

About Mineral Collecting

By

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Our growth as collectors.

As we grow as collectors we become “partialized” to particular mineral species or localities. Perhaps early in our lives we worked at a borax mine that produced fine specimens of borate minerals and came to love them. Or perhaps we attended a mineral show and became hypnotized by a display case full of fabulous silver specimens on displayed by an old collector. Or we were out field collecting with a friend and discovered a fabulous pocket of meyerhofferite pseudomorphs after inyoite. These and other life experiences partialized us, often without realizing it, to certain kinds of minerals and we will always have a soft spot in our hearts for them.

If you become a mineral dealer, you will need to learn that the partialities you developed during your early years are, in many instances, not reflected by similar ones in your clients. In learning this lesson the first reaction you have is irritation that others, because of their ignorance, do not appreciate the kinds of specimens you do. You think that if you can just educate them sufficiently, they will come to appreciate same kinds of specimens you do. These are rocky fields to till and eventually you come to accept, at least to some degree, that the world is as it is, and not what you want it to be. After many years you look back at some of your early attitudes and wonder where in the world they came. And at last, you find that your personal tastes have indeed been shaped by the marketplace after all. However as Mark Twain remarked “It is better to be a young June bug than an old bird of paradise.”

Over the years your value system will change. Every collector has had the experience of early on visiting a collection and thinking it was a great collection. Then in ten or fifteen years going back to look at the collection again and wondering what happened to all the good specimens. In most cases the specimens did not change, only your perception of them. This sort of phenomenon strikes particularly hard at field collectors. When you break into a good pocket of crystals and collect them, they look like the finest things in the world. Usually however when you get them home, unwrap them, clean, trim and label them they look smaller and not nearly as good as they did when you took them out of the ground. Then after you take them to a mineral show, where they have to compete with all the other specimens offered for sale, they look even less remarkable.

One summer my best buddy said to me. “Come on!, lets go to Colorado and collect some amazonite. I have some claims near Crystal Peak in Teller County, Colorado that look good. You pay for the bulldozer and we will split 50/50.” That sounded great to me, so off we went. It was a glorious summer spent camping among the pine and aspen trees and collecting amazonite. I learned to drive a bulldozer and swat flies all at the same time. We got about 1000 pounds of amazonite crystals. We found many different pockets of amazonite and one of them, lets call it pocket #17, produced some particularly fine specimens. One of them was a stacked cluster of fabulous dark blue amazonites, about a foot high, that we thought looked like the empire state building. We carefully packed it away in a box and marked it so it would

not get lost among all the other boxes. A few months later we got around to cleaning up that particular batch of specimens and unwrapped the specimens from pocket 17. We were both shocked!. The specimen had vanished. We scabbled in vain among the packing materials thinking we had not unwrapped everything, but the specimen was simply was not there. We even considered the possibility that someone had gotten into the box and stolen it. Eventually I pointed to a small specimen and said, "You know, it was sort of like that one, but much larger." We both examined the specimen and put it back down on the table and stared at it in silence. At the same moment we both had the sinking feeling that this small modest specimen was the cherished Empire State building specimen that we remembered so vividly. It had shrunk to the size of a small cabinet specimen. We just broke up laughing about it. I don't think anyone is immune to such "shrinkage". Dick Bideaux, one of the authors of the multi-volume "Handbook of Mineralogy", and a stickler for accuracy, carried a small plastic ruler in his wallet to measure crystals so he could record their dimensions rather than have to rely on memory, which he knew was not very reliable.

Not all collectors will continue to collect all their lives. Sometimes it is a passing fancy. Life is continually changing and it takes us in many directions and often young collectors get married and a wife and children will often cause an interest in minerals to become dormant only to flower again later in life. Fashions in minerals change, for a few years thumbnail size specimens are all the rage and a few years later not that many collect them. A few collectors, fortunately only a few, come to feel that they have been led down the garden path by dealers loading him up with overpriced specimens and drop out of the hobby. Most of what I have written below is directed not at transient collectors but rather toward those who will in most likelihood become collectors for life. There is much literature out there for novice collectors which I never found very useful, informative or "real world" so I decided to write this for dealers, curators and advanced collectors who should, If I have done my work successfully, experience cognitive resonance when reading this work.

How much can you know?

No matter how much you have done, read or observed, you are never going to know it all. The best you can hope for is to learn more than anyone else. If you think you know a lot about minerals, consider!: Tell me all about the minerals and specimens from Cerro Rico! What?! You have never heard of the place? Well, it has been continuously mined for last 400 years and considered by many to be the richest silver mine ever found. The city of Potosi, in Bolivia sits at the foot of Cerro Rico and during its heyday was the largest city in the western hemisphere with an opera house and riding academies. Faced with such a history, how could you not know about the specimens produced at this locality. We can be sure that no one can know more than a tiny percentage of the truth about this place. We can be certain, however, that many of the best specimens ended up in silver coins produced by the Casa Moneda (the mint), that was established there by the Spanish. This is just another way of saying "The best azurite specimen that was ever found is probably in a copper pipe somewhere under New York City." Potosi is probably best known to collectors for the best phosphophyllite crystals ever found.

Where can I find out about fine mineral specimens and what they are worth?

Well right here of course! But there is much more to a well rounded mineral maven than just specimens. Much of our civilization is built from the raw materials produced from the mines and quarries that produce the specimens we crave. The history of humanity is entwined with these localities and wars have been fought over them. All of our lives as specimen collecting

nut cases we spend learning about why some specimens are better than others, their current availability, and how much they are worth. Collectors are always gossiping about such things, but the discussion of such things in print seems to be sedulously avoided. The reason is that such things are a matter of opinion, always changing, sometimes according to fashion, and are not easily quantified and measured. Even amateur mineral magazines rarely talk about such things. I think they are worried that someone's opinion about the quality or value of a specimen will offend some of their readers, or worse yet, step on the sensitive financial toes of the dealers who advertise in their magazine. Heaping praise on a specimen or those from a particular locality present no problem, but saying or implying that some are not as good as others is "taboo". There is little upside in making such value judgments in print, only a down side.

If a dealer has what he thinks is the best of a particular mineral species in the world, he will proclaim it to the heavens. If, however, he does not, which is almost always the case, he is not anxious to compare his goods with the best. The reason is simple and obvious. If comparisons were made the specimens offered for sale would appear less appetizing and more difficult to sell. Even if we don't have the best specimens, we are usually able to exaggerate the quality of our wares enough to make a profit on them. We get away with it most of the time because we usually know more than the person buying the specimen. Need I point out that this "evil" behavior is not limited to mineral dealers and used car salesmen, but common in most areas of human commerce? Crevat Emptor.

As collectors, when we are looking at a case of mineral specimens, especially fine ones, we often play the game; "What is the best specimen here?" or "Which one would you like." It is a way to hone our ability to discriminate between the best and second best. Often when buying an expensive specimen, even knowledgeable collectors will ask the dealer, "How good is this specimen?" This same question is asked in many different ways: "Is it worth the money?", "How many better ones have you seen", "Is the mine still producing specimens?" etc. Of course any answer(s) from the person selling it should be taken with a grain of salt. If you put these questions to another dealer keep in mind that he may be reluctant to praise a competitor's merchandise because he would rather sell you something from his own inventory. In such cases his praise of the specimen might be less wholesome than true objectivity might call for. Depending on who you are dealing with, the amount of waffling about the desirability of a particular specimen is likely to be in direct proportion to its price. Here is a tip that all collectors should take to heart. If you borrow a specimen from a dealer to show to another, show it in private and in such circumstances that preclude the possibility of the owner knowing who you are showing it to. Even if you follow this rule, many dealers and collectors are reluctant to comment honestly on the value and quality of a specimen because they have found out that such opinions will more often than not cause them problems with other dealers and collectors. When all is said and done, we are often still not sure of how valuable a specimen is. I told a dealer friend of mine after the Freilich auction (see below) "You know, Ken, sometimes I think I don't have any idea of what's going on in the mineral business anymore!" He answered "Well I do,.....one or two days out of the week." Life without surprises would be very dull.

Seven things you can do to learn about mineral specimens.

To learn about minerals and mineral specimens you must see them and handle them. It is very important to handle them. A picture provides a limited one dimensional view of a specimen. It will not teach you the feel, heft, smell and taste of a mineral or allow you rotate it

three dimensions and look at it from all angles. This allows you to comprehend more easily surface textures and the three dimensional nature of different kinds of crystals. So you need to go to where most of the specimens are located. So here is what you must do. Visit museums and schools that have mineral collections, ask to see private collections, read mineral magazines and books, attend meetings of gem and mineral societies, visit gem and mineral shows, collect your own specimens and surf the net. Here is some information about these things.

1. Some great institutional mineral collections you should try and visit. They include but are by no means limited to the following and not all of them have their collections on display:

- Harvard University, Boston
- Yale University, New Haven, Connecticut
- American Museum of Natural History, New York
- Academy of Science, Philadelphia
- Bryn Mawr College, Bryn Mawr, Pennsylvania, near Philadelphia
- The Smithsonian Institution, Washington, D.C.
- A.E, Seaman Mineral Museum, Houghton, Michigan
- Carnegie Museum of Natural History, Pittsburgh, Pennsylvania
- Houston Museum of Natural History
- Los Angeles County Museum of Natural History, Los Angeles
- Canadian National Museum, Ottawa, Canada
- Royal Ontario Museum, Toronto, Canada
- British Museum of Natural History, London
- Sorbonne, University of Paris

Some of these collections may be partially accessible because of limited exhibit space, limited personnel time, or the collection(s) may be mostly or partly in storage. I chose to mention these few either because I have spent a lot of time studying the specimens in those institutions or because the curators granted me extraordinary privileges in handling and photographing their treasures. For a more complete listing and description of many mineral museums, see the 25 year index of the "Mineralogical Record" and look under 'Museums and Private Collections' in the General Index. Also see the book "World Directory of Mineral Collections" by the International Mineralogical Association, 1994.

2. Good private collections. See as many of these as you can. Donated private collections are usually the foundation upon which great institutional collections are built. Most collectors love to show off their collections. If you meet someone who has a good collection, introduce yourself and say "I've heard you have a wonderful mineral collection, may I come and see it?" It is rare that you will be turned down and usually a little persistence will gain you access. Among your fellow collectors resides much of the knowledge that you are seeking. Convince the collector or curator that you are interested and knowledgeable and the doors will swing wide to their specimens, knowledge and help. If you are granted access to a mineral collection, do not pick up any of the specimens unless you understand the correct protocol for handling mineral specimens. If you don't know about this, see further on and read the subsection titled, Specimen Handling Protocol.

3. Books. You should invest in some of these. As a collector, much of what you need to know is scattered through the mineralogical and geological literature, but some sources are much richer than others in information about what good specimens are. I have always had a pet

peeve about the descriptions of minerals in books. Many books will give lists of minerals found in various geological environments or found at various localities, but say precious little about the quality of those specimens, nor present a picture to see. My main gripe has always been “Where’s the beef?”. When pictures of the described specimens are not present, which is usually the case, try and intuit the knowledge of specimens that the author has. He may have profound knowledge of what fine specimens are or he may be a geologist or a mining engineer with a very limited knowledge. In the latter case, the author may wax enthusiastic about a mine that has three foot green fluorite crystals, but fails to mention they are only massive, highly fractured blobs of fluorite, barely distinguishable from the country rock and of interest only to people who want to make toothpaste. Many years ago when I was doing a lot of field collecting I called up Dr. Richard Jahns, an expert on pegmatites, at Stanford University. I asked him for advice about where to go in the Petaca mining district in New Mexico. He wrote the USGS Professional paper on the district. He enthusiastically told me about a fabulous mine there that had three foot fluorite crystals and sprays of columbite and tantalite in the walls of the mine. But he cautioned me, don’t tell anyone else! We found the fluorites as described above. Here are some books I have found particularly useful and instructive, or in other words have the most “beef” in them for specimen lovers.

“Das Mineral Reich, Branus”, 1903, or its English translation, in 1912. This book contains colored plates of what fine mineral specimens looked like in the late 19th and early 20th centuries. The specimens were taken from mostly German collections and mineral museums. For many years it was perhaps the best book to consult when you wanted to determine where one of your specimens stood in the hierarchy of mineral quality. Though the image quality in the book was good for its day, one wishes that the book could be republished using the best of today’s image reproduction. Still it is plain the best specimens of 100 years ago are still fine specimens today.

Dana’s “System of Mineralogy”, 6th & 7th editions, and “Dana’s Textbook of Mineralogy”, 4th edition. James Dana is generally considered the father of American Mineralogy and the various editions of his “System of Mineralogy” have long been cherished by American mineralogists and collectors. The “System” lacks descriptions of silicate minerals but has good crystal drawings. Pictures of fine specimens are lacking. However for each species, in the “Observed” section, there are mentioned many localities that have produced good specimens. I can’t think of how many times I have consulted these weighty tomes for correct locality information. A word of caution about these localities. Often they have been carried forward from earlier editions and references. I am convinced that sometimes the authors had never even seen a specimen from the locality they were referencing. When the reference was first given, the specimens from those localities were frequently the best ones available. Quality standards have escalated and many of the specimens would hardly be given a second glance by today’s collector. But if these localities were referenced by the “great god” Dana, they must be worthy of being included in new books. Right? Well, sometimes.

“Handbuch Mineralogie” by Hintze. Publication of this work began in the first part of the 20th century and has continued intermittently since that time. Although this work is in German, any serious mineralogist or mineral collector should at least be familiar with it. The complete work consists of 247 volumes of mineralogical information. Well, OK, it isn’t 247 volumes, it just seems that way. The work is so large and detailed that it is at first intimidating. Some Americans just throw up their hands and say, “Only the Germans would do something

like this.” This work by Hintze is to Europe what Dana is to the United States. It sort of reminds one of the Encyclopedia Britannica or the full unabridged Oxford English Dictionary. It makes Dana’s System seem rather anemic.

“Mineralogy for Amateurs” by Sinkankas, 1964 and subsequent editions. This is a deceptively simple looking book, but one that embodies a wealth of mineralogical knowledge and wisdom. It has many photos of good specimens and tells you about others. Get a copy and use it, you will find it rewarding. This is the one mineralogy book that we carry in our wholesale warehouse. Depressingly we find that it is difficult to sell, and it is in fact outsold by a hundred or more to one by books on the metaphysical attributes of minerals.

“Handbook of Mineralogy”, Bideaux, Anthony, Bladh & Nichols in 6 volumes. It sure doesn’t fit in a hand. The work is arranged alphabetically by mineral name, and each volume deals with chemically related groups of minerals like silicates, phosphates, etc. This will certainly become rated as one of the great mineralogies. The work allows only one page to describe each mineral whether it be an extremely rare, one locality mineral, quartz or calcite. At the top of each page is a brief discussion of “Crystal Data”. For the collector, perhaps the most interesting feature of this section is mention of the largest known crystal of that mineral. It often will not tell you what locality they might be from or much about what they look like, but you will at least know how big they get. I do not know how much work each of the authors did in writing this book, but Dick Bideaux was a real stickler for accuracy and I believe the accuracy of the data in this mineralogy may surpass that of all others. Dick offered a five dollar reward to anyone who could spot an error in the text, and if I recall correctly, that at the time of his death he had paid out less than \$100.

“Popular Guide to Minerals”, Gratacap, 1912. Written by a former curator of the American Museum of Natural History, it includes a description and some photos of specimens in the Clarence Bement collection which for its time was considered the greatest private mineral collection in the world. Its gift to the American Museum, thanks to the generosity of J.P. Morgan, instantly catapulted the museum to the top ranks of great mineral museums. When the museum received the collection it was reported that they had not a single specimen that was not bettered by a similar specimen in the Bement collection. Over the years, after the departure of long time curator Fred Pough, this magnificent patrimony was frittered away by inept curators and misguided museum policy. Although today, the curation again appears to be in competent hands, the specimens remaining in the Museums hands from this great collection are but a shadow of its former greatness. Gratacap infused his work with mineralogical wisdom for the collector, most of which is as true today as when he wrote it early in the 20th century.

