

16. The World in Miniature

When we collect, we usually seek the biggest rock on the ground. But you may be surprised at what you'll find within the world in miniature! Step through the magnifying glass and learn to collect, clean, and store the smaller wonders of the mineral and fossil world and discover great specimens most people walk right over. Many people focus on **cabinet specimens** (ones that are fist-sized). Here, you'll learn about **miniatures** (a specimen small enough to fit in the space of a 2-inch cube), **thumbnails** (fits within the space of a 1-inch cube) and **micromounts** (specimens so small as to require magnification with a hand lens or microscope to identify and evaluate). Learn not only how to collect micromounts but also how to capture images to share with others via drawing or photographing your specimens. You'll find one thing for certain: these small specimens sure are easy to store!

Activity 16.1: Collecting, preparing, and storing miniature minerals.

Except for their size, miniatures aren't a lot different from larger specimens you may have collected, but you may need to use special techniques to trim and store a small mineral. Learn those techniques and make a collection of at least 10 miniature minerals.

Activity 16.2: Collecting, preparing, and storing thumbnail minerals.

You might extract thumbnail minerals from a cavity in a rock, sift them from soil, or carefully split one away from a larger mass of crystals. Learn special techniques to collect, mount, and store thumbnail minerals, and make a collection of at least 10.

Activity 16.3: Collecting, preparing, and storing microminerals.

Microminerals are a special class requiring extra special care and materials. Because they are so very tiny, they're easily lost or destroyed. Learn what special efforts to take to collect, mount, and store them, and make a collection of at least 10 microminerals.

Activity 16.4: Collecting, preparing, and storing miniature fossils.

Sometimes you'll find small fossils in mint condition sitting right on the surface. More often, you'll need special techniques to collect, trim, and store a small fossil without damaging it. Learn those techniques and collect at least 10 different miniature fossils.

Activity 16.5: Collecting, preparing, and storing thumbnail fossils.

Learn how to use small chisels, saws, and nippers to trim matrix from around thumbnail fossils. Also learn how to safely store your small treasures so they aren't lost or destroyed. Then make a collection of at least 10 different thumbnail fossils.

Activity 16.6: Collecting, preparing, and storing microfossils.

You can find microscopic fossils loose in the dirt at a fossil site. Learn about graduated screens for sifting sediment to retrieve tiny fossils. Also learn how to store your tiny treasures so they aren't lost or destroyed, then collect of at least 10 different microfossils.

Activity 16.7: Collecting and classifying sand.

A heap of sand is basically a collection of microminerals and microfossils. Form a sand collection and explore the world of sand grains with sand samples from at least five very different locations. Explain why your samples may look different from each other.

Activity 16.8: Drawing or photographing microminerals, microfossils, and sand.

In order to better share your micromineral, microfossil, or sand collection with others, make drawings or take photographs to magnify your specimens.

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- 16.7 Collecting and classifying sand
- 16.8 Drawing or photographing microminerals, microfossils, or sand

To earn your World in Miniature badge, you need to complete at least 3 of the 8 activities. Check off all the activities you've completed. When you have earned your badge, sign below and have your FRA leader sign and forward this sheet to the AFMS Juniors Program chair.

Date completed

My signature

Youth leader's signature

Name of my club

Leader's preferred mailing address for receiving badge:

Back-up page for the World in Miniature badge.

Let's start with some definitions...

- A **cabinet** specimen fits within the confines of a 5-inch cube. These are the sorts of specimens we often see on display at gem and mineral shows. They're generally no bigger than fist-sized and would fit comfortably within the palm of your hand. But that's not what this unit is about...
- A **miniature** is a specimen that fits within the confines of a two-inch cube.
- A **thumbnail** is a specimen that fits within the confines of a one-inch cube.
- A **micromount** is a specimen so small that it requires a hand loupe (generally 10X or 20X) or a microscope to identify and appreciate it. It's also usually permanently glued and mounted in a small box or slide.

It's probably best to start kids exploring smaller specimens with "minatures." The smaller you get on the scale presented above, the more complicated and expensive it can become to build and maintain a collection, and micromounts are pursued primarily by "connoisseurs" of the mineral and fossil world. These tiny specimens often represent the pinnacle of perfection. Many of those stunningly perfect crystals you see featured in colorful magazine photo spreads are actually micromounts; take a close look at the captions, and you'll often see measurements expressed in terms of millimeters.

