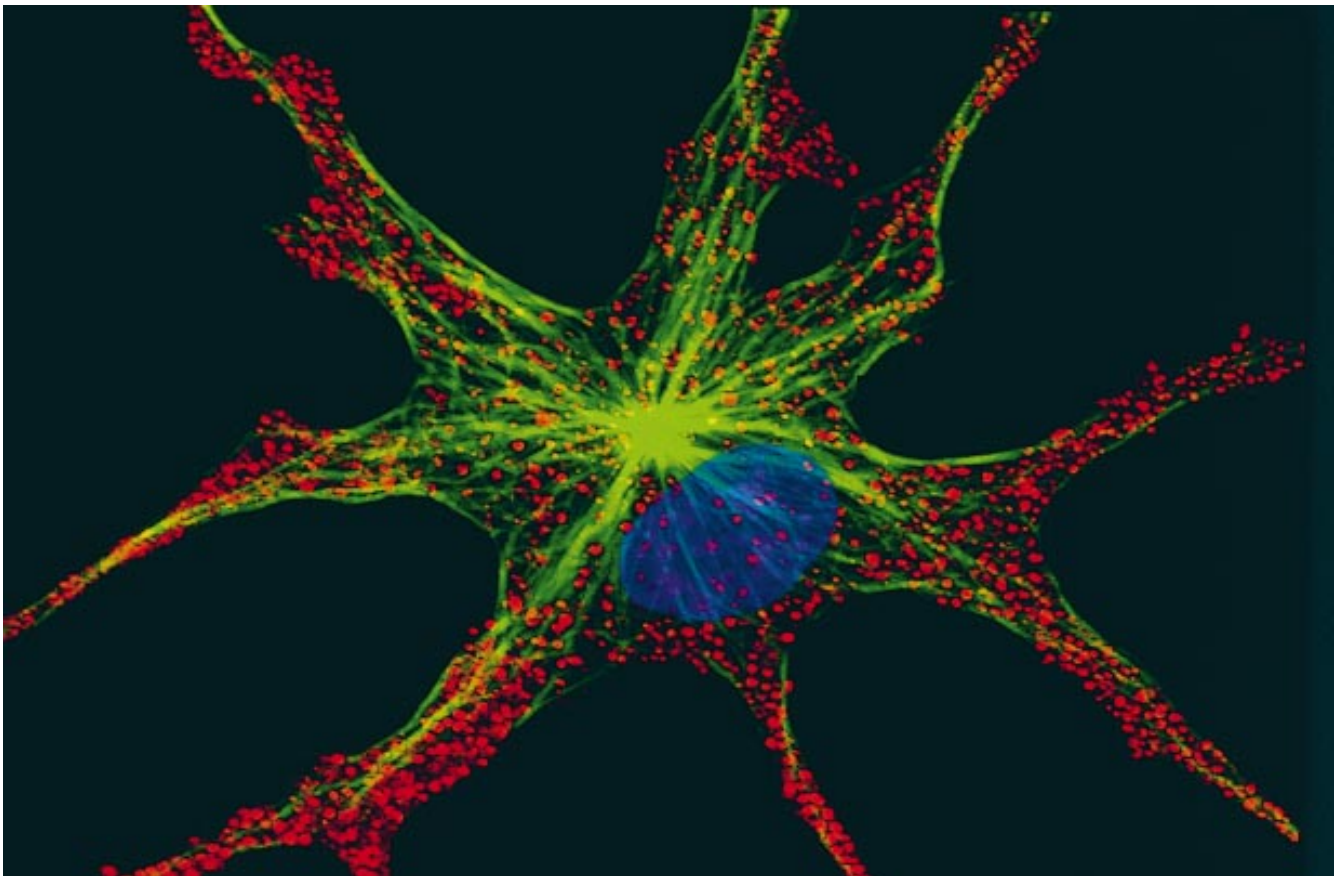
Biology in pictures

The beauty of camouflage



When a fish or a reptile changes color, it is because of the movement of tiny pigment granules in specialized skin cells called melanophores. These cells have hundreds of membrane-bound pigment granules, or melanosomes, which can be aggregated at the center of the cell or dispersed throughout the cytoplasm. When the melanosomes are aggregated the animal appears lighter, and as they disperse the animal's skin becomes darker.

The image above is of a frog melanophore in culture. The melanophore has been fixed and indirectly labelled with fluorescent antibodies against microtubules (green) — the tracks along which the pigment is moved. The melanosomes (red) have been imaged by collecting back-scattered light on a laser-scanning confocal microscope with the fluorescent filter set removed. A DNA-specific dye, chromomycin A3 (blue), labels the nucleus. The three separate images have then been pseudocolored and combined electronically.

Melanophores are frequently used as a model system for the study of intracellular organelle transport and the motor proteins that power it. During pigment aggregation, melanosomes are transported along microtubules by the motor protein cytoplasmic dynein. By contrast, during pigment dispersal the melanosomes are thought to be moved along microtubules and along actin microfilaments by the kinesin-related protein kinesin-II and by myosin-V, respectively.

The movement of pigment therefore involves both the regulation of the melanosome-associated motors and the coordination of organelle transport along two separate cytoskeletal systems.

For more details, see: Rogers *et al.*, *Proc Natl Acad Sci USA*, 1997, **94:**3720–3725; Rogers and Gelfand, *Curr Biol*, 1998, **8:**161–164.
(Photograph kindly provided by Stephen Rogers, Department of Cell and Structural Biology, University of Illinois, 601 South Goodwin Avenue, Urbana, Illinois 61801, USA.)