“En Visitant Les Grandes Collections Mineralogiques Mondiales”, Guillemin, 1964 & 1972. The author visited many museums and private collections and made lists and a few line drawings of the specimens he thought were the best and published them in two paperback volumes. Had he sufficient resources to publish these with good color photos instead of line drawings, these books would be much better known to collectors than they are. Even so, these are good books to have if you are interested in fine minerals.

“The Worlds Finest Minerals & Crystals, Bancroft”, 1973. Perhaps the best effort up to the date of its publication to show what the best specimens in the world look like. Somewhat limited in the variety of minerals it depicts but certainly a benchmark for its time.

“Gem & Crystal Treasures”. Peter Bancroft, 1984. A wonderful accumulation of pictures of photographs and descriptions of classical mineral localities with descriptive text by a collector of considerable knowledge of such things. It also has some good pictures of fine mineral specimens from those localities. You should have this book and read it if you want to be a well rounded collector.

“The F. John Barlow Mineral Collection”, F. John Barlow, Robert W Jones & Gene L. LaBerge, 1996. Contains many good color photos of fine specimens in the Barlow Collection and many interesting “war stories” about John’s acquisition of his specimens. It is nice because the photos are scattered throughout the book with the relevant text adjacent rather than being all bunched together to save money. Much of John Barlow’s collection is now in the Houston Museum of Natural History. If you need to buy one book that will show you what fine specimens are, this is the one you should get. As in all books, there are some errors. The stannite pictured in the book is really a sphalerite.

“The Desmond Sacco Collection”, Bruce Cairncross, 1999. This book describes the specimens in Desmond Sacco’s collection and shows predominately specimens from South Africa and Namibia. Many of them are very fine, and it will give the collector a good perspective of what fine specimens look like from those localities. One young man I know considers this to be the “Bible” in so far as what fine minerals are. You will need to make up your own mind.

“The Magnificent Mineral Collection of Joseph A. Freilich”, a Sotheby’s of New York auction catalogue, (Sale 7586). The specimens pictured in this auction catalogue represent many of the specimens in the Freilich collection and many good ones are pictured here. Calling the collection “magnificent” is certainly an exaggeration when compared to some of the other great private collections of the world, but I suppose understandable considering the commercial aspect of the auction. Many of the great color photos were taken by the premiere mineral photographers the Van Pelt’s, although Sotheby’s neglected to give them credit for their photos in the catalogue. This catalogue and the separate list of hammer prices from the auction are important to collectors because this was the first time in at least 100 years that there has been a major auction of fine mineral specimens. The hammer prices at the auction were all over the map, from modest to silly, but they provided a concrete benchmark of how much people are really willing to pay for fine specimens.

Don’t go bothering Sotheby’s for copies of the catalogue because they were all sold out shortly after the auction. If you want one you will have to get them from dealers in out-of-print mineral books. There was a certain amount of smoke and mirrors involved in this auction. The real reserve prices on the specimens were known only to the auctioneer and one or two other individuals. Almost 40% of the specimens did not sell at all. Of the specimens that were sold 60% of them sold for less than the minimum estimate. Many of the specimens were sold for about 70% of the low estimate which was about as low as the auctioneer seemed willing to accept. A number of specimens in the actual Freilich collection were not in the auction because they had not yet been paid for and were returned to the dealers who supplied them. Some of the specimens that had not been paid for were purchased by Sotheby’s because they thought the auction would not be successful without them. One very knowledgeable dealer was shocked when a pyrite specimen from Peru sold for \$75,000 and a wonderful crystallized gold called “The Eagle” only brought \$69,750. Dealers bought more than just a

few of the specimens. One dealer bought back a specimen that he had sold Mr. Freilich because he was able to buy it for about half of what Mr. Freilich had paid for it. The specimens in the collection were related to the much more valuable collection of mineral books owned by Mr. Freilich. Conventional wisdom has it that Sotheby's really wanted the books, but to get them they also had to take the minerals.

“Tsumeb, George Gebhard”, 1999. Tsumeb, Namibia (South West Africa) is a classic locality known to all collectors. This locality has been mined for more than a hundred years, and almost all but the most specialized collections have specimens from this location. You can't be a mineral collector and not be familiar with the wonderful specimens this locality has produced. This book provides the collector with pictures of fine specimens from Tsumeb, wonderful pictures of the locality, and a good historical perspective.

Mineral magazines. Probably the most influential is the “Mineralogical Record”. This magazine has been published without interruption since 1970. This periodical in all its issues may be the single greatest repository of information about fine specimens. Its articles and photographs will help you learn more about fine mineral specimens than any other single source. It's editor, Wendell Wilson, produces a magazine that is a tough act to follow. He is, however, quite shy of putting controversial items in the magazine relative to some of the foreign magazines. This may be due, at least in part, to the litigious nature of the American culture more than a fear of controversy. Another good magazine that has been in existence much longer is “Rocks & Minerals”. There are a number of good foreign publications as well. Two German magazines, “Lapis” a tough competitor for the “Mineralogical Record”, and “Mineralien Welt”, come immediately to mind.

Another word of caution. Sometimes articles are written with the hope of advertising and enhancing the desirability of the specimens described. Other articles are written by authors who love the specimens of a particular area and/or hope to infect others with their enthusiasm. Most of the time the authors just want to see “their name in lights”, pass on knowledge they have accumulated, make a name for themselves or all three. Most magazine editors are willing to cooperate with these goals to a certain extent for the sake of good articles for their magazines. Many magazines do not pay for the articles they publish or, if they do, the money would not even provide a minimum wage for the authors. Usually there must be some other payoff for the authors than pure altruism. If you can discern these motives, you can get more information from the article than would otherwise be the case.

4. Gem and mineral shows and dealers. A great part, perhaps the greatest part, of mineral collecting is your interaction with other mineral collectors, dealers & curators. If you don't believe this, consider the following: You wake up in the morning and everything is the same except you are the only person left on earth. Would you still be interested in building a fine collection of minerals or anything else? I think not. Philosophy aside, the Tucson Gem and Mineral show is the best place for a collector or dealer to interact with his peers and the most intense learning experience that a collector can have. Every February for more than fifty years mineral collectors curators and earth science professionals from across the USA and all over the world converge on the desert community of Tucson, Arizona. Here they interact with each other, listen to or give lectures, buy, sell and display mineral specimens, books, gems, jewelry and vast amounts of any imaginable related material. It is the ultimate bazaar of our hobby. This is the “Mecca” of the mineralogical world and you owe it to yourself as a mineral person to make the pilgrimage at least once in your life. More on this show later.

Many other gem and mineral shows are also worthwhile. The big European show in Munich in October is exceptional and the shows in Denver in September and the French show at Saint-Marie aux Mines in June are good. It is at these shows that you will be able to meet and get to know mineral dealers and learn about the price of minerals. You should visit individual mineral dealers at their homes and shops when ever you can. Unless you become strictly a field collector, dealers will provide you with most of your specimens.

5. Field collecting. If you learn to collect your own specimens in the field, it will add a substantial dimension to your appreciation of minerals. Climb down 600 feet of wooden ladders of questionable integrity into an abandoned mine, camp there in darkness for a day or two, exhaust yourself breaking and moving rock, collect a pocket of good specimens, carry them back up the ladders on your back and you will come away a different person. Try it, you will remember it the rest of your life and strangely enough, if you are young, you will want to do it again. It is an unforgettable experience to break into a pocket of fine minerals that has been there for millions of years and collect them. The problem is that it is not easy to do and more difficult yet to make a living doing it. Even the most successful field collectors do not live high on the hog. Why more collectors are not killed in abandoned mines is a mystery to me. I have done more than a little of this kind of collecting and have had a couple of close calls from falling rocks that could have killed me. All field collectors worth their salt have harrowing stories about how they nearly met their end in quarries and abandoned mines. But when you are young you know you are never going to die.

If you want to field collect successfully, you should locate an experienced field collector through gem and mineral societies or internet chat rooms who you can talk into taking you under his wing and showing you the ropes. Carry his rock hammers, pay for the gas and all the food, laugh at his jokes, tell him how handsome and intelligent he is. What ever it takes, it will be worth it. It is not that you can't do it on your own, but an experienced field collector to guide you can save you years of effort and make your collecting more productive by an order of magnitude.

6. Gem and Mineral societies. Many of these amateur societies exist all over the United States and sparingly in other countries. Most of them are oriented to gems and jewelry making even though they usually have a few lonesome souls whose main interest is mineral specimens. A few societies are mostly mineral oriented, and you will need to find one of those to join. Here you will meet your soul mates. If you have no idea how to connect with one of these clubs, get a copy of the most recent "Buyers Guide" edition of the "Lapidary Journal" which usually comes out every May. In this guide, among many other things, is a listing of gem and mineral clubs which is alphabetical by state and city. The listings give contact numbers. There are also foreign listings. Many gem and mineral societies now have websites. The Internet can provide you with many contacts. Just Goggle your request. Also the Internet has various chat groups devoted to gems and minerals. Wwwwmindat.org, hosts a number of chat groups specializing in various aspects of mineral collecting. Here you can ask for information about groups or people in your area. You will find many people willing to help you. If you live in a country where there are no listings, professors at your local university should be able to put you in touch with kindred souls.

In the United States, perhaps the most influential institution which has shaped the perception of what quality specimens are has been the American Federation of Gem and Mineral Societies and their regional federations. The Federation has developed a set of rules

governing competitive gem and mineral exhibits that is still used today. If you decide to enter these competitions you do so at your own risk. In addition to the rules, you will learn that the decisions of some judges can be arbitrary and that some of the judges don't know all that much about minerals anyway. These rules spell out the different categories in which you can compete, the things the judges look for, and how many points can be won or lost for different aspects of the exhibit. These include perfection (freedom from damage), rarity, labeling, quality of exhibit (are there wrinkles in the fabric lining the exhibit or lint on the liners?, I kid you not). In the mineral specimen competition there are different size categories in which you can compete: micromount, thumbnail, miniature, cabinet, etc. Federation rules specify that specimens competing in the thumbnail category must fit within a 1 inch cube as displayed, and miniature size specimens must fit within a 2 inch cube as displayed. The "as displayed" means that when sitting in the display case, you must be able to set a one or two inch cube down on top of the specimen and not have it reach beyond the walls of the cube. There are categories for different kinds of specimens: self collected, minerals containing some element like copper, educational, pseudomorphs, etc. The rules specify that you can get up to a maximum number of points if all your labels are correct, if your display is perfect, etc. Most of the time competition hinges on the quality and freedom from damage. When a collector loses a competition because some of his specimens have some slight damage, you can imagine how closely he will inspect future specimens before he buys. The European collecting community which does not have any similar competitive environment does not have the mania for perfection of their American cousins. The influence of the federations has been declining for a number of years, but the emphasis on perfection persists.

7. Surfing the Internet. Increasingly, the Internet and the information on it has become important to learning about minerals. For some people it has largely replaced the traditional sources of information represented by books, magazines, gem and mineral societies, and gem and mineral shows. You can interact with people with similar interests in chat groups, and you can learn about the technical side of mineralogy from publications available on-line. If you are interested in building a collection, the Internet is full of hundreds of web sites created by people who would love to sell you specimens with more pictures than you can look at. Many are for sale at fixed prices and others are for sale at auction on sites like E-bay. The auction sites and the dealer web sites are a good way to learn about specimen pricing. There are dealers who specialize in high end specimens, rubbish specimens, and all intermediate qualities. I would caution you to pay close attention to the size of the specimens because you will find when the specimens arrive they will usually look smaller than you imagined them to be. Also keep in mind that the people who take pictures to post on the net often know how to take really good pictures and that when the specimen(s) arrive they will frequently look inferior to the pictures you saw on the net. A lady in makeup, nice clothes, a new hairdo and high heel shoes under soft lighting will always look better than one who has just finished a hard day's work. That is why you never see Playboy center-fold models walking around on the streets. They don't exist, in fact they never existed outside of the image in a camera.

An increasingly important web site for collectors and even professional mineralogists is www.mindat.org. Here you can find many things included in standard mineralogy texts plus much of interest to collectors. This site contains a searchable database listing thousands of localities and pictures of thousands of mineral specimens from these localities. The chat groups on this site are frequented by the most knowledgeable and sophisticated mineral

people in the world. They also have an extensive list of links to other websites. You can learn a great deal here and can share your knowledge with others.

Huzzah! Now that you have completed reading about the seven things to do in your quest to reach mineral collecting nirvana, perhaps you will read further. What follows are some observations about the various kinds of mineral collectors. You may be one or more of them and if not, you will probably become one. Like most vocations, it will take you about ten years to learn your way around the block, and then another ten years to get good at it. After ten years, if you have applied yourself to doing all of the above you should be able to look a well crystallized mineral specimen and know what it is, where it is from and how good it is relative to others of its kind. If you can't you probably need another 10 years of seasoning.

On high end dealers and heavy hitters.

There is a level of collecting and dealing where only high-priced specimens are desired. Many of these are what we might call "world class" specimens. The prices of such specimens in recent years has escalated into the realm of fine art with similar prices, and marketing tactics by dealers as well. For many years back in the 1960's for instance, \$2,500 was about as much as you could ever hope to get for any mineral specimen unless its gem value was greater. Then in the 1970's it moved up to about ten times higher yet. Today's the top price has escalated yet another order of magnitude with some specimens reported being sold for over a million dollars. It is to the advantage of the top-end dealers to pretend that such prices are commonplace, and if you balk at the high prices the implied threat is that you had better get with the program or you won't get any good specimens. It used to be that the going price of a fine specimen was "X" dollars. Periodically someone would come along and be willing to pay "2X". The guys who would pay "2X" often knew they were paying more than the market price and also knew word of this would spread and they would be offered a lot of specimens and get first crack at the really fine specimens. When this type of collector stopped buying, reality would set in for a few months or a year until the next guy would come along and start paying big prices. Then the rush was on for the high end dealers to try and get to that buyer and sell him specimens till he burnt out.

Many of the big buyers understand they don't really know all that much about minerals and work with one or a few dealers to supply them with specimens, often relying on them for advice. Before you can sell specimens in this elevated market, you must first sell yourself. Once you can convince the "money man" you are knowledgeable and trustworthy, you are "in" and can sell him a lot of stuff. I say "him" because almost all the big buyers are men with the exception of one lady in Europe who has been a major collector of minerals for longer than all the men who are currently paying big prices for specimens. Most of the really expensive specimens are not sold at gem and mineral shows, but directly to well healed collectors. However high end dealers attend the big shows because here they have the opportunity to meet heavy hitters that they would not otherwise have. Once a "big buyer" starts buying then the dealers do what they can to "develop" him as a client in a way that will allow them to sell him more specimens and more expensive specimens. Of course, they will try to wean him away from buying specimens from their competitors. Sometimes real cat fights erupt among the high end dealers. Some dealers operate on the principal that there are no new customers, only other peoples customers.

Like all high end dealers in antiques, coins, paintings, etc., the high end specimen dealers know it is better if they can set themselves apart from the "riff raff" dealers. They do this by

segregating themselves as much as possible from those dealers who may sell good but not the best specimens. At the Tucson show, this has taken the form of running their own high end show at a separate venue in a country club hotel in the northern part of the city. At the other venues they must jostle cheek by jowl with their often not well-healed competitors and occasionally suffer the outraged howls of the older long-time collectors that are shocked by the current prices. They get used to that, however, but what really bothers them is when one of their "fish" i.e., big buyers is in the room along with some of these those old time, knowledgeable collectors and the "fish" hears the collectors, who obviously know what they are looking at, start saying things like, "Oh my God, I thought the specimen was fairly priced and was thinking about buying it when realized I was off by two zeros! can you believe it?", or "Someone has got to be kidding on these prices. Just last year I bought one of these, even better than that one, and paid about ten percent of this price." These kinds of comments can be deadly, and only a certain amount of them can be explained away. A common tactic to keep from scaring people away is to put on the labels of extra expensive specimens, "POR" which means price on request. The implication is if you are a person of modest means you can't afford the specimen. Of course to be fair, these old knowledgeable collectors are often living in the past, still thinking a dollar today still has the same value as it had 20 years ago. They also don't like the idea the new prices are real because it means they won't be able to add many fine specimens to their collections. I must admit I look at some of the specimens with high prices on the Internet and wonder who in the world is going to pay them. But in a gradually inflating economy, whether it be the 21 century USA or the Roman Empire, many older people are and were outraged by the new prices.