Still, it doesn't necessarily have to be complicated nor expensive to make a start with even a micromount collection. In this unit, we won't try to be comprehensive but instead will focus on simple, inexpensive basics while providing recommended resources for anyone wishing to go into more depth, particularly with microminerals and microfossils.

Smaller specimens provide a great way to get kids started in collecting. For one thing, such specimens are often a lot kinder to a child's budget if purchasing specimens at a gem show. While perfect crystals of precious gemstones such as rubies, sapphires, diamonds, or emeralds are going to cost a bundle no matter what the size, many common specimens of such minerals as quartz, calcite, or pyrite, or of fossils like brachiopods, horn corals, or ammonites usually cost a whole lot less the smaller they are.

Kids are also more likely to find "mint" condition fossils or crystals of smaller sizes when collecting in the field. They just need to be trained to look for and appreciate these smaller specimens. When I was a child, I was on the lookout for the twelve-foot long petrified log or the *T. rex* skull—perhaps somewhat unrealistically, given that I grew up in Illinois....I haven't done a formal count, but I'd safely wager that the vast majority of my own self-collected fossils fall within the categories of miniatures and thumbnails.

A miniature or thumbnail collection certainly takes a lot less space to store. While those fist-sized cabinet specimens could fill up shoebox after shoebox in a child's closet or under the bed, over 100 thumbnail mineral specimens can easily fit in a space just one foot by two feet and literally thousands of microfossils mounted on slides can be tucked compactly into a space no bigger than a breadbox. Finally, as a fringe benefit, working with small specimens refines hand-eye coordination and helps a child in developing concentration, patience, and focus.

Back-up page 16.1: Collecting, preparing, and storing miniature minerals.

Collecting miniatures. One good way to start kids collecting miniature minerals is in the backyard of a willing club member who has a 40-year accumulation of rock sinking into the ground, with small chips and pieces scattered all about. Let kids know they won't be seeking a spectacular giant hunk but instead rejects and cast-offs: the quartz or calcite-filled geode that shattered under a hammer blow and now sits in unwanted pieces. On close inspection, and with a little scrubbing, these pieces may yield perfect miniatures. Encourage kids to get up-close-and-personal with the rocks. Other sources of miniatures include gem shows, swaps with fellow club members, and—of course—field trips to mines and mineral localities listed in guidebooks for self-collecting.

Tools for field collecting miniatures will be the same as those used for collecting bigger specimens (see Back-up page 8.2): a rock hammer and chisel, goggles for eye protection, work gloves to protect hands, a roll of toilet paper for wrapping specimens so crystal tips and faces don't get chipped or scratched, zip-lock baggies for transporting specimens safely home in buckets, knapsacks, or soda flats, and masking tape, markers, and notebooks for recording locality and other field information for each specimen.

Preparing miniatures. Preparing miniatures basically involves trimming away matrix and unwanted damaged crystals. Kids shouldn't try to trim excess matrix in the field but rather at home, where they can better control the trimming. Basic supplies needed include lapidary hammers and small chisels (along with eye protection), rock or tile nippers and/or special vice-like rock trimmers to snip away pieces of matrix, a small rock saw, a hack saw fitted with a grit-edge or tungsten carbide blade rod, and a regular hand magnifying glass or, better, a bench magnifier that allows one to work with both hands free. Small sand bags are also helpful to secure a specimen and to absorb the shock of any hammer-and-chisel blows, which should be administered with a light touch.

For sturdier, non-soluble minerals and crystals, cleaning often involves nothing more than a scrubbing with soapy water and a toothbrush. I've also used steel dental picks and a dental water pick to get at stubborn dirt packed within tiny crevices.

Storing miniatures. Miniatures may be stored in egg cartons, small fold-up cardboard specimen boxes, or compartmentalized plastic storage boxes with fold-top lids sold with fishing tackle or in bead-supply stores. A more expensive option is the 2-inch Perky box, named after its creator, Willard Perkins of Burbank, California, who was known to friends as "Perky." For use with miniatures, these come in two sizes: medium (1-3/8"X2"X2") and large (2.25"X2.5"X2.5"). These small plastic boxes, available from mineral suppliers, usually have a black bottom lined with Styrofoam and a clear plastic top. Specimens can be pushed into the Styrofoam or held in place with a dab of mineral- or poster-tack. These Perky boxes, in turn, can be stored in soda flats or small cabinets.

Note: Kids can use this activity to satisfy requirements toward earning the Collecting badge simultaneously (Activity 5.1).

Back-up page 16.2: Collecting, preparing, and storing thumbnail minerals.

