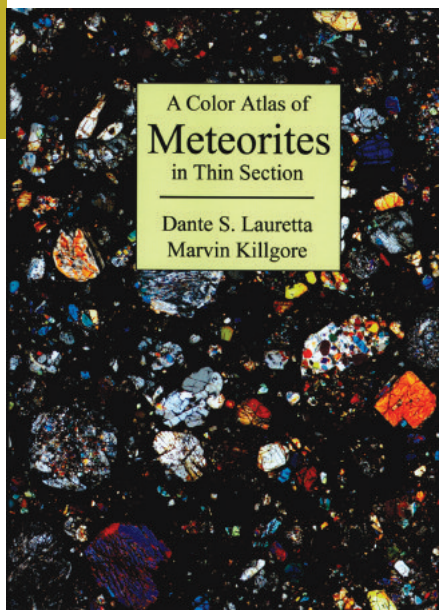
# A Color Atlas of Meteorites in Thin Section[1]




When neophytes first gaze at the colored rectangles in one of Piet Mondrian's paintings, they may muse that the image is pretty, but puzzle over whether it means anything. The Dutch artist is widely known for formulating the neoplasticism style of painting during World War I, having successively given up on naturalism, impressionism, pointillism, and cubism.

Colored geometric shapes also appear in the petrographic microscope when one is viewing non-opaque minerals in transmitted light using crossed polarizers. To the novice, the images may seem pretty, but puzzling. Besides a course in optical microscopy, what a beginner needs is a guide to the appearance of minerals and rocks in thin section. In the early 1980s, two such guides were published: *Atlas of Rock-forming Minerals in Thin Section* by MacKenzie and Guilford and *Atlas of Igneous Rocks and their Textures* by MacKenzie, Donaldson, and Guilford. These are terrific books, filled with colorful images of rocks and mineral grains; adjacent photomicrographs are made in plane-polarized light and with crossed polars. Short descriptions are provided and magnifications are included. The aspiring petrographer can compare an uncharacterized sample on the microscope stage with the photos in the book and come up with a tentative identification. At least two generations of petrology students have used these books to aid their studies of terrestrial rocks.

But what of the fledging meteoriticist? The MacKenzie books are of limited help—most of the illustrated minerals and rocks are not represented in meteorites. In anticipation of this need, Gustav Tschermak published *The Microscopic Properties of Meteorites* in 1885, replete with 100 black and white photomicrographs of stony meteorites in thin section. If we use the modern classification system, we find that Tschermak included images of CO, CV, and CR carbonaceous chondrites, equilibrated and unequilibrated ordinary chondrites, HED samples (howardites, eucrites, and diogenites), aubrites, mesosiderites, silicates from the IVA iron Steinbach, and two Martian meteorites (Shergotty and Chassigny). Short descriptions are given for each figure.

Tschermak's book was a fine one in its day. It was translated by John and Mathilde Wood and republished in the Smithsonian Contributions to Astrophysics in 1964. I keep a copy on my shelf, but I don't often refer to it. There are informative images in the book to be sure, but a newcomer to meteoritics would need more. He or she would need an atlas in color, one that would show all the major chondrite groups, a book that included everything in Tschermak plus additional non-chondrite groups, like ureilites, acapulcoites, lodranites, winonaites, brachinites, angrites, and lunar meteorites. Ideally, the book should include photomicrographs made at different magnifications, and illustrate the same field of view in plane-polarized light, with crossed polars, in reflected light, and with back-scattered electrons (BSE). Short descriptions would be essential and a brief introduction to the various meteorite groups would be an added bonus. I would have greatly benefited from such a book when I was a graduate student. I'm sure I wasn't the only tyro wishing there was a cosmochemistry edition of MacKenzie.

Dante Lauretta and Marvin Killgore have heard our lament (we weepeth sore in the night, and our tears were on our cheeks) and produced *A Color Atlas of Meteorites in Thin Section*. With nearly 300 pages of photomicrographs and BSE images, it fills an essential niche. It is not just for graduate students, dilettantes, and interested amateurs—I can also recommend it to professional meteorite scientists. Few such folk are familiar with the textures and mineralogy of all the meteorite groups. For example, a quick flip of the pages would demonstrate to the curious that lodranites are much coarser grained than acapulcoites.

The photomicrographs and BSE images in the atlas are all in sharp focus (a feat not always achieved in research papers), and the colors in the crossed-polar images are vibrant. The authors found a printing house in South Korea that could reproduce the images faithfully.

I like the book and recommend it, but there are a few minor shortcomings. A peculiarity of the volume is the reliance on the second author's meteorite collection for so many (56%) of the illustrated specimens. In some cases, thin sections of less-weathered samples could have been readily obtained from institutional collections. An unfortunate omission is the thin section number; this would have been of lasting value to petrologists who might spot an interesting feature in the photomicrographs and want to request sections. In the Introduction, the authors maintain that they followed the classifications listed in the authoritative *Catalogue of Meteorites*, edited by Monica Grady, but I can't figure out where they obtained the unrealistically low subtypes of the EH3 and EL3 chondrites—they're not listed in Grady, the *Antarctic Meteorite Newsletter*, or *The Meteoritical Bulletin*. The mean diameters of H, L, and LL chondrules given on page 11 (~0.3, ~0.7, and ~0.9 mm, respectively) are out of date; the most recent estimates are ~0.3, ~0.5, and ~0.6 mm (Rubin 2000). And as long as I'm being picayune, H and L chondrites are named for their high total iron and low total iron contents, respectively, not for their high metal and low metal abundances as indicated on page 10. The well-known mesosiderite (stony-iron meteorite) Vaca Muerta (i.e. Spanish for "Dead Cow") is misspelled in the Table of Contents and the body of the atlas. But these flaws and the rare typo (e.g. on p. 26) do not detract from the overall usefulness of the book.

At $98 this hardcover is not cheap, but neither is a graduate school education. I recommend that the atlas be available near the microscopes of all cosmochemistry laboratories so that graduate students and their mentors will have a handy reference when they find themselves gazing at unfamiliar features in a thin section. The legions of meteorite collectors would also enjoy this book. If they are willing to shell out more than $40 per gram for a diogenite (meteoritic orthopyroxenite) on eBay, they should invest a hundred bucks and buy this new atlas.

## REFERENCES

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1 Lauretta DS, Killgore M (2005) A Color Atlas of Meteorites in Thin Section. Golden Retriever Publications, Tucson, AZ and Southwest Meteorite Press, Payson, AZ, 301 pp, ISBN 0-9720472-1-2, $98