On general and specialty collecting.

As a mineral collector you will soon find yourself becoming partialized to certain kinds of minerals. It may be that you will find yourself attracted to perfect small specimens like micromounts, thumbnail or miniature sized specimens. Perhaps you will find yourself drawn to minerals from one locality, state or region. Perhaps you will find you want to concentrate on a particular mineral like quartz or calcite, or on a particular mineral group like copper minerals, sulfosalts or feldspar. The possibilities are extensive. Often collectors will have general collections and sub-collections of various specialties. Of course over time these things tend to change and morph into others. Specialty collecting is something that happens naturally to collectors and can produce very interesting collections. If you specialize you will soon find you know more about your specialty than almost any one else, and you can build a unique collection that no museum can match. One collector I know commented that the longer you collect, the uglier the minerals. He said that if you collect long enough you end up collecting black minerals. This is because color has ceased to be important and other things like crystal form, and rarity have become of paramount interest.

On field collecting.

I know a few collectors who hardly ever buy specimens. They collect their own. Some of these hardy individuals have spent their lifetimes running around, often in terrible weather exploring remote places and dangerous abandoned mines. Some of them have transformed themselves into human TBM's (tunnel boring machines) and eat rocks for lunch. Well, if not rocks, terrible things from ancient tin cans that have been bouncing around in the back of the car/truck so long that the labels are long gone. Some of the things they have collected are amazing. However, unless you are very smart, extra hard working, and lucky, I would advise you not to quit your day job. Most of the problem in making a living out of field collecting is

that you just can't move enough rock to get to the minerals that will allow you a comfortable life. But then again who would describe field collecting as a comfortable life?

If you pursue this kind of collecting, you will get a lot of good exercise which will probably let you live years longer than if you choose the silver pick kind of collecting. There are few experiences in life as gratifying and as memorable as breaking into a wonderful pocket of beautiful specimens and collecting them. This experience is what usually hooks a collector for life and sets him on the path to being a dedicated field collector. Although you will not find many world class specimens, if you persist, eventually you can put a display together that will stop traffic and be all the more impressive because you collected them yourself. Most field collectors don't work at it very hard or if they do they live in areas that don't offer many good opportunities for field collecting. It used to be easier to collect in the field. Today it seems that most of the places you would like to collect are owned by someone else, posted "keep out" or closed to collecting for other reasons. Some really hard core dudes make middle of the night collecting trips into working quarries, hang from ropes on rock faces and hide out from the guards when they come around and are occasionally busted for trespassing.

If you really want to get hard core, here are some things you will need to learn to be a successful field collector. You will need to learn how to read topographic maps and learn how to find your way around geological libraries to locate leads to possible productive collecting areas. You will need to learn about various kinds of collecting tools, and if you get serious, learn about various kinds of heavy equipment and how to use explosives. Also you will need to learn the laws regarding explosives, claims, government land of various kinds, and the laws regarding trespassing. You will need to learn more than just a little bit about geology and learn how to be persistent. You will need to learn how to locate the owners of the land on which you want to work, and how to charm them into letting you work on their land. You will need to learn how to use GPS equipment to find where you are relative to where you want to be. You will need to get a four wheel drive vehicle and know how to set up a comfortable all weather camp. You will have to learn how to sight identify minerals and use a hand lens to identify minerals and rock types. You will need to learn about the various dangers present in abandoned mines: poisonous air, rotten timbers, dangerous ladders, bad ground that may send a rock to squash you flat, and old explosives, to name just a few. It will help if you can learn some rock climbing techniques and how to get up and down ropes. You will need to develop the ability to drive night and day to get somewhere near nowhere. You will need to develop "the eye" which is a sort of psychic ability to discern where the crystals are hiding. Then of course you will have to learn how to clean and trim the specimens once you have collected them. Thank God this is only a hobby.

Field collectors are a remarkable and accomplished breed. They are perhaps the rarest and purest form of mineral collectors. They hearken back to the very beginnings of what we now call the earth sciences and in many ways embody the simple thrill and youthful joy of the treasure hunt. If you look you will find them "out there" trekking over just one more mountain, digging down just another foot and hoping for just a little bit longer. Remember, the first law of field collecting states: The best to be found is still in the ground and the best that has been found has been ground! (Ground up into powder in the mill and processed into metal)

In the southwestern part of the US there are a lot of abandoned mines. Thirty years ago, before the government started closing them up, and the litigious atmosphere was less oppressive, many were freely available for any fit person to explore. Many of them were base

metal mines with substantial oxide mineral components, especially large quantities of difficult to characterize iron oxide minerals known by the old, venerable name "limonite". Some of these mines were particularly dirty and after collecting for a couple of days you came crawling out looking like a demon from the 9th circle of hell. You were completely filthy, impregnated with fine limonite dust which would take several long showers to remove and underwear that would remain forever pink.

We were in central Arizona, and had left the mine in mid morning to spend the next 5 hours climbing the steep trail up along the canyon wall to reach our car. Then we hit the road for the ten+ hour drive back to Los Angeles and our day jobs the next morning. After five or six hours we had to stop for gas. The doors flew open, beer cans and an empty bottle of Thunderbird clattered out onto the concrete next to the gas pumps. We created a further disturbance with good natured horse play and squabbling about who would use the bathroom first. There were a couple of cars full of good citizens gassing up at the same. Simultaneously, they grabbed their kids, jumped back in their cars, rolled up their windows and locked the doors. Wow!! Did we cause that? Yes, I guess we did. It was at this point I realized that I had probably achieved some proficiency as a field collector and at the same time wondered just how much further down that road I wanted to go.

On collecting micromounts.

What do you call a pygmy rapist? Its obvious! His a micromounter. I apologize, that was a terrible joke. Micromounters take big rocks and break them down into little ones and put them in little plastic boxes. Also this is something you do for fun, not profit. You do it because you want to learn about minerals and in pursuing this collecting discipline you almost always end up learning more about minerals than your cousins with their big flashy expensive rocks who look at you like you are afflicted with some sort of mental disorder. When and if you sell your micro collection, conventional wisdom tells a dealer that he can't pay more than about a dollar a specimen for your collection and make any money on it. I suppose it could happen, but I have never seen or heard of a case where a micromounter has made money. So resign yourself to the fact that you will never make any money by collecting micromounts and will spend huge amounts of time playing with rock trimmers, glue, and little plastic boxes.

Micromounting is a solitary discipline because of the considerable labor involved and is usually only done by one. The collector of flashy minerals merely buys his specimens, plops them in a drawer or a display case with a label that has been made by some dealer. You on the other hand must carefully examine mostly large ugly looking rocks under a microscope to locate the best nest of barely visible crystals, break the rock down into little bits taking care not to damage the tiny specimen(s) you are trying to create. Then you get to clean it, mount it on a tiny pedestal of cork, plastic, cactus thorn, hair, etc. and then carefully glue it into a tiny box, a tiny plastic mausoleum, where with luck, the little specimen will spend eternity undisturbed and protected from the vicissitudes of life. You then you get to carefully label the box with information about its contents. And after all that, you then have the privilege of looking at it from time to time and showing it to the occasional rare person who might be interested in looking at it.

What on earth could induce someone to collect these kinds of minerals? Well, just look through the microscope at some good micromounts and you will understand. There you are in a glass bottom boat slowly cruising above the most amazing fairy gardens of shapes and colors. Things straight out of a science fiction movie. You could never invent or imagine such things. If these were blown up in size, they would put to shame most mineral specimens

because of the perfection of their crystals. Once you are hooked, you usually spend the rest of your life chasing these tiny, perfect jewels. Micromounters are quite sociable creatures and have numerous conferences where they trade specimens among themselves, look at each others specimens, and listen to lectures. They even have a Hall of Fame. Many advanced micromounters become micro photographers so they can better share their amazing little treasures with others. Their collections usually contain wonderful specimens of species not available to collectors of larger specimens because Mother Nature doesn't make them any larger. Micromounters are better at mineral identification than most because they see a wider range of mineral species in good crystals than their cousins who collect larger specimens. There are many more minerals which exist as fine micro crystals than occur as larger crystals that you can appreciate without a microscope. If you want to learn about these minerals, you will need to become a micromounter.

Each micromounter develops an individual style of mount. There are two or three more or less standard sizes of little plastic boxes used. In past generations when small plastic boxes were not available, the variety of boxes and containers used by micromounters was quite diverse. It seems everyone develops a somewhat different method of preparing these boxes, using different materials to mount specimens on, and different labeling formats. Considerable ingenuity has been brought to bear on how to mount various kinds of specimens, such as tiny single crystals, unstable minerals, etc. The varieties seem endless. The way each mounter prepares his specimens, prepares the boxes, mounts the specimens and labels them is like a signature. If you want to become a micromounter, I could recommend a couple of books. The "Complete Guide to Micromounts" by Milton L. Speckles and "The Complete Book of Micromounting" by Quintin Wight.

I was introduced to micromounting by Neil Yedlin who was elected by his peers to their Hall of Fame. He collected other kinds of minerals and had a wonderful book collection as well. When I lived in New York City, I used to drive up to New Haven and visit him, and would usually buy a few specimens and books from him. He always made time for us to spend some time looking at his wonderful micromounts. I had always thought I would like to do that kind of collecting but never quite got to it because I was always chasing around to various countries trying to buy specimens for my wholesale mineral business. Then one day, because I got around, I happened onto an auction mandated by the state of Arizona for the estate of Bob Becker. He had died without a will and had no relatives to claim his things. Among many other items, his micromount collection was for sale. I am not sure what prompted me to bid on the collection, probably the memory of Neil Yedlin and his wonderful micro collection, but I was high bidder for the micros and hauled my treasure back to California.

Shortly after I purchased the collection I wandered into the room of one of the few dealers at the Tucson show who catered to micromounters. It turned out to be a real nest of them. They were all talking to one another in the sociable way they do while looking through microscopes. Word of my purchase had preceded me, and one of the ladies looked up from her scope and said to me, rather crossly, "What do you want a micromount collection for?" To them I was known as a wholesale dealer who sold large quantities of things like quartz crystals and Brazilian amethyst. In other words, a pillaging barbarian. The best way to defuse situations like this is to admit to what the person is implying about you. So I told her, "Well obviously to cloak myself in a veneer of mineralogical respectability." Another sour look and a bit of a stiff smile and the matter was closed. I was accepted into the pack, well sort of.

In the years since that incident I have made it a point to salvage micromounts from the many of the tens of thousands of specimens that flood through my warehouse. I've extracted out many specimens that have the potential to make wonderful micromounts and ship them up to my good friend Dick, Dr. Richard Thompsen. He is a sharp geologist and in his retirement a demon micromounter. He makes my micromounts for me. Now you know my dirty little secret. I am grateful that he considers the specimens I send him worthy of his time. The mounting time he has saved me has enabled me to create and develop a computer database program that has the ability to make the labels for my micromounts and other specimens. This software application has gobbled up thousands of dollars in professional programming time and thousands of hours of my time for development and testing. It is becoming quite useable and none to soon. I am no longer able to print by hand the small neat labels needed to label micromounts. Even on my best day, I could never match the character compactness, legibility, and neatness that computer printed labels provide.

I think a lot of dealers respect micromounters for their knowledge. More micromounters should approach dealers and propose that they make micromounts for the dealer if the dealer will supply the specimens. Many dealers would be amenable to such an arrangement. Often when a dealer gets a collection or a lot of minerals, it includes specimens which could be judiciously trimmed to produce mount material without loss of value to the original specimen. I have "de-microed" a number of collections and many large lots of specimens and harvested terrific micromount material.

On collecting rare minerals or systematic collecting.

There are about 4,000 known "official" minerals and each year roughly 50 more are approved by the CNMMN (Committee on New Minerals and Mineral Names) of the IMA (International Mineralogical Association). The number of known minerals is really very few compared to the numbers of species known in the plant and animal kingdoms. The number of known insect species exceeds a million and even the number of different fleas probably exceed the number of minerals. With such a relatively limited number of species it is possible to build a collection that contains a majority of known minerals. No collection in the world has them all, and there are probably less than 25 collections in the world having 80%. There may not be a single collection that has 90% of them. The people in charge of many large institutional collections frequently don't have any idea of how many species they have or know which ones they lack. A lot depends on how much you believe the labels accompanying the specimens and which list you are using to define "real" minerals. A few rare species collectors seem to derive most of their satisfaction from checking off minerals from their "want list" when they obtain a missing mineral. This is a shallow sort of satisfaction but most who attempt this rigorous discipline learn far more about minerals than the average mineral collector.

The standard list that many collectors use as a Bible is "Fleischer's Glossary of Mineral Species" by Joseph A. Mandarino & Malcolm E. Back. Europeans tend to use the "Strunz Mineralogical Tables" first created in 1941 by the venerable Hugo Strunz and updated periodically. If anything, the Strunz list is gaining in popularity and may become the internationally accepted standard. There are other lists and each is a little different. Minerals approved by the IMA (International Mineralogical Association) are the basis for such lists. The number of minerals on each list depends on how many of the grand fathered mineral names the author(s) are willing to accept. It also depends on how many minerals the IMA has accepted that the author(s) reject, and how many minerals that the IMA has never accepted that the author(s) consider valid. Every mineralogist worth his salt will never entirely agree

with the IMA or other mineralogists on exactly which species are valid or even what exactly constitutes a mineral. If you collect long enough, you will form your own opinions.

If you choose this type of collecting, you will need to determine the quality of specimens you will collect. Will you be willing to accept a fly speck of a mineral inside a small gelatin capsule scotch taped to a label. On the other end of the spectrum is the rare species collector who insists his specimens be at least an inch across showing the mineral richly by eye and if the mineral forms in crystals to show well-formed crystals on the specimen. If you choose the latter, you will likely never obtain even half the known species since they just didn't make them like that. Or even if one or two specimens like that really do exist the odds are that they will never be offered for sale or trade. Most rare species collectors when confronted with lowering their standards or never acquiring a specimen of the species will usually lower their standards and accept specimens of lower quality, even sometimes a fly speck in a gelatin capsule, until they can get something better which might not exist anyway.

Some dealers in mineral specimens have commented, only half in jest, that there is only one thing rarer than a rare mineral, and that is someone to sell it to. It has been joked that sometimes a mineral is so rare that it isn't even on the specimen. This means that often the amount of a particular mineral on a specimen is so small it cannot be seen even with a powerful reflected light optical microscope. Sometimes the amount the mineral is so small they can only be imaged with a high resolution scanning electron microscopes or microprobes. When it takes this kind of instrumentation to verify the presence of a mineral, the collector or curator is almost always at the mercy of the dealer selling him the specimen because he does not have access to that kind of equipment. In such cases, it is a temptation for the rare unscrupulous dealer to label a likely looking rock with the name of a really rare species, knowing it unlikely the fraud will ever be discovered. In the long run such dealers are eventually found out and are forced out of business. The rare mineral collecting fraternity is small and word travels fast.

Collections of rare minerals are sometimes referred to as "arrow rocks" because dealers often glue tiny paper arrows on the specimens that point to the minute area which contains the mineral of interest. Collections of rare minerals typically look terrible because in most cases the crystals, if there are any visible crystals at all, are so small they can only be seen with a microscope. Quite often what you are looking at in rare species collections are rocks with specks of rare minerals on them. For example, collections of minerals from the zinc mine at Franklin, New Jersey look like rock collections rather than collections of crystallized minerals. A friend of mine had a wonderful collection of Franklin minerals, one of the best in private hands, and was showing it to a beginning collector who liked to collect his own specimens. He observed, "I see you like to collect your own specimens too". Meaning that my friends collection looked like the rubbish he was used to collecting.