Collecting thumbnail minerals. See Back-up page 16.1 on ways to collect miniatures. It'll be much the same when approaching thumbnails. However, the "tools of the trade" get a little more specialized. You'll need the same tools used for collecting miniatures, augmented with a loupe, flat screwdrivers and ice picks, and chisels of various sizes but especially small ones. The screwdrivers and ice picks can be used to probe small crystal-lined pockets and to remove mud and clay from cavities. If trying to chip out a little crystal-lined vug, stuff bits of rags (or shaving cream) into the cavity, both to protect crystals from shocks of hammer blows and to keep them in place so they don't go flying. In areas where small crystals may be loose in the dirt or gravel or when searching through mine tailings, your best tools are hand rakes, small shovels or trowels, and quarter-inch mesh screens in wooden frames. This is how many fee dig sites operate, with a pile of earth from mine tailings to be dumped into screens and sifted in water for quartz crystals, tourmalines, garnets, etc. Also handy: a supply of small zip-lock baggies to store finds.

Preparing thumbnail minerals. For thumbnails, as with miniatures, the goal is to reduce larger rock blocks with hammers and chisels if the crystals can take the shock of blows being delivered around them. You want to trim away as much matrix as possible without damaging the crystals, switching to increasingly delicate techniques the closer you get. Instead of delivering sharp blows with a standard rock hammer and chisel, you'll switch to small chisels and deliver delicate blows with small lapidary hammers (while wearing eye protection). You can also use rock or tile nippers and vice-like rock trimmers. For especially stubborn matrix, you may need to use a trim saw lubricated with water rather than oil, but most collectors prefer a "natural" edge on matrix as opposed to the straight edge of a saw cut. One way to create a natural edge is to saw a shallow groove from below and then tap with a small chisel and hammer from above. When using hammers and chisels to remove matrix close to your specimen, place your rock on a sand bag to cushion blows, and use a bench magnifier to leave both hands free. Two other important tools are tweezers and glue should a crystal in a cluster pop loose.

Storing thumbnail minerals. Thumbnails are best stored in 1-inch Perky boxes, which are actually 1.25"X1.25"X1.25". These small acrylic boxes, available from mineral suppliers, have a black bottom lined with Styrofoam and a clear top. Specimens can be glued onto or pushed into the Styrofoam or attached with tack. Instead of Styrofoam, you can also use 1-inch acrylic squares that make it easy to remove a specimen from the Perky box for display in an exhibit. For kids just beginning and on a budget, matchboxes will also do, or—as with miniatures—plastic boxes with compartments and fold-top lids sold in bead stores or with fishing tackle. The bottom of each compartment should be lined with cotton to keep specimens from rolling about. Basically, use anything that's enclosed so as to contain the small specimen securely and to keep out dust.

Note: Kids can use this activity to satisfy requirements toward earning the Collecting badge simultaneously (Activity 5.1).

Back-up page 16.3: Collecting, preparing, and storing microminerals.

Collecting microminerals. What does a chunk of rotting granite shedding flakes of mica, quartz, and feldspar have in common with a freshly cracked geode with interior crystals speckled with black dots? On close inspection, both may yield perfect microminerals. In collecting microminerals, kids need to dive in nose-first and really get up-close-and-personal with the rocks. It's not enough to scan the ground from above. Kids need to get on hands and knees or even their bellies when searching through gravel or over matrix likely to hold tiny crystals, and they'll definitely need to bring their 10X or 20X loupes to look closely at what they spy. I've found perfect little "Pecos diamond" quartz crystals while lying on the ground, picking through the sandy rubble of an ant hill in New Mexico.

Preparing microminerals. Preparing microminerals involves trimming away matrix, very carefully, very slowly, just a little at a time. Basic supplies include hammers and small chisels (along with eye protection), nippers and/or special vice-like rock trimmers, a small rock saw, Dremel-type grinding and cutting bits, dental picks, pointed-nose pliers, tweezers of various sorts, glue, and a bench magnifier that allows for hands-free work or even better, a binocular stereomicroscope, commonly called a dissecting microscope.

