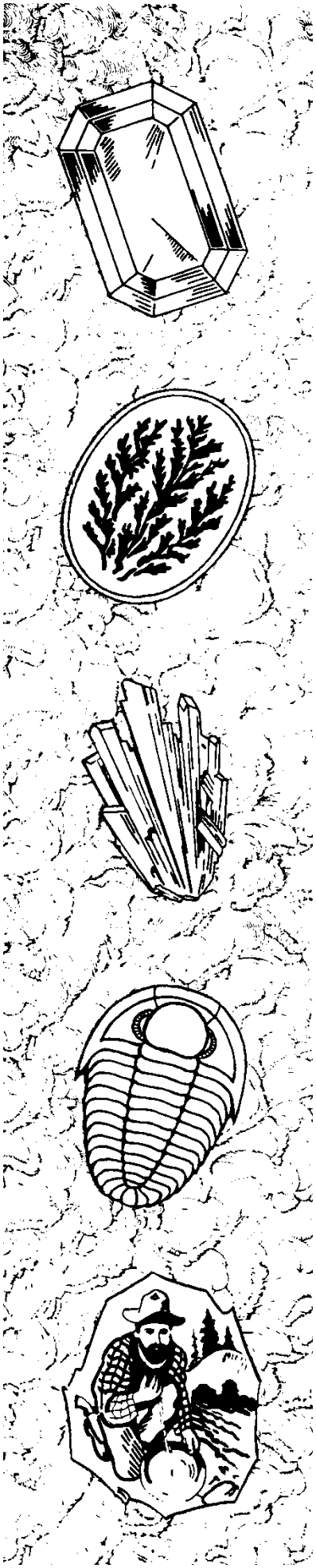
ROCK LORE

March 2011

Rutile on hematite photographed by Charles Calkins

Mr. Calkins' article in this issue explains how you can capture beautiful images like this one.

OFFICIAL PUBLICATION OF THE SAINT LOUIS MINERAL & GEM SOCIETY



Editors' Note by Brad and Gwen Weatherbie
We would really like to publish photos and descriptions of your rock adventures! We appreciate interesting pictures for the cover (like the one for this month), too! Don't worry if you writing is not perfect; we'll edit it for you.

Editorial Practices:
Please submit articles, photos, and committee news at least two weeks in advance of meetings for future editions at rocklore@weatherbie.com. We will put your work into the final publication as space permits.

All submissions to Rock Lore will be edited for spelling, grammar, length, readability, etc. before being published. When possible, we will allow the author to review and approve changes, if requested.

GSLAESC News by Brad Weatherbie
Scholarships are available from the Association for college students (sophomores & later) studying earth sciences. Anything from a single class on geology to a major in mining could qualify. Applicants must be club members or children or grandchildren of members. Please contact Brad Weatherbie or David Wixom for more information.

Photographing Minerals by Charles Calkins

It is common for a mineral collector to want to document his collection for cataloging purposes, insurance, or simply for show-and-tell. Collections can be presented on the Internet via web hosting providers, or using services such as Mindat (http://www.mindat.org/) which encourage members to contribute to their mineral database. Mineral photography does not need to be a challenge, and good images can be obtained with a consumer-grade camera and basic setup.

Photographing small mineral specimens falls under the category of "macro photography" because the final image is often as large as, or larger than, the sample itself. Jeffrey Scovil (http://www.scovilphoto.com/), Associate photographer for the *Mineralogical Record* and *Rocks and Minerals* magazines, is likely the best-known photographer in this area. He has described his techniques in *Photographing Minerals, Fossils, & Lapidary Materials* (ISBN 0-945005-21-0), a definitive work on obtaining excellent images. Good images can be obtained, however, with simpler setups (mine is shown in Figure 1), provided that certain issues, described below, are kept in mind. Although all of these issues apply to digital photography, many affect film photos too.

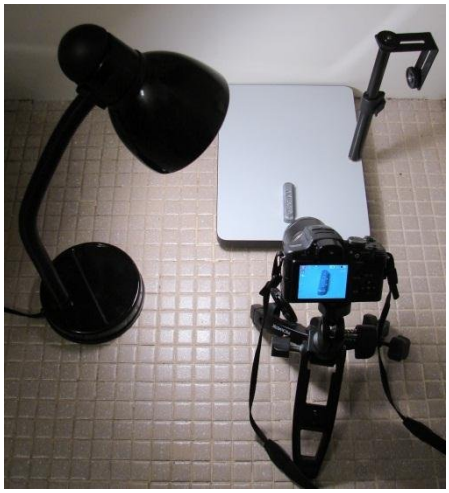


Figure 1 – Photography setup

Lighting: Specimens need to be well-lit, but a direct light must be diffused. Otherwise, specimens will have bright highlights or look unnaturally flat. Figure 1 shows direct light provided by a frosted daylight bulb. Room lights are also used so shadows are filled in with ambient light. I have found that a windowless bathroom, with overhead lights near the ceiling, is a good place for taking photos. Lighting can be controlled, and the bathroom tile diffuses much of the light so the lighting of the sample is not harsh. Bouncing light off of white paper or Styrofoam, or placing a lamp behind translucent material, can also diffuse light well enough for a good image. Even with good lighting, however, the angle of the specimen may need to be adjusted to avoid glare, to accentuate a crystal facet, or the like.