Rare species collectors are lonely people because there are not many people with whom they can share their avocation. They are the nomads of the mineral collecting fraternity. Information about the availability of rare minerals is difficult to come by. A mineral may be rare, but it may be abundantly available at a particular mine. Such is the case of teallite, a rare lead tin sulfide which is one of the main ore minerals at the Carguaicollo Mine in Bolivia. One afternoon a friend of mine and I wandered into the camp and bought more than 200 pounds of beautiful cleavable teallite at prices only somewhat higher than the smelter would pay.

Sometimes a species is really rare, and only one piece the size of your fist or smaller was found. However, that piece can be broken up into hundreds of tiny specimens which can at least temporarily saturate the shallow market for such things. The truly difficult fact to know is that there was only one small piece found and it was broken into six one centimeter size specimens and hundreds of tiny ones. A knowledgeable collector will know this and try to lay his hands on one of the centimeter sized specimens rather than a gelatin capsule holding only a pitiful speck of the mineral. If only two specimens are known, that fact will be enthusiastically advertised. If, however, 500 tons of specimens of a particular mineral have been found, this fact will not be advertised. Huge quantities of a particular kind of specimen make it "uncollectable". Not many collectors will put a piece of common Brazilian amethyst in their collections. A dealer may advertise antlerite as a rare species, and on a world-wide basis it is not common. But fail to mention that at Chuquibambilla, in northern Chile, home of the largest open pit copper mine in the world, antlerite is an ore mineral.

If you decide to collect rare minerals, keep in mind that you may only be able to recover a small percentage of your purchase price should you need to sell the collection. Here is more food for thought. Depending on whose list of valid mineral names you are using, there are about 4,000 mineral species known. Each year the IMA-CNMMN (International Mineralogical Association-Committee on New Minerals and Mineral Names) declares some minerals to be invalid because they are determined to be varieties of already known minerals or mixtures of other minerals. Most of the ones that are approved are of little interest to the average collector because they are unattractive. There are approximately 40,000 mineral names that have at one time or another entered the mineralogical and geological literature. At one time, these were all considered to be valid minerals. For one reason or another, over the last century, most of these mineral names have fallen from favor and been cast upon the mineralogical rubbish heap. Most all of them were sold by mineral dealers as being real mineral species. Using these numbers, it would appear only 10% of the minerals that were at one time considered valid, are still valid. Based on these numbers one could make the case that if you buy a specimen of a rare mineral species today, there will be only a 10% chance that it will be considered a valid mineral 100 years down the road.

The process of throwing out the names of minerals that are shown not to be valid and approving the names of new minerals will continue into the foreseeable future. We think however that the numbers of minerals cast into the outer darkness will diminish substantially because of the rigorous vetting process instituted by the hard working members of the IMA-CNMMN.

The market for rare minerals is small, but the world market for them is large enough to keep a few dealers interested in obtaining and selling them as part or most of their inventory. It is interesting to note that in Russia a cottage industry has developed to find, describe, and sell rare specimens. The proceeds from these sales has helped keep some few of the mineral laboratories in Russia warm in winter.

As in all fields of human endeavor, competition develops naturally and it is no different in the field of rare minerals. The prime objective is to collect as many species as you can. The more successful you are, the smaller your "want list" will be. A small want list can, for advanced collectors, be a way of competing. He who has the smallest want list is king. If you are a rare species collector and can get your want list down to a page or less, that will usually impress

and perhaps even intimidate your competitors. Once the list is down to a page, then you work toward making larger margins on your page, increasing the font size, and even perhaps some day decreasing the number of columns. You will, however, never get them all.

On the new age or metaphysical use of minerals.

During the last twenty years there has come into being another kind of collector, perhaps “practitioner” might be a better word, which has had a large impact on the mineral business. These are a group of people who believe crystals and minerals can be useful and sometimes powerful tools allowing them to achieve a variety of goals. Although they rarely know the difference between a crystal, mineral, or a rock and are vague about the scientific properties of minerals such as hardness, cleavage, refractive index and atomic structure, they firmly believe they can use crystals to improve their health, happiness and success in life. Many believe they can feel energy given off by minerals and rocks, and the more advanced practitioners claim to be able to intuit what various minerals and rocks can be used for.

These practitioners borrow from a variety of ancient beliefs about gems and minerals. Their beliefs range from native American Indian beliefs, to Chinese and Asian beliefs to those of the ancient Greek and Roman cultures. A large group of them subscribe to the tenants of “Feng Shui” philosophy and use various crystals, gems and minerals to attempt changes in the “charkas”. There are many publications that provide information about the “powers” of crystals. Few, if any, of these powers can be measured by scientific instrumentation or experiment, but this does not seem to detract from their belief that crystals are important to helping them along in life. Frequently when they say “crystals”, they assume it means only quartz crystals and assume others will automatically know they mean quartz crystals.

Sometimes the people in the more traditional mineral collecting fraternity refers to the metaphysical crowd as “Healie Feelies” because of their propensity for picking up the crystals and “feeling them”. All in all they, represent a substantial part of the mineral market and some of them develop into mineral collectors They have their own vocabulary and talk about things like “ancestor crystals”, chakras, and how to cleanse and program crystals. I had one customer who bought some quartz crystals so he could program them to clear traffic. I was told that some of my quartz crystals had found their way under Tina Turner’s bed to help give her more “energy”. In the metaphysical community there are people who make their living teaching various aspects of these sundry philosophies and how to use specific crystals and stones to achieve results. If they become prominent enough they write books on such teachings.

I asked one of the best known authors in this community how she came by all the metaphysical knowledge she had written in her book. I commented I thought it must have been direct revelation since she did not site any references. She assured me everything was all quite scientific. Whenever she encountered a new mineral, she would get together with several advanced practitioners and they would hand the specimen around and “feel” it . When three of them agreed as to what the mineral/crystal was good for, then that was what would appear in the book.

If these people were not such a large force in the market place, I would be able to travel less to foreign localities and buy fewer specimens. Overall, the hobby and even the science of mineralogy ultimately profits from their interest in minerals.

On Mineral Dealers.

There is probably no such thing as a pure mineral collector or a pure mineral dealer. Often the distinction between them blurs, sometimes to the extent it is difficult to tell which is which. If you are a field collector you rarely keep all you find. You are often willing and anxious to trade or sell your duplicate material. When you do, you are a dealer. If you are a silver pick collector you may, from time to time, need to sell some of your minerals to help pay unexpected bills. When you do, you are a dealer. Even if you only trade some of the specimens in your collection for different or better specimens, you are, at least to some extent, a mineral dealer. Mineral dealers buy and sell mineral specimens to make a living or at least partially make a living. The best mineral dealers love minerals and have their own collections, even though they may be limited in scope and specialized. If you don't love minerals it will be difficult to learn all you need to know to be successful. Once you are hooked on minerals it is difficult to get away from them. John Patric, one time mineral dealer and later a show promoter, who is not universally loved and admired by those who know him, remarked with great insight: "If you think the mineral business is easy, just try and get out of it." Mineral dealers get to know their customers and what their "pucker factor" is. The pucker factor is a price above which a collector will not buy a mineral specimen. Although this may seem a bit callous, it is necessary for a dealer to know what kind of specimens his customers want and how much they are willing to pay. Without this knowledge they will not be able to help their customers build their collections. There are some questions collectors should ask the dealers who supply them: What is their policy on returning specimens? What is a dealers policy on accepting specimens from their collection to trade for other or better specimens? How much of their initial purchase price can they expect the dealer to return if they need to raise money? The more convoluted the answers are to these questions are, the more reservations the customer should have concerning the dealer. Most dealers, if they have to pay their own money for a specimen will want to double their money. If they know for sure who will buy a particular specimen they may be willing to work on a smaller margin. If the customer will give the specimen to the dealer on consignment the dealer is usually willing to work for a smaller percentage.

On museum Curators

To be a successful curator today you must be comfortable with schizophrenia. Most mineral curators have many different, and sometimes conflicting, masters they must try to satisfy. Museums today are not what they used to be. Curators today are increasingly being told they must scramble and provide an increasing amount of their own funding. To achieve this, museums and curators have to compete in the marketplace for the attention of the public and get that public to pay for an increasingly large part of their budgets. This means collections, unless they can be used to help achieve this objective, are increasingly considered by management to be excess baggage. In practical terms it means mineral collections must be used to attract the public and if this can't be achieved the collections will be placed in long-term storage or sold off to make room for other things more attractive to the public. Some curators have created "treasure rooms" (walk-in vaults open to the public) where gems and fine jewelry are displayed. Such exhibits have proved popular with the public. So the public is one of the important masters a modern curator must please.

Another master is the "publish or perish" mandate that is often still in force for curators of collections. The curators are expected to do research and contribute to scientific journals in their area of specialization. They are also encouraged, and sometimes expected, to contribute to the funding of their department, in other words, to become a successful fund

raiser. This requires finding “angels”, people with more than the average amount of money, to help fund department activities and additions to the collection. Sometimes this takes the form of establishing a support group of interested people and collectors. The support group sponsors various activities like field trips (sometimes to foreign countries), lectures, and fund raising events like auctions.

Then, of course, there is the traditional role of the curator, namely curating the collection. The curator is responsible for the numbering, cataloguing, labeling, storage and display of the specimens. The job of correcting labels is a never ending job. The names of countries and other place names are continually changing as well as the mineralogical nomenclature, and the labels should change with them. Also, no matter how careful a curator is, some errors will creep into labels and nit-picking collectors take glee in being able to correct the curator’s labels. Increasingly it has become important a correct value be placed on the specimens for insurance purposes and because management needs to know so they can insure and better manage their resources. If the mineral collection is worth \$40 million dollars, the management may judge they should sell it and use the money for things which would better garner the support of the public, say a mechanical dinosaur with tape loop roar and flashing eye-balls. Often dealers will be brought in to give up-to-date valuations as this is something curators are poorly trained to do. A good curator also is, to some extent, aware of prices in the mineral market and maintains good relations with mineral dealers, as well as collectors.

So a curator is pulled in many different directions, and the successful ones somehow manage to juggle all of these balls in the air at the same time. No easy job. Most curators enjoy one or two facets of their jobs much more than others. Some mineral curators really don’t like collectors very much, loathe mineral dealers, and would rather deal mostly with research. The fewer masters a curator is adept at pleasing, the less successful he will be.

Just as some curators of mineral specimens don’t like collectors and dealers very much, I think some curators are real dummies when it comes to knowing what minerals are and something of their worth. I would like to suggest that a test be developed for prospective museum curators that would insure that they have some idea about the value of the specimens to be entrusted to their care. Create a mineral collection of about 100 specimens of well crystallized minerals from world wide localities and require each curatorial applicant, to take the test. A passing grade would be they are capable of sight identifying 85% or the specimens and their localities. If they can do that they will almost certainly know something of their value. It doesn’t take all that much of a mineral collection these days to be worth a half million dollars. If you had a machine worth a half million dollars would you allow some dummy that didn’t know anything about it to run it?

On how a mineral gets its name.

In ancient history, when something new was found, the persons who found it would give it a name and often others started calling it by that name. Then that name would appear in print in some popular publication and finally in some scientific article. As time passed scientists often found the name was not very good and needed to be changed. A classic example is the mineral name “calamine”. Through the new science of chemistry it was found that there were two types of calamine, one a zinc silicate and the other a zinc carbonate. It was eventually agreed in order to avoid confusion that the name “calamine” should be done away with and replaced with smithsonite for the zinc carbonate and hemimorphite for the zinc silicate. At other times minerals with different names were determined to be the same mineral, or that

the mineral was not really an individual mineral at all, but a mixture of minerals. These kinds of situations and others caused a great many mineral names to be discarded.

The state of mineral names became so chaotic that in 1959 the various national mineralogical societies joined together in to form the IMA (International Mineralogical Association). The IMA formed a committee, the CNMMN -Committee on New Minerals and Mineral Names. This committee has issued guidelines for the data which must be presented to them for them to determine if a new mineral is worthy of being given a name. The guidelines, 14 pages of them, can be read at <http://www.geo.vu.nl/~ima-cnmmn/cnmmn98.pdf>. Once the committee is satisfied you really have a new mineral and that all the necessary data provided for the new mineral is correct, they will allow you to propose a name for the new mineral. Until that point, it is only known as an unknown mineral and assigned a number. Theoretically you can name it anything you want, but the reality is somewhat different. It is recommended you give it a name suggested by the elements which make up the mineral, the locality from which it came or after some worthy person or organization. If the mineral is to be named after a person, they would prefer that it be named after someone who has toiled in the mineralogical or geological vineyards all their lives, but sometimes other names are permitted. Minerals have been named after famous people or well-known mineral collectors or dealers. No one has really tried very hard to have a mineral named after their dog or girlfriend, or at least none have thus far succeeded. Some who sit on the committee feel strongly that minerals should not be named after collectors or mineral dealers. It is also a requirement that a mineral name will not be accepted until it has been approved by the IMA and actually published in a recognized journal. The "Mineralogical Record" although predominately an amateur magazine is one such journal. This publishing requirement is getting to be a bit of a problem because some professional journals like the "American Mineralogist" now rarely want to publish mineral descriptions. They do devote a small section in the back of most issues of their journal for abstracts of new minerals. I think eventually these descriptions will be published on line and not in actual ink and paper professional mineralogical journals.

On Mineral Nomenclature.

Mineral nomenclature in the last few years has been stood on its head. The IMA (International Mineralogical Association) has now split many minerals into two or more "new minerals". Apophyllite is now fluorapophyllite, hydroxyapophyllite or natroapophyllite. heulandite is now either heulandite-Ca, heulandite-K, heulandite-Na or heulandite-Sr depending on what metallic element dominates the structure. aeschynite is now aeschynite-(Ce), aeschynite-(Nd) or aeschynite-(Y) depending on which rare earth element dominates. Tourmaline used to be a nice mineral, but tourmaline is now the name of a mineral group which includes more than 15 minerals. Some tourmaline crystals, when you study them closely, actually have two or more tourmaline group minerals residing in the same crystal. We won't even go into what the IMA has done to the amphiboles, pyroxenes, and micas.

In mineral nomenclature, as in the nomenclature of plants and animals, there are the "splitters" and the "lumpers". Splitters are those who would like to create a new species for every mineral which has even a small difference from others of its kind. For example, the structure of eudialyte has now been determined, and there are those who contend more than 150 possible new minerals could be described from eudialyte because of major elemental substitutions in various structural sites in the unit cell. The people who would like to see all these variations given a new mineral name would be called splitters. A lumper is someone like the venerable Dr. Fred Pough who said something like "Just call it tourmaline. Tourmaline

is a perfectly good name. You don't need 15 new names for the same mineral, that is just dumb." Younger mineralogists tend to be splitters and the older ones tend to be lumpers.

So problems arise in just what mineral name you put on a specimen's label. Imagine the situation in old institutional collections containing thousands of specimens. If they want their labels to reflect modern nomenclature, thousands of new labels must be made. Even more daunting is that without running the appropriate scientific analysis on each of their specimens the curator has no way of knowing exactly which of the new minerals it is. If you have a hundred specimens of Heulandite in your collection, unless you run a test on every specimens you can not give it a new nomenclature name that is definitely accurate. It is a real mess and the nomenclature boys are still busily working on various mineralogical problems. It is unlikely that the this situation will improve anytime in the near future.

On specimen availability.