Storing microminerals. Microminerals are usually permanently glued into a protective container and are then referred to as **micromounts**. Micromount boxes with a black bottom and clear, snap-on lid can be purchased from mineral supply stores, or you can use those small plastic boxes with snap-on magnifier lids. There are many sophisticated techniques for gluing microminerals onto tiny rods and mounting them in display boxes. But for kids just beginning, it's probably best to use pedestals of tiny corks painted black. They can be handled more easily, both for gluing on the specimen and for positioning and gluing the pedestal into the box. Trim down the pedestal to keep the top of a mineral specimen just under the upper lip of the box so the lid never comes in contact with the mineral. If possible, the pedestal should not be visible beneath the mineral when viewed from above. Have kids practice with less desirable specimens until they acquire patience and skill at gluing and positioning with tweezers. For practice, they should start with larger specimens with flat bottoms to glue to larger pedestals. Great attention is needed, with a steady hand, to place and glue a micromineral to a pedestal. Also, work should be done on a tray under good lighting so tiny specimens don't get dropped and lost.

Sauktown Sales (Mill Creek, Indiana) specializes in micromount specimens and supplies. On their website www.sauktown.com, they provide not only supplies but much useful information and links to nearly two dozen web sites related to micromounts. Although pitched toward an adult audience, a couple reference books and a web site also provide fine information for you to consult in working with kids on this activity:

- Milton Speckel, *The Complete Guide to Micromounts* (1965, 1980; out of print?)
- Quintin Wight, *The Complete Book of Micromounting* (1993). Available through the Mineralogical Record, www.minrec.org

Note: Kids can use this activity to satisfy requirements toward earning the Collecting badge simultaneously (Activity 5.1).

Back-up page 16.4: Collecting, preparing, and storing miniature fossils.

Collecting miniatures. Kids will find miniature fossils as they seek other, larger fossils during your regular field trips. In fact, a great many common invertebrate fossils fall within the size range of one- to two-inches and are often found weathered free at an outcrop: sea urchins and small sand dollars, small clams and snails, “Devil’s toenail” oysters, a great many brachiopods, crinoid stem fragments, twiggy bryozoan, trilobites, horn corals, and more. You should also encourage kids to make trades with fellow collectors since they’ll often bring home multiple examples of a fossil species. Encourage them to trade duplicate specimens from their collections with duplicates in other kids’ collections to more quickly expand the variety of their holdings at no cost—while at the same time making friends within the hobby. Finally, they’ll discover true bargains at gems shows for fossils that fall within the one- to two-inch size range, specimens that are *a lot* more affordable than big flashy fish fossils from Wyoming or two-foot limestone slabs with whole crinoids from Morocco.

Preparing miniatures. Preparing miniatures involves trimming away as much unnecessary matrix as possible without damaging the fossil. Basic supplies needed include hammers and small chisels (along with eye protection), rock nippers and pliers and/or special vice-like rock trimmers to snip away pieces of matrix, a small rock saw, and a regular hand magnifying glass or, better, a bench magnifier that allows you to work with both hands free. With a miniature fossil, you usually want to remove all the matrix, if possible, and Dremel-type bits and brushes and dental picks can help in removing final specks of dirt or matrix from small nooks and crannies. If the fossil has been silicified and is in a limestone matrix, soaking in vinegar (acetic acid)—followed by a vigorous brushing—can also help dissolve, loosen, and remove matrix. (Afterwards, soak the fossil in water and baking soda to neutralize any remaining acid from the vinegar.)

If a specimen is delicate or can really only be exhibited in matrix, as much matrix as practical should be removed. If a specimen is in hard limestone or shale, a small rock saw or a hack saw fitted with a grit-edge or tungsten carbide blade rod is often used. However, many collectors prefer a “natural” edge to the matrix rather than the flat edge that a saw produces. One way to create a natural edge is to saw a groove from below and then tap with a small chisel and lapidary hammer from above. When hammers and chisels are being used to remove matrix that’s very close to a specimen, the rock should be placed on a sand bag to cushion blows.

Storing miniatures. Miniatures may be stored in egg cartons, small fold-up cardboard boxes, or in 2-inch Perky boxes, named after their creator, Willard Perkins. These small plastic boxes, available from mineral suppliers, usually have a black bottom lined with Styrofoam and a clear plastic top. These Perky boxes, in turn, can be stored in soda flats or small cabinets.

Note: Kids can use this activity to satisfy requirements toward earning the Collecting badge simultaneously (Activity 5.1).

Back-up page 16.5: Collecting, preparing, and storing thumbnail fossils.

Collecting thumbnail fossils. Small thumbnail fossils might be found right on the surface of a fossil locality, having weathered free and mixed in with surrounding soil. To increase the odds of finding specimens, take screens to sift through such soil at the base of a fossil outcrop. You'll also find many thumbnail fossils embedded in limestone, sandstone, or shale. Rather than trying to remove fossils from hard matrix in the field, kids should bring those specimens home to work in a more controlled setting with an assortment of tools at hand.