White balance: Setting a camera's white balance properly for the lighting conditions is essential. Light can be "warm" or "cool," producing reddish or bluish tints, respectively, in photos. Some cameras are also susceptible to shifting color due to fluorescent lights. While the eye can perceive a white object as actually white under a wide variety of lighting conditions, a camera is often fooled. Digital cameras have an automatic white balance setting that generally works well in sunlight, but frequently has trouble when other types of light are used. The white balance can be set using a neutral gray card or a special purpose device such as the WhiBal (http://www.rawworkflow.com/whibal/). The

card is placed in the same position as the sample that is to be photographed, and the camera's white balance is adjusted. With a correct white balance, the color of the mineral sample will appear correct in the photograph.

Camera support: For a sharp image, the camera must be firmly supported. Figure 1 shows a camera stand with a gray base. The camera can be mounted on the black post so it can face straight downward. This works for some samples, but the best view of a sample is not always from directly above. Also, a stand like this may place the camera too close to a sample for the camera to be able to focus properly, especially if any magnification is used. In Figure 1, the camera is mounted on a mini-tripod that allows great freedom in the camera adjustment. Not only can the camera be adjusted to any angle, but the tripod can be placed at any distance from a specimen. Here, the sample is viewed at an oblique angle from a greater distance than what would be possible if the camera stand were used. The neutral gray base of the camera stand makes a good background, though.

Depth of field: Depth of field refers to the range of distance that is in focus. "Zooming out" to show the widest view yields the greatest depth of field. "Zooming in" to magnify an area narrows the depth of field. Figure 2 demonstrates this. On the left, the camera is zoomed completely out (1x magnification) and the Doe Run lead pig is completely in focus. On the right, fully zooming in (18x magnification) to the D of the word DOE produces a close-up image of the D and O, but E and RUN are out of focus. A good image balances the close-up view with how much of the sample is in focus. Focus stacking (http://en.wikipedia.org/wiki/Focus_stacking), where many images are combined to yield a greater depth of field, is a way to address this issue. (Editor's note: digital cameras generally have much greater depth of field than film cameras.)

Figure 2 – Depth of field

Macro mode: Macro mode, generally indicated by a flower symbol, allows an object that is very close to the camera to be in focus, so it is often needed for photographing small mineral specimens. For instance, the digital camera shown in Figure 1 is a Panasonic Lumix DMC-FZ35. When not in macro mode it cannot focus on an object that is closer than 30 cm. However, in macro mode, the minimum focusing distance is only one centimeter. Increasing magnification (zooming in) also increases focusing distance. Therefore, zooming in may require the camera to be moved away from the subject, reducing the magnification effect. For the FZ35, in macro mode, using the full telephoto zoom of 18x increases the minimum focusing distance to one meter.

Close-Up lens: The minimum focusing distance can be reduced by attaching a close-up lens to the camera. For example, the camera in Figure 1 has the Panasonic DMW-LC55 close-up lens attached, which reduces the focus distance by a factor of 3. So, with this lens, in macro mode, using the full telephoto zoom of 18x, an object can be as close as 33 cm, making the subject appear much larger than it would otherwise.

Software: It is important to capture the best image possible with the camera, but software can modify the raw image to fix flaws and produce a final image. A multitude of free programs such as Paint.NET (http://www.getpaint.net/), GIMP (http://www.gimp.org/), and RawTherapee (http://www.rawtherapee.com/) provide alternatives to more-expensive programs such as

PhotoShop (http://www.adobe.com/products/photoshop). With these programs, photographs may be rotated, cropped, sharpened, and/or re-sized. Also, without modification, photos of specimens with bright colors may appear washed-out, especially if strong, localized lighting is used. Increasing the image saturation by 10% or so with software improves the image so it more accurately represents the original sample.

Image quality: When processing photos, it is helpful to work with high quality images. Use the highest-quality file format your camera provides whenever possible. To save memory space, a consumer-grade camera typically discards information when it converts images into a JPEG format. When using TIFF or RAW formats, generally, no information will be lost. Also, while JPEG is limited to 8 bits per color channel (256 shades each of red, green and blue), TIFF or RAW may use 12 bits per channel (4096 shades) or more. The greater the color depth, the greater freedom available for correction after the image is taken.

Image size: As with quality, images should remain at the size they are obtained from the camera while they are being processed, and only reduced in size, if needed, once image processing is complete. A large image can always be reduced in size, but a small image made larger will look blocky. One measure of image size is the number of pixels it contains. The FZ35, for instance, captures images that are 12 MP (megapixel), 4000 x 3000 pixels. If printed by a 300 DPI (dots per inch) printer, this would yield an image 13.3x10 inches in size. While this is a good resolution for printing a poster, it is too large for Internet presentation. For instance, Mindat reduces images to no more than 1024 pixels across for the primary image display. Considering that a standard computer monitor's resolution isn't much larger, this is reasonable – the image will fill most of the screen.

Figures 3, 4 and 5 show examples from my collection, taken with the setup shown in Figure 1. More photos can be seen on my page on Mindat (http://www.mindat.org/user-10785.html). (Editor's note: the format of Rock Lore does not permit us to do justice to Mr. Calkins' beautiful pictures. Especially if you receive the paper version, please look for larger-format versions of these photos at StLRockClub.com.)

Figure 3 – Vivianite

Figure 4 – Wulfenite

Figure 5 - Rutile on Hematite