Specimen availability is influenced by many factors. One factor that has lead to the overall abundance of specimens compared to a century ago is the ease of modern transportation. No longer must you take weeks on boats, trains, and horseback to arrive at a remote locality. With modern air transport you can be most anyplace in the world within two or three days. Also modern mining practices and the demand for raw materials have lead to the development and expansion of mines that move huge quantities of rocks and earth. Man has surpassed natural erosion in the shaping of the earth's surface. Also there are many more people living on the earth, and there are many more wealthy people with disposable income to spend on silly things like collecting minerals. These are the main factors which have made mineral specimens abundant and available like never before.

Even with modern transportation, vastly increased mining, and money to burn, political factors can severely interdict the production of mineral specimens. This has most recently been demonstrated by the collapse of the Soviet Union and the opening of China to world trade. During much of the 20th century, specimens from these places were rarely available to western collectors. Now the situation has changed dramatically, and specimens have come flooding out of these countries into the West in response to profit making opportunities that simply did not exist before. Yet there are still many places in the world where political barriers prevent the exploitation of mineral resources and the specimens they produce. When the political situations in these countries permit, large quantities of specimens will be produced. Many countries in Africa have tremendous mineral wealth and eventually will produce large quantities of specimens. The Republic of the Congo (Zaire) is but one example. The Congo produces a fair number of specimens today, but they are nothing compared to what will be produced when political changes permit the return of large scale mining.

If you are going to spend money buying specimens, you may benefit from some advice about the kind of specimens to buy and which are likely to retain their value and increase in value more than others. Buy the best specimens you can afford. If you buy inexpensive specimens, most of what you are paying for is the effort of the dealer to clean, price, label, box and cart the specimens around to gem and mineral shows. This money you will not be able to recover. Consider not buy specimens that will likely never be in short supply. To determine which those might be involves learning something about the geological setting from which they are recovered. Two good examples of these are amethyst from Brazil and zeolites and related species from India. Both are from vast basalt formations, each thousands of square miles in extent and have been producing specimens for generations with no end in sight. Such

specimens are not good investments, because the chance of them becoming scarce is highly unlikely. There are enough of these specimens in the ground to supply every man, woman, and child on the planet with many specimens. Every collector who ever wanted a nice zeolite specimen from India has at least eight. I know what I am talking about because I have visited the producing areas in both countries and have imported literally tons of specimens.

You will be well advised to stay away from minerals like gypsum because there are endless supplies of these kinds of specimens and more grow annually in ponds of various kinds and other deposits. In addition, these minerals are soft and are easily damaged. Some kinds of garnets are very abundant and will also never be in short supply. Many kinds of evaporate minerals like halite are common and any amount can be collected and will be collected into the foreseeable future from salt lakes and ponds. All of the above have their exceptions and often they are so beautiful that collectors can't resist them. Even I have been known to cave in occasionally and buy some.

On the other hand, some mineral deposits (mines) are quite large but finite. For a number of years, specimens from these places are abundant and cheap, but after they close specimens from these mines become scarce and start escalating in price. One example would be the lead-zinc mines of the Tri-State District which straddles the intersection of Missouri, Kansas and Oklahoma. For generations the mines in this district poured out endless tons of galena, calcite, sphalerite and marcasite specimens. After the mines closed the specimens seemed to disappear, and we all wondered what could have possibly happened to them all. Now fine specimens from the Tri-State District can bring hundreds or even thousands of dollars. Another example is the Ojuela Mine at Mapimi in Mexico. Again for generations this base metal mine produced tons of specimens of which the best known are its wonderful adamites. Eventually the mine closed and the price of fine adamite specimens has shot through the roof. A fine miniature sized adamite today will easily cost you more than a thousand dollars. The kinds of specimens you should look for to maximize your investment are the ones that are being produced in abundance from currently operating mines which will, in your lifetime, cease production. Those specimens are cheap today and will, after the mine closes, escalate quickly in price. Today's common minerals can become tomorrow's classics. Keep in mind that mining takes place today at a much faster pace than mining of yesteryear. This means mines will be depleted much faster than in past generations and the specimens they produce will become valuable classics more quickly.

On specimen desirability.

There is a hierarchy of mineral desirability. Though not rigidly defined, it is based on the following factors which are arranged in approximate order of decreasing importance: beauty, color, transparency, luster (shininess/sparkle), freedom from damage (perfection), specimen size, crystal size, association, provenience, hardness, and composition. Collectors will argue for hours over which factor is more important. Beauty is in the eye of the beholder, and as your knowledge of minerals increases, you will find what you consider beautiful will change along with your knowledge. In the beginning a large colorful amethyst geode might seem the epitome of beauty and desirability. As you learn more about minerals color will likely become less important to you than it once was. When this happens, your amethyst geode may be relegated to a corner of the living room for non mineral savvy guests to admire.

At the top of the heap in specimen desirability, which generally correlates to a high monetary value, are the gem minerals. This means well formed crystals of minerals that are hard,

transparent, colorful and which can be cut into gems. Good specimens of minerals like diamond (even though it is usually colorless), corundum (especially rubies), beryl (especially emerald and aquamarine), topaz (the blue and imperial varieties), and tourmaline are examples of these desirable minerals. Minerals that are transparent have always fascinated people. The most common transparent minerals in the ancient world was quartz. For centuries this was the epitome of transparency against which all others were measured. Transparent quartz, or crystal as it was known to the ancients, was thought to be ice that had been frozen so hard it would never melt. When man learned to make transparent glass, and it took them centuries to learn, the makers of course borrowed the upscale name of crystal to their glass to help sell it. Now when the word crystal is used, people most commonly think of glass.

Next in desirability are well crystallized specimens of other colorful minerals. Specimens of crystallized gold and silver also rate high. Specimens having crystals containing rare elements are also sought after. Then come those minerals that are soft, not colorful, usually white, black, gray, brown, or contain only common elements. Finally, at the bottom of the heap, if I had to pick one group, would be water soluble evaporates. These specimens are the most likely to end up as little piles of white powder in your cabinet as they gradually deteriorate over the years.

All other things equal, there are things that make mineral specimens more desirable than others of the same kind. For example, if you have a table full of diopside specimens from Tsumeb, Namibia, some of them will instinctively appeal to people more than others. If you ask people off the street, who know nothing about specimens, to pick out the best five specimens, you would find that the same specimens would be picked time and again. If you repeated the same experiment with knowledgeable mineral collectors you would find that they picked mostly the same specimens. There would be some difference because the advanced collectors would be looking for some things that a novice would not, like the amount of damage, crystal size, and association.

Here is what knowledgeable collectors look for. The first thing that catches the eye is the color and brilliance of the specimen. Some of the diopside crystals mentioned above may be coated with a little malachite or calcite and not be very shiny. Obviously the bright green lustrous ones will be considered for selection first. The next thing would probably be crystal size. Larger crystals are preferred to smaller ones if they are of equal color and luster. Then comes the configuration of the specimen. Is it just a flat plate of crystals, or is it a mound or stalactite of beautiful crystals. Perhaps the specimen is a "floater" which means that there is no obvious point of attachment where the crystals grew. Does it look like the crystals are straining to fly up off the matrix? Good, just what I am looking for! These things are particularly cherished by collectors. Next, and of great importance to collectors, is its freedom from damage. A specimen with even a small amount of damage will be worth only a fraction, sometimes a small fraction, of what an identical specimen without any damage would be worth. Some collectors examine potential specimens for their collection with a magnifying glass in their search for damage. Any small amount found may be enough to remove it from consideration because Federation judges may deduct points if the specimen is placed in competition. Often, if a particular mineral specimen has an associated mineral with crystals of contrasting color and form, this will place it higher on the scale of desirability. Then come considerations like the chemical composition of the mineral(s) on the specimen. Specimens containing crystals composed of rare elements like gold and silver are desired more highly of

than those containing common elements like iron and silicon, but these considerations can be easily outweighed by other considerations like those listed above. Some people consider historical factors related to a particular specimen to be very important. Perhaps a photograph of that specimen has been pictured in a book or magazine or owned by a well-known collector or institution. Perhaps it has even been pictured on a postage stamp. Usually as you become more knowledgeable and sophisticated, you become confident enough to set your own standards and you don't need to borrow those of others.

In the beginning, the size of the specimens was considered most important. Men who ran the mines thought that the larger the specimen the better it was. If the mine produced copper, silver or gold, then, for the men who ran the mines, the larger the specimen of copper, malachite, silver, or gold, the better the specimen. I call this the "hernia complex". If you gave yourself a hernia trying to lift a huge specimen or it took five men and a boy to lift a specimen, that piece was obviously better than one which required only two men to lift. Mining companies often competed to see who could mine the largest specimens and sent these huge things to world fairs for display and competition. This kind of collecting almost instantly fell from favor with collectors because they just didn't have facilities to house such huge specimens. For years in the middle of the 20th century there was a wealthy farmer in the Midwest, named Funk, who loved big minerals, and for him it was definitely the bigger the better. He had several large barns he used to house his collection. Such collectors are almost non-existent today, and museums all over the world which were given these white elephants. are scratching their heads trying to figure out what to do with them.

However, the Museum of Natural History in Paris, France bought and made an exhibit of giant crystals from Brazil and other places. They advertised it heavily to the public and it has become a real drawing card for the museum. This may be the only successful exhibit of really large specimens. The traditional curators in other French museums were scandalized by the amount of money that was spent on these large, and in their eyes, poor specimens. The exhibit was a ripping success and the admission fee charged to view the giant crystals more than paid for the exhibit. Some museums place a few of these big specimens here and there in their exhibit halls knowing full well that they will be damaged people picking and scratching at them. They figure they can gain more by satisfying the curiosity of their "customers" than the specimen is worth.

On repaired, augmented and faked specimens.

When you drop a specimen, and you will drop them, they often break. Sometimes, when you are trimming a specimen down to size, it will break in an unexpected manner rather than in the way you hoped. I have had the experience of trying to trim a tough specimen in a hydraulic trimmer and after applying great force, literally had the specimen explode, shooting specimen fragments in all directions, even bouncing them off the walls and ceiling. At the Los Angeles Museum of Natural history, one of the great Chilean proustites was borrowed by a staff photographer. A while later it was returned to the curator as red gravel in a small box. The specimen had been dropped on a concrete floor and totally destroyed.

The catastrophic destruction of specimens is not usually what happens to dropped specimens. When dropped, specimens usually just break into two or three pieces. Often some of the specimens value can be recuperated by gluing the specimen back together. If you are lucky, the specimen will break cleanly and when you put it back together without glue, you will hardly be able to see the break. In such cases you can restore the specimen almost

to its original condition by using a tiny bit of glue to repair the specimen. The reason you should use a very tiny amount of glue is that if the break is clean, the amount of glue needed to hold it together is very small and any excess amount will be forced out of the break when you put the halves back together and this excess glue will make a mess and is difficult if not impossible to remove from the specimen completely. If you are not so lucky, the specimen will have not broken cleanly, and some or many small fragments from along the break will have been produced along with the main pieces of the specimen. In such cases the repair becomes much more difficult and demanding. I would recommend using a water soluble glue so if you make a mistake you can take another crack at mending the specimen if you screw up the first try. More permanent glues like epoxy frequently turn yellow after a period of time and are difficult to remove if you make a mistake.

Repaired specimens are usually worth only a fraction, often a small fraction, what a similar un-repaired specimens would be worth. However if the specimen is good enough, say in the "world class" league, being repaired doesn't seem to affect its value. Sometimes the repairs are extensive, and the specimens may even be partially reconstructed, and still the value remains high. Don't ask why. That's just the way it works.

Some specimens are more than just repaired. A classic example is the reconstructing of missing portions of broken franklinite crystals with Plaster of Paris, then using black shoe polish to match the color and luster of the original franklinite crystals. Sometimes broken areas in smoky quartz, tourmalines and other crystals are reconstructed with plastic. Additional coloring agents and or other materials are added to the plastic so it will match the color and transparency of the crystal. After the plastic has set, the surface is sanded, striated or polished to match the surface of the crystal that is being repaired. This can be a very tedious and time consuming business and is reserved for only very expensive specimens. If done well, it is almost impossible to tell where the repair and/or reconstruction was done.

Some mineral specimens have had their color enhanced. The most common is the addition of some transparent chemical like silicone oil. This non reactive oil fills in tiny cracks and often makes a blue specimen look a shade bluer or a pink specimen somewhat redder. Tumble polished stones in Brazil, and most other countries, receive as a final treatment, a dip in hot paraffin. The excess is rubbed off, and the stones look better than they would without this treatment. Colorado amazonite specimens frequently receive this same treatment. Some minerals are helped much more by this treatment than others. Quartz is not helped that much, but damaged areas on fluorite crystals almost disappear when treated with a touch of silicone oil. The miners in Tsumeb, Namibia would always spray their calcite specimens with a particular brand of sun screen blocker. It would soak right into the cracks, and since the spray was water soluble, the excess could easily be rinsed off. You could always tell which ones had been treated for they had a nice perfume smell which was one of the ingredients in the sun block spray. Many Brazilian dealers, when cleaning their specimens, employ a water rinse as the last step of their specimen preparation routine. This rinse water has a layer of baby oil floating on it, so as the specimens come out of the final rinse they receive a coating of oil. It does make them look better, if more slippery. The paraffin treatment is long lasting but the silicone oil treatment gradually dissipates. In addition, if too much oil is used, it will catch dust, and the specimen will become dirty sooner than it would otherwise.

Sometimes the color enhancement is more invasive. The use of green died oils to enhance the color of emeralds has been a standard practice among Colombian emerald dealers for

generations. Some emerald crystals are just painted with a green enamel to make them look darker. Dealers and collectors have been known to touch up black sphalerite specimens from Tennessee with a brown felt marker and scuffed green fibrous malachite with a green felt marker. A few years ago some miners/dealers in Morocco found they could take white anglesite crystals, put them in household bleach for a few minutes, and change the color to a very attractive red/orange. A number of sophisticated mineral dealers fell for that one and lost a lot of money when the fraud was discovered and they had to make refunds. Of course their suppliers in Morocco had long since vanished with the money.

Beware of fake minerals. Most fake minerals are those where crystals from one or more specimens are glued onto another specimen. Sometimes these are clumsy fakes, and an experienced person can spot them from across the room. Others are made so well you will need a microscope and/or other tests to find out if the crystals have glued or altered. The varieties of fakes are endless. Some species should be examined more closely than others. Emerald and cinnabar specimens are notorious for being faked and should always be inspected carefully.

There has probably been more effort and cleverness expended in counterfeiting of emerald specimens than any other species. Typically the emerald crystals are fitted into the matrix and glued in place. It used to be fairly easy to spot these by using an ultraviolet light or a hot needle to probe areas on the specimens suspected of having glue. The glue would fluoresce and a hot needle would cause it to deform easily and sometimes even smoke. With time these fakes became increasingly sophisticated. The practitioners in Colombia stopped using glue that fluoresced and began using adhesives used in dental work. They also employed great care in fitting the emeralds into the matrix and covering the contact points with rocks that closely matched the surrounding natural matrix. If the emerald crystal were of pale color they would sometimes drill a hole into the crystal from its bottom and fill the hole with green epoxy. These made fabulous looking fakes. They would sometimes facet polish terminations on the tops of their crystals to do away with broken sections, and coat the crystal with a hard green lacquer which had the added benefit of covering up any wheel marks that might be left by the polishing lap. It got to the point that I could often not tell for sure if they were fakes or not. At that point I had to admit defeat. They were smarter than I, so I stopped going to Colombia to buy emeralds specimens. To really test a matrix emerald you have to soak it for a day or two in a strong solvent like MIBK (methyl isobutyl ketone). That usually will soften up the glue enough to reveal a fake. It is easier just to assume any emerald specimen that looks like it might possibly be a fake, is a fake.

You rarely see single crystals of cinnabar offered for sale. This is because most of them have been used to create fake cinnabar specimens. These too have become more cleverly made over time. The people who make them keep stocks of various kinds of dolomite and small quartz crystals from the cinnabar mines which they use to match the piece of matrix when they glue on the cinnabars. Fake specimens have been known for hundreds of years. This practice most probably started just because miners would take some pretty rocks home from the mine and then with little else to do would glue them together in various ways to make ornaments for their house. When they discovered some lazy dumb city dudes would pay money for these artifacts because they thought the specimens were real, the race was on.