Preparing thumbnail fossils. As with miniatures, preparing thumbnail fossils involves trimming away matrix. Basic supplies needed include: rock- or lapidary hammers and small chisels (along with eye protection); pliers or nippers to snip away pieces of matrix and/or special vice-like rock trimmers; a small rock saw; a regular hand magnifying glass or, better, a bench magnifier that allows you to work with both hands free; Dremel-type bits, saws, and brushes; dental picks; tweezers; and glue. Some small silicified fossils embedded in limestone may be freed in acid baths using acetic acid (vinegar) or muriatic acid (often sold with swimming pool supplies).

Caution: *Working with acid should always be done by an adult exercising great precautions with long rubber gloves and aprons, eye protection, and a high quality respirator mask in well ventilated areas, with any open containers kept away from areas where pets might be or where fumes might cause damage to paints, pipes, etc. We do not recommend that kids work with acid of any sort, and any adults electing to do so should first thoroughly familiarize themselves with all procedures and precautions.*

Storing thumbnail fossils. Thumbnails are best stored in 1-inch Perky boxes, named after their creator, Willard Perkins. These small plastic boxes, available from mineral suppliers, usually have a black bottom lined with Styrofoam and a clear plastic top. Specimens are often pushed into the Styrofoam or attached to it with a dab of tack. Instead of Styrofoam, you can also use 1-inch acrylic squares that make it easy to remove a specimen from the Perky box for display in an exhibit. For kids just beginning and on a budget, matchboxes will also do, or plastic boxes with compartments and fold-top lids of the sort sold in bead stores or with fishing tackle. The bottom of each compartment should be lined with cotton to keep specimens from rolling about. Basically, use anything that's enclosed so as to contain the small specimen securely and to keep out dust.

Note: *Kids can use this activity to satisfy requirements toward earning the Collecting badge simultaneously (Activity 5.1).*

Back-up page 16.6: Collecting, preparing, and storing microfossils.

Collecting microfossils. In areas of recent marine deposits, microfossils might be mixed loose with soft sediments (sand and mud), requiring only that you scoop up a sample and sift it through a screen. Or microfossils might be embedded in limestone, sandstone, or shale. To check sediment or rock samples, take a 10X or 20X loupe into the field. If you detect small fossils in a sediment sample, take home a supply in zip-lock baggies; if in matrix of hard rock, take several hand pieces home. Use the same tools already listed in Activities 16.4 and 16.5, but add sifting screens of various mesh sizes. You can purchase stackable graduated screens from geological supply houses such as Ward's, or you can do like I did and make your own with wooden frames and screens of various sizes purchased from a hardware store, starting with quarter-inch down to window screen and smaller. Small trowels and hand rakes are handy for sifting through soft sediments and dirt containing fossils that may have weathered out of a limestone, sandstone, or shale bank. It's always a good idea to sift through dirt surrounding such "hard rock" outcrops.

Preparing microfossils. For microfossils in soft sediment and for those that are weathered free in the dirt around hard sediments, all that's required is sifting away the sediment with a series of graduated screens. You'll also want a bench magnifier that allows for hands-free work or even better, a binocular stereomicroscope, commonly called a dissecting microscope, along with stick pins and tweezers. Work should be done on a tray under good lighting so tiny specimens don't get dropped and lost. (Microfossils embedded in limestone may be freed in acid baths and those in shale can sometimes be freed by soaking samples in kerosene, but those techniques are best reserved for adults exercising due precautions; see the references listed below for specific techniques.)

Storing microfossils. Microfossils can be prepared as "micromounts" in the same manner as microminerals, within small micromount boxes (see Activity 16.3). Alternatively, professional geology supply houses, such as Ward's, sell small slides made especially to hold microfossils. These are made of two layers of cardboard, a glass top, and an aluminum frame to hold the glass atop the cardboard. Specimens may be glued in with a small dab of white glue or a droplet of gum tragacanth or gum arabic.

Although most reference books published about microfossils are pitched to an adult audience, they provide fine reference for any adult working with kids on this activity:

- Brasier's *Microfossils* (1980). This one is detailed and technical!
- MacFall & Wollin's *Fossils for Amateurs: A Handbook for Collectors* (1972). Now out of print, this was a longtime standard for amateurs and is in many libraries or used book shops. Chapter 12 overviews microfossil collecting.
- Margaret Kahrs (editor), *Microfossils: M.A.P.S. Digest Expo XXI Edition* (Mid-America Paleontological Society, Vol. 22, No. 4, 1999).
- Jim Brace-Thompson, "Microfossil Techniques: Tools & Methods for All Budgets," in Kathleen Morner (ed), *Paleotechniques: M.A.P.S. Digest Expo XXVI Edition* (Mid-America Paleontological Society, Vol. 27, No. 2, 2004). (Call me for reprints.)

Note: Kids can use this activity to satisfy requirements toward earning the Collecting badge simultaneously (Activity 5.1).

Back-up page 16.7: Collecting and classifying sand.

A **psammophile** is a sand collector (*psammo* = sand; *phile* = lover of). And a heap of sand is basically a collection of microminerals and microfossils. Help your juniors become psammophiles by forming sand collections and exploring the world of sand grains with samples from at least five very different locations. Explore samples under 10X or 20X loupes or microscopes and discuss why they may look different. For instance, sand that has been transported a great distance and ends up along a beach or in an area of sand dunes is often **well sorted**; that is, it often consists of grains that are rounded and of relatively uniform size and composition. This is the case with nearly pure white quartz sands found in areas around the Monterey Peninsula in California or white carbonate beaches in parts of Florida. Sand that hasn't been transported far (as along a stream in a mountain valley) may have rough, angular grains of all sizes and may consist of a wide variety of rocks and minerals (**poorly sorted**). The color of the sand is due to the color of its constituent minerals. For example, White Sands National Monument in New Mexico holds vast fields of pure white sand composed of gypsum, whereas Papakōlea Beach in Hawaii has green sand due to the mineral olivine. Work with your kids to explore the differences in the shape, size, texture, color, and other characteristics of sand samples and encourage them to speculate about what caused those differences.

In building their collections, kids can conveniently store samples in small baggies, bottles with lids, or stoppered test tubes. This is one hobby involving little or no expense. Many great books have been published all about sand. As a reference in working on this activity, you may want to purchase these or see if your library has them:

- Gary Greenberg, *A Grain of Sand: Nature's Secret Wonder*, 2008. This is both a font of information about the diversity of sand and a gorgeous coffee table book filled with wonderful close-up photos. My top choice for a book that inspires!
- Gary Greenberg, et al., *The Secrets of Sand*, 2015. Greenberg teams up with coauthors for another informative, fun, well-illustrated look at sand.
- Ellen J. Prager (author) & Nancy Woodman (illustrator), *Jump Into Science: Sand*, 2006. This book, published by National Geographic, is aimed squarely at kids, with a fun "sandpiper sleuth" seeking answers to what sand is, where it comes from, and how it gets to the beach. My top choice for young readers.
- Michael Welland, *Sand: The Never-Ending Story*, 2010. A university press book for advanced readers, this is still a great read with interesting facts and surprises.
- Bagnold, *The Physics of Blown Sand & Desert Dunes*, 2005. A reprint of a classic text first published in 1954, this advanced tome is for the true scientist among us.

Anne Lowe-Salmon in Connecticut pointed me to the International Sand Collectors Society (www.sandcollectors.org) that publishes a quarterly newsletter called *The Sand Paper*. They've sold an educator's kit for about \$30 that included sand samples and a CD of sand-related activities. Check them out! This is the best resource I've seen, with great info telling all about sand, the hobby, and how to become a psammophile.

Note: Kids can use this activity to satisfy requirements toward earning the Collecting badge simultaneously (Activity 5.1).

Back-up page 16.8: Drawing or photographing microminerals, microfossils, and sand.

Microminerals, microfossils, and sand are best appreciated under the lens of the microscope, but we don't always have a microscope on hand to share the intricate details of our tiny specimens with others. In order to better share them, help your kids make drawings or take photographs to magnify their specimens.

Such illustrations or photos can come in handy in displaying tiny specimens. For instance, at a club show, a county fair, science fair, etc., it can make for an interesting display to have a tiny specimen atop the head of a pin side-by-side with a close-up drawing or photo. These illustrations or photos also can be used to accompany an article about the specimen. With sand, such illustrations help vividly show the difference between well sorted and poorly sort sand samples, or showing the tiny foraminifera that make up some sands from tropical beaches.

Work with kids to make drawing of specimens observed under a microscope. Or, if you have access to one, use a digital microscope such as a Dyno-Lite Digital Microscope hooked up to a computer to photograph specimens.