Classic European fakes include epidote specimens from Austria where the hair-like actinolite associated with the epidote crystals was used to hide evidence of their manufacture. Many

fakes using pink fluorite crystals glued on quartz crystals were also created and sold. Usually you can spot fakes without using a microscope and other tests if you examine specimens carefully. You can't examine every specimen you see carefully, so the secret is to know which ones to examine carefully. When I was fooled it was usually because the specimen looked wonderful and was inexpensive. I wanted to believe that it was real. If specimen looks good to be true this should be the red flag that causes you to stop and examine the specimen carefully. Once the seed of doubt takes root in your mind you will seldom be fooled. Sometimes the fakes are so good they can fool even experienced dealers, but if a dealer is reliable they will always refund your money.

In the last few years there have been some examples of well made fakes that fooled everyone for a while. An Italian man discovered that he could grow beautiful big sulfur crystals on matrix. He would dissolve elemental sulfur in carbon disulfide, chuck in pieces of authentic looking matrix and let the carbon disulfide slowly evaporate which would cause fine, big sulfur crystals to grow on the matrix. Carbon disulfide is quite smelly and it is a wonder the neighbors didn't complain. He sold and traded them all over the world for fun and profit. Another example may be the wonderful wire silver specimens supposedly found in a mine in East Germany during the time of the Soviet occupation. These were sold for very high prices and now many people including myself feel that they are probably fakes grown in a clever manner even though we don't know exactly how it was done.

Specimen durability

As the years pass you will find that some mineral species deteriorate, a few of them disastrously end up eating the labels and boxes in which they have been kept. Marcasite specimens are notorious for ending up as piles of white and gray fragments which eat their way through paper boxes and, with a little effort, even through the bottoms of metal drawers. Realgar specimens are infamous for cracking apart and changing from a beautiful dark red color to orange and yellow, if they are not kept strictly in the dark. However, well-cared for specimens of realgar more than 100 years old exist because they have been kept strictly away from light. Many water soluble minerals also disintegrate, usually leaving behind piles of lumpy white powder. Proustite crystals are also well known for changing from a beautiful transparent red color to black. Again, if they are kept strictly away from any light, they will remain beautiful for years. Even amethyst will lose its color gradually over time. Usually this color loss is so gradual that you don't notice the change until years later. The first time I encountered this phenomenon was in Uruguay. I was at an amethyst mine near the little town of Artigas near the Brazilian border and saw an almost continuous pavement of amethyst crystal specimens under some eucalyptus trees near the mine. I asked why they put the specimens there and was told that the shade kept them from losing their color. Later I took a good piece of Brazilian amethyst from Rio Grande do Sul, broke it in half, kept one half in a dark place, and put the other out in the sun for a few months. At the end of that period of time I glued the pieces back together and half was the original color and the other half was a washed out blue gray color. Amethyst specimens will also keep their color if you keep them away from light. Sulfide minerals like chalcopyrite, pyrite, stibnite, pyrrotite, etc. will oxidize and lose their brilliant luster over the years unless extraordinary steps are taken to keep them in pristine condition. Many of these changes have been discussed and commented on for more than a century.

In 1912, in his "Popular Guide to Minerals", Gratacap write of the specimens in the Bement collection at the American Museum of Natural History, "I have noticed that specimens of even

vanadinite, descloizite, and rhodonite, lose something of their initial brilliancy and intensity under the scourge of that actinic bombardment to which they become exposed in our halls. The fluorites, pink quartzes, even the delicate greens of some spodumene, the faintly blushing calcites and the rhodochrosites, also sensibly succumb to these exposures, while it is a matter of common annoyance to find that the realgars, cerargyrites proustites, cuprites, crocoite, and sulphurs go through changes that slowly alter their substance, texture and appearance. Stibnite loses its splendid surface, cut topazes pale, and some colors in barite slowly vanish. Mercury minerals are altered, cerargyrite changes and andorite tarnishes.”¹ Each mineral was formed in the earth when conditions were favorable for them to form. When the mineral is collected, the environment of the mineral changes, the temperature, ambient light level, humidity, bacteria, and exposure to different gasses change. All or some of these may cause the mineral to change just as taking an ice cube from the refrigerator will cause it to change. Despite this knowledge, many collectors continue to buy specimens with little regard for the changes which may take place in them in the years to come because of environmental factors. If you spend a lot of money on specimens and want to preserve your investment, some consideration should be given to environmental changes.

¹ A Popular Guide to Minerals, Gratacap, 1912, p.261.

Some minerals are very soft, like gypsum. Gypsum is so soft you can scratch it with your fingernail. Others species, like cyanotrichite, produce crystals so delicate you can't touch them without damaging them. Probably the best specimen of cyanotrichite was destroyed by person's unknown. One day the man who collected it, opened the drawer the specimen was in, and saw a line of crushed fine blue crystals across the entire specimen. Someone who knew nothing about specimens could not resist feeling the pretty blue fur. The collector was heartbroken because he collected the specimen and it had cost him days of driving, hours of hiking up and down steep canyon trails, and more hours of hard labor moving rocks from the walls of the mine to open the pocket from which he collected the specimen. Then he had to take extraordinary care to get the specimen back to his house undamaged. To try and repair the damage, he damaged this ill fated specimen further by partially sucking it into a vacuum cleaner while trying to "lift up" the matted-down hairs. Sometimes you just can't win.

Other specimens are subject to partial degradation like kurnakovite and inderite specimens which will turn white on their exteriors in response to air pollution near cities like Los Angeles. Others will partially dehydrate, change color, and become opaque like sturmanite. Yet others are heat sensitive like cerussite and sulfur. Large sulfur crystals have been known to crack when held because of the thermal stress caused by the warmth of a hand. I have seen crystals of aquamarine and ferberite that have literally exploded in display cases when placed under strong hot lights. Some minerals will literally melt before your eyes when you expose them to normal room temperature conditions. Examples of these minerals are ice, mirabilite, and antarcticite. If you are concerned about eventually recovering or making a profit on your collection, you would be advised to consider carefully before buying delicate and changeable minerals. If you do, you must take rigorous care of them while you own them.

I really don't know why I am going on about all this at such length. All the information about this sort of thing was available in the literature when I was getting started, and I read it. I did not take it seriously, thinking I suppose, I was never going to die and therefore the physical laws that applied to other peoples specimens would not apply to mine. At any rate I ignored the wisdom of my elders and went about, bent on getting more and better specimens, thinking little of the future. I had to learn the hard way about specimens that change on you

over time, and I suspect each generation of collectors will also have to learn in the same school of “hard knocks”. There is only one thing that man has learned from History, that being man does not learn from history.

On quality and price relationships.

Over the years there has been an upgrading of what is considered to be a fine specimen. What was a good specimen in 1900 might today be considered only fit for study purposes. The reason for this is the large increase in mining activity which has gone hand and glove with the industrialization of the 20th century and the vast increases in the quantity, quality and speed of communication, transportation, and travel. These factors, with a concomitant increase in disposable income and more leisure time for people in wealthier countries, has combined to call forth quantities of specimens unimaginable to collectors of a century ago. Specimens of most mineral species known at the turn of the century have been eclipsed by better specimens from newly discovered localities. This is a trend which will presumably continue into the immediate future. One can argue that at some point we will have used up all the richer and more easily extracted mineral resources of our planet and we will be reduced to processing sea water and low-grade mineral deposits which will produce few specimens. However, this should not happen any time in the next few hundred years. However, should this seem limiting, be of good cheer! The other planets of our solar system undoubtedly have mineral deposits with fine mineral specimens just waiting for the first space-going collectors and dealers. But earth first, we will mine the other planets later!

The perfection demanded by today’s collector and the high prices they are willing to pay are linked to small quality differences that the collectors of a few generations ago would find puzzling. The stamp and coin hobbies have also seen a dramatic escalation in prices based on tiny differences in the quality of their goods. The price of specimens is logarithmic. The price of good specimen may be in the X range. The price of a fine specimen may be X² and the price of the best specimen may be ten times or a hundred times higher than that. The breathtaking prices of the best specimens is caused by competition. The innate drive of humans to excel and be the best at what they do. The powerful and wealthy will want the best cars, airplanes, boats, homes, hotel rooms, paintings and sometimes mineral specimens. This isn’t going to go away anytime soon, so I guess we will just have to deal with it. So jump into the fray and get going as best you can!

Much in the way of specimen prices is smoke and mirrors. Most dealers put their price on the specimen labels. Some do not. Those that don’t are frequently dealers from third world countries like Pakistan, India and Morocco. Many of these dealers show up at the larger gem and mineral shows. They prefer to size the customer up visually before putting a price on their specimens. They do not realize how much this irritates people like Americans and Germans who will often just walk away than ask the price and then haggle over it. They are raised in cultures where un-priced goods and haggling are the norm. It is what they are used to and comfortable with. They see no reason to change. Also putting labels and prices on each specimen is a lot of extra work. The internet is also an excellent place to check out prices. The price on the label and or advertised on the net is not necessarily what the specimen sells for. Often the final sales price is less than the sticker price, and sometimes the price will be sharply discounted if the specimen has been in the dealers inventory for a long time. If the material being offered for sale is something new, the price will likely be much firmer. Some dealers expect that most of their customers will hammer them for a discount and have already calculated that into the price. Other tend to stick with their prices come hell

or high water. They figure that if they become know for always caving in on the price it will just make life more difficult for them.

Sometimes specimens are sold on the installment plan and it is not unheard of that specimens are repossessed for non payment. Frequently, dealers sell very fine specimens directly to special customers, so these pieces are never even seen at mineral shows. And even if they are at the show, they will frequently be hidden away in a drawer or a box under the counter. If a specimens is in a display case with a price on it, that means that others have seen it and didn't buy it. Why would someone want to buy a specimen that had been rejected by others. At least that is the way some might look at it. The customer will feel much better about buying a fine specimen if he is shown the secret treasure hidden away under the counter. Right? Often the buyer makes it plain to the dealer that he is not to divulge the price paid for the specimen. Most collectors want the price they pay for specimens kept quiet, feeling if it became known it would cause other dealers to mark them as big spenders and jack up the price of their offerings. Others may not want their wives to know how much they are spending on specimens. Also, when you ask for a discount on a specimen or discuss terms of payment, be sure to do it in private. If you hammer the dealer for a discount in front of others, they will likely not give it to you. To give a discount with others listening is like broadcasting to the world you will always give a discount if asked, and no dealer wants to be put in that category. Discounts depend on the dealer, and each dealer will have different policies. These policies can be flexible depending on how much the dealer needs the money and how much the customer is buying. If you pick up a \$10 specimen from a dealers front table and ask for a discount, it will likely not be fourth coming. The material that dealers put on their front tables is usually considered almost expendable, so if some kid comes along and breaks off a few crystals or drops the specimen it is no big deal. Front table material is used as a buffer to help protect the more valuable specimens displayed in the back of the booth. If valuable specimens are on the front table, they will very likely be kept under glass and away from curious hands.

Most collectors have a love-hate relationship with the prices of specimens. For more than 100 years we have been complaining of the outrageous prices of fine mineral specimens, and we love to tell stories about getting great specimens at bargain prices. These coups are among our most cherished memories. Collectors who heard of the few crazy prices paid in the Freilich auction in 2001 were predictably horrified. They did not stop to consider most auctions have a few items which sell for crazy prices. What they really found horrifying was that if the prices paid were real, this meant they would soon have to start collecting micromounts and could never hope to buy another good specimen for their collection. They were all glad, of course, because the hammer prices indicated there collections were worth a lot more than they thought. But if push came to shove they would rather their collections be worth less if it meant that they could buy more fine specimens for their collection. I think collectors in general are like this.

A curious thing about the value of minerals is that for specimens to be really valuable, it helps if some goodly quantity were produced. If the mineral is so rare only two or three were produced, collectors may never be aware of their existence. There are not enough of them to make a market, and rather than command a high price, the average collector will be merely puzzled by the specimen. After all, if this was a great valuable specimen, why don't their friends or local museums have one and why haven't they seen one in pictures. They have no yardstick by which to measure the desirability of the specimen. Truly advanced collectors and

dealers are always looking for these “hen’s teeth”, but their pocket books are more limited than those of the “trophy” collectors and of course the price they will pay for such things is more limited.

Gratacap in his “Popular Guide to Minerals” made the observation, “A delicate regard for one pocket book will not enhance the distinction of one’s cabinet.” If you want only to collect the finest specimens like those pictured on magazine covers, hang on to your shorts and your wallet. The best specimens can cost you tens of thousands of dollars each. Many have been sold for over \$100,000 each. I have heard of a few that have supposedly sold for more than a million dollars each, although how accurate such reports are is open to discussion. Paul Desautels, former curator of minerals at the Smithsonian Institution, and of the most respected gem and mineral curators of all time, often said that fine mineral specimens have always been undervalued. He compared them to fine art at bargain basement prices. How much does a good Rembrandt cost? What is the cost of a good French Impressionist painting or a Picasso? He always reasoned fine mineral specimens should be worth at least as much. So rejoice all you greedy collectors out there, plenty of bargains are still available. Perhaps the single story which most accurately describes the soul of a true collector is one told about Professor Clifford Frondel when he was showing a group of collectors some of the treasures in the back room of the museum at Harvard. He said, “Here we have some particularly fine examples of a rare twinning law of quartz. There are only six known specimens in the world. See, you can count them: one, two, three, four, five, six.”

On a specimen handling protocol.

As a young collector I learned most of this the hard way through trial and error. If you take to heart what I am going to tell you, it will save you a lot of pain and embarrassment. When you get a chance you might want to pass this on to other young collectors. It will stand them in good stead. It is really no more than politeness and common sense. The best way to learn about mineral specimens is to handle and look at them closely from a variety of angles. Without this kind of experience, many things about minerals will be difficult to learn and remember. Often just the heft of a specimen (its density) is enough to clue you in to what it is specifically.

No matter how wealthy you are, the fact will always remain that most mineral specimens will always belong to other people. So if you want the privilege of handling these specimen, you must gain the confidence of their owners by demonstrating you will not molest their delicate and cherished little children and will handle them with the proper care. Most collectors are glad to show other collectors their collections, and some will tell you far more about their specimens than you really want to know. Most collectors, if approached in an intelligent fashion, will be only too happy to open their homes and collections to you.

So there you are, in front of a specimen cabinet, or leaning over a drawer full of specimens. What do you do? Do you reach out and grab the most colorful specimen exclaiming, “Wow, man! Bitchen!”? Although my vernacular may be dated, and such a response might rate high with Bevis and But-head, I would advise against it. You should first find out how your host feels about people handling his specimens. A good deal of how he feels about your handling his specimens is related to how knowledgeable he feels you are. If he feels you could not identify 50 species on a good day, he is going to be reluctant to let you touch any of his specimens. If, however, you look closely at the exquisite blue furry, specimen, making no effort to touch it and comment, “That is one of the best Grandview cyanotrichites I have ever

seen, I collected at the mine three times and was never able to get any that good.” You will have gone a long way toward gaining his confidence. At one stroke you have demonstrated that you: (1) know a good specimen when you see one, providing of course, it is a cyanotrichite you have identified and it is indeed a good one; (2) know more than just the name of the mineral you are looking at and are skillful enough to discern the correct locality by knowing some of the sometimes subtle but positively identifying characteristics of the specimens from that particular locality, (3) know enough about specimens to know how incredibly delicate cyanotrichite is by not picking it up and (4) have paid him a compliment on his good taste.

Perhaps next to the cyanotrichite is an incredible, drool-provoking azurite rose from Bisbee, Arizona that you would murder your grandmother for, which you would like to fondle for a minute or two, even if you could never hope to own anything so fine. The correct procedure is to say something like, “That is a wonderful Bisbee azurite. May I examine it more closely?” The answer will almost certainly be yes, unless you have already committed some social or mineralogical blunder or the collector is a real hard case. When you have permission you should wait a moment to see if the collector is going to pick it up and hand it to you. If he makes no move in that direction, you may assume that you now have permission to pick up the specimen.

Before you actually pick it up, note carefully how the specimen is sitting on the shelf or laying in the drawer. You do this so you can put the specimen back exactly as it was before you touched it. Be careful how you pick the specimen up. Do not try and pick up any specimen by grabbing it by the largest crystal. Try, if possible, to avoid touching any of the crystals, and pick it up by its underlying matrix. If it is a small specimen, pick it up carefully with your thumb and forefinger. If it is larger than an apple, use both hands to pick it up. If you have picked it up with your thumb and forefinger, as soon as possible, place the cupped palm of your other hand under the specimen. This gives the collector the warm and comfortable feeling that should the specimen somehow slip from your fingers that it will drop no more than an inch into the soft palm of your other hand rather than on to the floor, or even worse onto another specimen in the drawer where it would likely cause damage to both specimens. When you have finished looking at the specimen return it carefully to the exact spot from which it came. If the collector handed you the specimen, hand it back to him when you are done as he obviously does not want you to pick up or replace specimens. In time he will usually give you a free hand with the collection.

It is also a good idea, but not absolutely necessary, to remove any rings you may be wearing. I have seen collectors heft a specimen in their hand to get a feeling for the density of the mineral. With each heft, the specimen would clank against a ring. This does not leave a good feeling in the mind of the collector to whom the specimen belongs. In a few instances I have seen collectors wearing bolo ties or regular ties bend over the specimen to look at them, and seen the weighted metal tips of the bolo tie or the tie hit the specimens. It would be unusual for the end of a regular tie to damage a specimen, however the metal ends of a bolo tie can certainly cause damage.

Why is it necessary to point out above what seems obvious and should be second nature? Well, it has to do with the nature of humans and their innate desire to experience new things. To the average man or woman on the street, a fine mineral specimen is just like fire to a young child who has never seen any. The instinct is to reach out and directly experience a

beautiful new facet of reality. I once saw a 70 year old lady encountering a fine acicular ulexite specimen for the first time. It was behind the glass of a display case with a prominent "Do not touch!" sign in. I watched in fascination as her universe narrowed down to just her and that specimen. Her hand reached way out around the glass of the display case so she could touch the delicate white acicular crystals. Had she succeeded, the specimen would certainly have been damaged. I had to yell at her to get her to stop. This was her first lesson in specimen handling protocol. She got mad and walked off in a huff. Don't let a similar action be yours.

On protecting you minerals.

The best advice I can give you about protecting your minerals is that you should keep them in a cool, dark dry place and touch them as little as possible. But that would not be very much fun. If you become a serious collector you may soon find that your mineral collection is worth more than the car you drive or even the house you live in. At the end of 20 or 40 years you might shock yourself if you totaled up how much your collection is worth. Catalogue your minerals and record what you paid for the specimens and who you got them from. If one of them turns out to be bogus for one reason or another, the dealer you bought it from, if he is reliable, will give you your money back. Make sure your specimens are labeled and in an attractive cabinet. This will help keep people from throwing them out. Keep the most valuable ones under lock and key. You would not want to scatter 100 dollar bills around the house where they could be picked up and possibly damaged or even stolen by casual visitors. If you live in earthquake country you should securely anchor your cabinets and drawers to the walls and use "earthquake tac" to hold the specimens firmly on shelves and prevent vibration or earth movement from vibrating them off or into other specimens.

During earth quakes many specimens have been destroyed. A collector I knew had converted his one car garage into a mineral display room. It had big almost floor to ceiling glass shelves lining the sides of the room. A moderate earthquake shattered the big sliding glass fronts and shelves, and all the specimens were spilled out onto the cement floor or cascaded down on top of each other mixed with sharp shards of glass. Another collector had some of his display cases thrown across the room with enough force that some dented the opposite wall. In some parts of the world earthquakes are a real threat to unprotected specimens.

Protecting you collection can take many forms. Years ago I visited Arthur Montgomery in his apartment in New York City. He let me look at his collection to my hearts content and take pictures of the specimens I wanted. After I had finished handling his pyrite specimens, he took out a cloth and polished the faces of the pyrite crystals to remove my finger prints. I thought he was just being an old fuddy duddy. Since then I have learned he was not. I have seen pyrite specimens with old fingerprints on them that could not be wiped off. The chemicals in the fingerprints were strong enough to alter the pyrite so that the finger prints were permanently recorded in its surface.

On cataloguing your collection and making labels for your specimens.

If you like specimens and collect good ones, you will eventually decide you should catalogue your collection and make uniform, attractive labels for them. Initially collectors don't care about making labels or cataloguing their specimens. As time passes some collectors realize that they are not going to live for ever and begin to think about what they would like have happen to their collection when they die. This typically happens when the collector realizes

that he has spent more on his specimens than his house is worth. At this point cataloguing his collection and making good labels for the collection becomes a desirable objective.

The old standard way to catalogue specimens is to assign each a unique number, glue that number on the specimen, and enter that number in a bound ledger book with a description of the specimen along with its locality. The next step is to write or type a label to keep with the specimen. There is still much to recommend this time-proven method. With the advent of computers with word processing and database programs, we are seeing a change in the way many collections are catalogued and labeled. Database programs are used to enter the data about each specimen and increasingly a digital image placed in one of the database fields. Then labels are generated on the computer and printed out. The more sophisticated cataloguing programs will allow you to create and or select the kind of label you want for your specimens, and then, when you are finished cataloguing specimens for the day, pushing a few buttons will print out labels for them. These programs allow you to quickly do things which would be very time consuming with the old ledger system. For instance, you may want to know how many calcite specimens you have in your collection, or how many specimens from Tsumeb you have, or how many calcite specimens from Tsumeb. With the proper database program this can be done in a few seconds, as is printing up reports about those specimens. The more advanced programs have fields for almost every imaginable attribute you want to record about your specimens, find and replace functions, spell checkers, tabbing and table view sequencing functions, find and replace capabilities and much more. They will allow you to spend less time with the drudgery of cataloguing your collection and making labels.

There are three basic kinds of labels you may wish to make for your specimens: Specimen labels, box labels and display labels. Of all of these, the specimen label is, in the long run, the most important. I call them "life saver labels". These are labels to be glued on the specimen. Once a label is somehow separated from its specimen, the clock starts ticking on how long it will before someone throws that specimen out in the trash. This label should contain, at the very least, the locality information about where the specimen came from. If there is room enough, then you can put the species information and the collection name and number on the specimen as well. It is not easy to find the time to do this work, but it will preserve the specimen and make it last longer before someone who doesn't even know what it is chucks it in a garbage can. Most advanced collectors have old specimens in their collection from the Foote Mineral Company of Philadelphia. The wonderful printed labels Foote glued to the backs of many of his specimens have the name, chemical formula, locality and at the bottom, the revered name "Foot Mineral Company". Many of these specimens are not great by today's standards, but we keep and cherish them because of the fine old label on them. If you have a good database and label making program, then you can quickly make up specimen labels at the same time you are printing out your display and/or box labels. If the kind of specimens you collect are too small to place labels on them, as would be the with thumbnail or micromount specimens, then put those specimens in some sort of nice display box and put the label on the box. This way the specimen will not easily be separated from the label. Placing small specimens in an egg carton with a hastily scribbled label on the outside or on a scrap of paper inside is an invitation for the trash man.

A display label is one you will put with a specimen when you place it in a display case. The species, locality, and whatever else you put on the label should be evenly distributed on the label from top to bottom to give a pleasing look. A box label is one you place with the specimen in a box with the specimen. The species, locality, and other data should be placed

near the top of the label. This is done so you can read the label without touching the specimen. When you place the label in the box you usually place it in a vertical position against the back wall of the box, any printing near the bottom of the label will likely be hidden by the specimen. If the label has locality data near its bottom you usually have to roll the specimen forward a little to read the data. If the label data is near the top, you can avoid unnecessary wear and tear on your specimens. If you put the box label on the bottom of the box under the specimen, you will have to pick up the specimen to see the label information. This plus the constant rocking of the specimens as the drawers are open and closed will often cause the label to become dirty and worn. In most large collections, what is needed are good box labels and not display labels. This is so because few of the specimens are ever displayed. Make box labels for everything and when you are creating a display, make display labels for them. When it is time for them to go back in the box you can put the display labels behind the box labels and can use them again in the future. If you have a good cataloguing program, it will be quick and easy to make new labels for your specimens.

When you make your labels, use acid free paper or some sort of archival grade paper. Also use a heavy paper, something like card stock. Also make sure that when you print the labels you use a printer where the ink is fast and durable and will not smudge or run when wet. This will ensure the labels you make will last a long time. On specimen labels, I recommend that you give them a final coating of marine spar varnish or polyurethane which will help them survive future cleaning in soap and water and/or an ultrasonic bath. Don't use a font size smaller than 5 points. If your font size is smaller than this, it will be difficult to read. Display labels should be at least 8 points in size and larger where possible.

When making labels, tradition calls for the most general locality name (the country name) to be last in the string of locality data. Ahead of it is placed the main political subdivision of the country in which the specimen was found. This means the state, province, canton, department, oblast, circle, etc. Next comes the name of the secondary political subdivision (county or parish in the USA), then perhaps the mining district, township, mountain or mountain chain, the nearest city, town or village, and finally the mine name. Usually the most specific locality name data like the mine name, if known, is placed first in the string of locality data on the label. Sometimes dealers will prefix the mine name with what part of the mine or the name of the pocket of minerals from which the specimen was taken. In most instances, it is not possible to know what part of the mine the specimen came from. If dealers frequently place this kind of data on their labels you should suspect that the locality may not be correct. I would advise you to put as much locality information on your labels as possible and where possible do not use abbreviations. To some extent this depends on how much space is available on the label. In many instances, it is not clear what the locality names on labels mean. Are they the name of a political subdivision, a mountain range, a city, a town or village, a valley or what? I would like to know these things, would you? In some instances the collector or institution may wish to reverse the order of the locality information on labels from the most general to the most specific i.e., from country down through the specific mine name. In my micromount collection, on the top of the micromount box I place a small label strip across the top with the species name(s). Across the bottom of the box top, I place a label strip which has the country name first. This allows me, in the calcite division of the collection to quickly place all the calcites from the USA together and then the calcites from California together etc. In this way you can quickly find and group for which you are looking.

On the value of making your specimens look important.

If you want to protect and preserve your specimens beyond your immediate life time, you need to make them look important. This is because after you die, your wife, children, or even someone you don't know, who doesn't know anything about specimens, may get their hands on your collection. If they are wrapped up in newspapers in an old cardboard box, the chances of them being thrown out in the dumpster are quite high. I can't even begin to tell you how many times this has happened to individuals, as well as at schools and museums. If on the other hand you make or buy a beautiful hardwood cabinet display them attractively inside with well made labels, the chances others will think them important the probability of their survival will be much higher. I have known people with collections whose value is greater than their home, wrap their specimens in newspaper stored in old cardboard boxes. The idea of spending an additional one or two percent of what their specimens are worth to display them attractively is something they would never do.

A few years ago a good friend and long time business associate from Brazil came to visit. He had in tow a jewelry manufacture from Hong Kong who ran a big jewelry manufacturing business. He had two to three thousand employees in mainland Chinese factories. Both of these gentlemen knew something of specimens but not a great deal. I showed them all of my better specimens and as an afterthought, showed them my micromount collection. The Chinese gentleman was more impressed with the micromounts than with my big flashy stuff. He could not have sight identified more than a few of the species even if they had been larger specimens. He didn't look at any of them with a hand lens or a microscope but seemed mesmerized by the orderliness of the collection, all the identical little boxes each with its careful tiny lettering describing the treasures within. He turned to me and said in an excited voice, perhaps some day you can make me a collection like this one. This is a good example of why you want to make your collection important.

On the cleaning of mineral specimens.

This subject could easily fill a book. Dealers and field collectors are the ones who really must learn more about cleaning than collectors because they are the ones that must prepare specimens for sale. For maximum return on their investment they must clean, trim, and present the specimens as attractively as possible. On www.mindat.com there is a chat group solely devoted to the cleaning of mineral specimens. If you have a particular specimen to clean, read the archived threads that have discussed the particular kind of cleaning you are interested in or ask questions about your particular cleaning problem. This is where you will get the best advice. As a collector you will perhaps from time to time want to clean your specimens and this will most probably take the form of washing them in soap and water.

Some specimens are so delicate you should not, under any circumstances, wash them in soap and water or scrub them with a brush. This may ruin the specimens. Some minerals form fine, acicular crystals "hairs" which will not survive even being placed in water. These include such minerals as cyanotrichite, okenite, and some mesolites. These crystals will typically mat down and stick together. Some people have claimed success in cleaning these types of specimens by using non-aqueous liquids with low surface tensions like diethyl ether which is extremely flammable. Other specimens of fine needle-shaped crystals may be stout enough to withstand being placed in water but brushing of any kind will damage them. Sometimes placing them or holding them upside down in the tank of an ultrasonic cleaner is an effective method of cleaning them. Be careful to avoid thermally shocking your specimens. Make sure that the specimens you want to wash are the same temperature as the water in

which you clean them. Pour out the water into the container to be used and then let it stand beside the specimens until they equilibrate in temperature. Once you become familiar with the properties of the specimens you want to clean, you may not have to do this. It is not likely that water out of the tap will thermally shock quartz, calcite or many other minerals sufficiently to damage them, but cerussite specimens among others are quite sensitive to thermal shock.

Recently fabric guns have come to the hands of dealers and collectors. These were developed and used in the dry-cleaning industry to remove stains from fabrics. These guns have a spring loaded piston which rapidly pumps back and forth (60 times a second?) causing the gun to expel an intermittent jet of cleaning solvent. This jet of liquid impacts and vibrates the fabric in the area of the spot usually cleaning it out in a few seconds. The steam, though intermittent appears continuous and The gun creates a buzzing sound and is sometimes called buzzer guns by collectors. The first ones available were European-made models costing several hundred dollars. They were so useful however dealers would buy them anyway because they could make money with them. Now they are substantially cheaper, and Chinese-made models are available for \$75 or less. The mineral enthusiast uses water in these guns in place of cleaning solvents. These guns have revolutionized the cleaning of mineral specimens. They can clean specimens in a tiny fraction of the time required by hand washing and often clean dirt out of places which were previously impossible to clean. The force of the fluid stream against the specimen can be very powerful. If you hold your finger directly in front of the nozzle, these guns it can, in some cases, drive the fluid through your skin. The force of liquid impact diminishes quickly with distance from the nozzle. At the distance of about three feet the jet breaks up into a mist of liquid. You can clean delicate specimens with this device if you do not hold it close to the gun. If you do, the gun can easily blow some crystals right off the specimen. A little experimentation will quickly teach you how best to use this cleaning tool.

Another common type of cleaning that is done is the removal of "iron stains" from specimens. There are several kinds of chemical solutions which can effectively remove iron stains but the best one depends on the particular mineral you need to clean. Before you use chemicals to clean a specimen, clean the specimens as thoroughly as you can, preferably with a fabric gun (high pressure water). This will allow the chemicals to remove the iron stains faster and more completely. Some minerals like quartz and the blue-green variety of microcline feldspar called amazonite are fairly, durable and you can use acids to clean them, although the hot acids over a period of time will roughen the surface of amazonite crystals. Some minerals with iron stains like hemimorphite and calcite will simply dissolve if you put them in acids. In addition, environmental concerns have made it difficult to obtain some acids and dispose of them. Strong acids are also intrinsically dangerous, and unless you know how to use them, it is better to try and clean your specimens without them. Probably the best overall iron stain removing method is to use a commercial product called "Iron Out" that is available in many large stores like Wal-Mart. It comes in a bottle as a fine powder you just mix with water according to the instructions on the bottle. Then you put your specimen in the resulting solution, and wait. This reagent has to a great extent replaced the use of strong acids like, hydrochloric, phosphoric, and the weaker but poisonous oxalic acid.

Sometimes collectors or dealers will want to remove calcite from specimens to show to good advantage crystals of other minerals which have been covered by the calcite. The best acid for this purpose, with some exceptions, is hydrochloric acid. This acid is still available in hardware stores and is sometimes called muriatic acid or "pool" acid. You must be careful

when using this acid. Use some sort of safety goggles to protect your eyes incase some of the acid splashes up on your face. Use some sort of rubber gloves to protect your hands from contact with the acid and handling the specimens in the acid solution. A ten to fifteen percent solution of concentrated acid is ideal for removing calcite. Place about a cup of acid in a gallon of water. When the specimen is placed in the solution, the calcite will react with the acid generating carbon dioxide which bubbles off. If the bubbling stops but calcite still remains, this means that the initial charge of acid has been neutralized and you must add more acid to remove the rest of the calcite. Often you can clean up or make less obvious small damaged areas on calcite crystals by dipping a cotton swab in the acid and gently stroking the area of damage with the acid filled cotton swab. This is an old trick that has been in use for more than a century to make the damaged areas on calcite “disappear”. When you have finished using the acid solution, add chunks of calcite or marble chips to it till the bubbling stops. The acid is now neutralized and you can dispose of it down the drain.

Minerals like hemimorphite and ludamite are sensitive to acid but you can use a buffered acid citrate solution to remove calcite from these minerals with out harming them. This solution is called a Waller solution. You can google “Waller” or ask the guys on the Mindat chat group how to do this. Other minerals like diopase and inesite are easily damaged by acids. Even acetic acid which is the active ingredient in vinegar can damage these minerals. For some reason, a week solution of nitric acid is much gentler on these minerals than other acids. Another common mineral that you may wish to remove from some specimens is gypsum. Gypsum is slowly soluble in water, and the best way to remove it is just to place the specimen in slowly circulating water. In a few days the gypsum will disappear.

Some mineral dealers have impressive facilities to clean, trim and prepare specimens for sale. Often these are rooms that contain various kinds of ultrasonic cleaners, high pressure water cleaning equipment, air abrasive tools, chemical baths, fume hoods, vacuum chambers, heating ovens etc.

On the Tucson Gem and Mineral Show.

Class! Where do you go to find mineral specimens? Museums, yes, very good Johnny!, Where else? Private collections, mineral dealers, schools, mines and quarries. Yes, good class, those are all excellent places. But remember that the mines and quarries should be active because if you have to move the rock yourself, you will live longer but you won't get as many good rocks as from ones that are actively being mined and the rocks moved for you. OK class, where else? Gem and mineral shows. Excellent Mary! Would you suggest any particular gem and mineral show? The “Tucson Gem and Mineral Show”? Mary, that's a great answer. You get a gold star after your name today.

One mineral show in particular should be emphasized as being exceptionally important to the hobby. This is the “Tucson Gem and Mineral Show”. This show is held each year in Tucson, Arizona. It starts late January and ends in the middle of February. It evolved from a small show sponsored by the Tucson Gem and Mineral Society held in a single Quonset hut type building at the Pima County Fairgrounds south of the city in 1960's. It has evolved into a monster show literally taking over parts of the city. It is not a single show any more but rather more than 40 different competing venues run by many different show promoters. The last venue to open each February is the show run by the Tucson Gem and Mineral society in the Tucson Community Center, and still called the main show by old timers. Thousands of dealers, collectors, shop owners, mineralogists and curators from all parts of the planet come

to Tucson each February to buy and sell minerals and every imaginable kind of gem, jewelry, fossil, meteorite, stone carving, and earth science related item. You can learn more about the minerals in a week at the Tucson show than you can during a whole year of running around during the rest of the year. The limiting factor on how much you can learn is your ability to absorb and correlate information. After two or three almost non-stop days, many people are exhausted and need a break to process all that they have seen and learned. A good strategy is to go away for a day or three, think about what you have seen and heard, then come back and hit it again. What the dealers are offering is just one facet of the show. Much of the rest of the experience is listening to and talking with other people at the show. This will go on as long as you can stand it. After the dealers close for the day, there is a huge amount of information exchanged by people who have met during the show and have dinner and drinks together in the evening. All night poker games and rowdy parties are not unknown. Sometimes friends will make arrangements to rent rooms or apartments together, and literally every waking hour is filled with shopping for specimens and jabbering about what they have seen and learned.

You should stay for the Tucson Gem and Mineral Society show because held in conjunction with this show are wonderful exhibits by many major museums and collectors. More than just a few world class specimens will be on display. Various trade, professional and government organizations have booths at the show. There are a variety of lectures available to interested parties as well as meetings by various professional and amateur societies and formal dinners for their members. There are competitions for the best of various kinds of minerals held at the show. Most of the money that collectors have to spend has been spent before the show has opened, but there still enough changes hands to keep all the dealers anxious to do what they can to secure a booth in the show for the following year. The competition at the show is intense and dealers are always working to come up with something new for the show. If you have something new your chances of good sales are better. New things are a great advertisement as well. Reporters for various magazines, news letters and online web sites have reporters circulating at the show anxious to report new, unusual and particularly notable specimens. Parking can be a problem.

The hard-core people arrive in Tucson late in January and don't depart until the middle of February. If you are a collector looking to maximize your efforts and money, you can find advantage in getting there early so as to have best pick of what the dealers bring into town. If possible make friends with some of them and help them unpack and set up their booths or rooms. Also you can sometimes gain advantage by staying late and looking for dealers who may be willing to "dump" good specimens cheaply so they won't have to store them for another year or transport them back to their country of origin.

On how to get more and better specimens for less money.

Like I have already said, If you have a lot of money, just go out and buy what you want. Most collectors do not, and could probably use some advice on how to get good specimens cheaply. This usually means substituting effort for money. In other words you will learn to do what those vile and disgusting mineral dealers do to stay in business. You will need to learn how to buy specimens for less than the current market value (the retail price). The two most important things that which will enable you to get fine specimens at bargain prices is knowledge and mobility. Mobility and knowledge are the name of the game. It is a little bit like the random walk searches ants do when looking for food. The trick is to use your intelligence to direct you mobility to maximize the return on your effort. Did you notice that five of the

seven things listed above to become proficient at your hobby required you to move around? You need to move around to find out where and what the good stuff is. The more mobile you are the greater your opportunities. If you are able to identify at a glance rare minerals that others can't you will find situations where you will know the value of things that others won't and be able to profit accordingly.

Perhaps a miner will have a bunch of colemanite specimens for which he wants \$10 each. You make your selection and buy them. But what the miner did not know and you did, is one of the specimens was mostly of hydroboracite and not colemanite and it was the finest specimen of that mineral known. Perhaps you are on a street corner in Lima and a runner comes up to you and offers you a lot of octahedral pink fluorite crystals on matrix. What he doesn't realize and you do, is that these are amongst the finest pink octahedral fluorites in the world and worth a great deal of money. Perhaps you have gotten to know the curator of an old and well known collection at a college. He likes the big flashy Indian zeolite specimens and Peruvian pyrite that you are offering to trade but the department does not have a budget for buying specimens. He thinks your specimens will attract the attention and interest of the students much more than many of the other specimens in their current collection. He is glad to trade you many find small specimens from the collection for the big attractive ones. He opens the drawers down in the basement and lets you select pretty much what you want. A Bisbee azurite rose, a wire silver from Norway, a leadhillite from Missouri, crystallized coppers from Michigan. "Help your self to the coppers, we have so many of them..", and etc. etc. Perhaps you were looking at some specimens from Burma and noticed a small ugly specimen that had some small rough ruby crystals growing on it. The dealer quotes you a very modest price and you buy the specimen. The thing that the dealer did not recognize but you did is that the rubies were growing on one of the largest known painite crystals. However if you don't get around, you will never be able to take advantage of such opportunities. So we will assume that you have the knowledge and are ready to be mobile. Where can you go that will be richer in opportunities than the random walk of an ant. Well, obviously you have to go to where the specimens are.

As always, if you have enough money you can just buy your specimens and in effect hire mineral dealers to go out and do those things necessary to get your specimens. Since this is not the case with most of us, the first thing you must do is to gain knowledge of what fine specimens are, the sources of mineral specimens mineral specimens their value and knowledge about minerals in general. **Mobility is the name of the game** unless your are a super salesman. You have to get around and see and handle as many specimens as you can. You need to visit as many mineral museums, private mineral collections, mineral dealers and mineral shows as you can. At the same time you read as much as you can about minerals and mineral specimens and talk to as many people as you can. Also go out in the field and collect as much as you can. This will be your college education in minerals and one that no educational institution can give you. During this time you will be adding to your collection as much as you can. If, during this time you don't have much money, that will be a blessing because it will force you into the efficient kinds of behavior that will later stand you in good stead. You will learn to sight identify most of the specimens you see and to know by looking at them what localities they are from. You will also be able to judge their quality and their value. You will also learn during this time who buys specimens and for how much and how people go about selling them. It will also help a lot if you can develop a knack of getting along with people and develop an understanding of the real reasons that they collect minerals.

After doing this for a few years (perhaps about 10) you may or may not be able or willing to think about doing it full time. I mean if you enjoy doing minerals so much part time, think of how much fun it would be to do it all the time. But the catch is that if you quit your day job you will have to become the most degraded and despised of human beings. A mineral dealer! (just kidding). You will still have to put groceries on the table, pay for housing, transportation and most important, specimens for your collection. You don't really have to do it full time. There are lots of dealers that have other jobs and the mineral dealing is just part time. But if you do want to do it full time, you will have to figure out how to make some money while your are doing it. If you are a died in the wool collector you will probably have to make some concessions about how many good specimens you keep in your private collection. Sometimes you will find it necessary to sell the best specimens in order to make ends meet and get on down the road to the next great piece, collection or lot of specimens. If you are a retail dealer the pressure to sell the good ones will be greater than if you are a wholesale dealer. The reason for this is that no collector wants to buy specimens from a dealer in order to finance that dealer to the point where they are able to keep better specimens than they are selling. Too much ego involved. Some do manage it to some extent however.

Getting the specimens efficiently is only part of the buying and selling equation. The other side of the equation is learning how to sell them and get the maximum amount of money for them. Some dealers are much better at this than others. If you are strong on the sales end you don't have to be as strong in the acquisition end and vice versa. If you can sell your specimens for a lot of money you can afford to pay more for your specimens and that means that you can sit on your butt and the specimens will come to you, but you will have to pay more for them than if you went to the sources. As a dealer, the better you can be at both sides of the equation, the more successful you will be.

Extracting the maximum amount of money for your specimens is an art form all in itself. I think it has more to do with understanding people and how to cater to and even manipulate their feelings and desires than it has to do with the quality of the specimens you are selling. In other words, yes, there is really a skill that people call salesmanship that is associated with great salesmen. They learn or instinctively know how to make people feel comfortable around them. I have watched some of the great ones at work. They can change their spots like a chameleon. And the really great ones are not even aware that they are doing it. Some of these dealers rarely leave home but they do spend a lot of time talking to their customers. I can't really help you much with selling specimens because that has always been my weak spot. I've got a rock, do you want to buy it? That's about as sophisticated as I get. I do know a lot more about how to get specimens close to their sources however and I may be able to give you some insight into that.

On getting specimens from collections.

There are only two basic sources of specimens. These are collections and currently producing mineral localities. Mineral dealers usually specialize in one or the other, but will sometimes work both sides of the fence. The skills required to be successful at recycling old collections is somewhat different than going to the localities and getting your specimens at or close to the producing source. Which of these you choose to concentrate on will probably depend more on what kind of person you are. If you are a people person you will probably gravitate to getting specimens from collections. Buying collections that old collectors have spent their lives building can be a lucrative business, but you have to build up enough capitol

to buy collections like that or have a source with deep pockets that trusts you enough to lend you the money. Some of these dealers are not great people persons, but have wives that are and this smoothes over a lot of rough spots. To be successful getting specimens from collections involves knowing about hundreds of different collectors and collections and what the status of those collection are. You also have to get to know those collectors and convince them your honesty and reliability. When they give you their collection to sell it is a little bit like giving their children into the hands of someone else to care for. If you have a bad track record of honesty and reliability it will be difficult for you to deal in old collections. Collectors will often deal with and watch various dealers for years before deciding who to sell their collections to.

Right now the pickings are good for this kind of dealing because of two things. The price of the finest specimens have escalated through the roof and the value of our money is not what it used to be. This means that old collectors who do not keep up with the price are sometimes dazzled by offers on their specimens that seem wildly inflated. They are still thinking in terms of 1950 dollars and not today's dollars. They may have paid \$2500 for a specimen and thought it was a huge price. Someone comes along and offers them \$25,000 and they can't believe it. So they sell it and the guy that buys it then may sell it for twice or even five or ten times as much. This has happened more than just a few times. They are amazed at the price they got for it but if they find out what the buyer sold it for a five or ten time mark up they are not so happy. Of course they would have no idea how to find out what the specimens is really worth or if they did they would not be able to find the person that would buy them a big price.

Often, if a collector trusts the dealer or at least has heard nothing bad about him he will give the dealer the collection to sell on consignment. This works well for the dealer because he doesn't have to lay out a big chunk of capitol for the collection. It can work out well for the collector as well because the dealer will usually be able to pay the collector a higher percentage of the sales price than he would if he had to lay out cash for the specimens. Often if the dealer isn't that well known to the collector, he can often swing the deal by offering substantial cash up front payment knowing that he will almost immediately get this money back from the sale of the better specimens in the collection many of which he knows he can sell immediately.

Sometimes you can do well by trading specimens for the ones you want. One way to make trading work for you is to find a source of inexpensive trading material. A good friend of mine worked as superintendent of a large open pit mine that produced good specimens from time to time. He made a point of collecting as many specimens as he could from the mine and then traded them all around the world for specimen he wanted. He built up a wonderful collection that way. Another chap who has done this kind of thing very successfully lives near a quarry in Canada and has managed to convince the managers of the quarry to let him be the official specimen collector for the quarry. He has managed to make a living by collecting the minerals from the quarry and has built up what must be the finest collection of specimens from the quarry which contains many fine and unique specimens. In both examples however, the bulk of the rock has been moved by normal mining/quarry operations. If you can put yourself in a similar situation to these two men, you can build a remarkable collection. The trick in successful trading is to have a good source of specimens that others want. Once you know the kind of things particular curators and collectors want, when you find the right specimen(s,) you can often make a very advantageous trades. Museums, frequently do not have funds to buy specimens and they are sometimes willing to trade. To be successful trading requires a considerable knowledge of the market prices of minerals, knowing what

museums and collectors particularly want and what they have to trade that they undervalue. Many people during the last several generations have worked hard on trading specimens from museums and in many cases the museums have felt that they have gotten the worst of the trades. This has caused a number of the major museums to severely restrict or eliminate trading all together. But it can still be done.

On getting specimens from the producing localities.

My forte is to go to the places where the specimens are coming from and buy a lot of them, import them to the United States and sell them. You should probably learn about this close to home before you move on to foreign countries. When I was getting started I did a fair amount of field collecting and found out first hand what it was like to move the rock yourself. This lets you understand and internalize just how much effort is required to move the rock yourself and what you can expect in the way of a reward. Most of the time the effort and expense is considerable and the reward minimal. One of the classical collecting localities in the United States are the various Herkimer "diamond" digs near Herkimer, New York. Here you can experience first hand convict labor. Some intelligent people with the ability to work hard can still collect good specimens there, but I think they would be the first to admit that they could make more money, working at other things. You just can't move enough rock by hand to make a decent living collecting your own Herkimer diamonds. I enjoyed field collecting a lot, but eventually concluded that it would be a hard way to make a living.

The first places I bought specimens from miners were at the open pit mines at Boron, California and the big asbestos mine at Asbestos, Quebec in Canada. The mine at Boron produced many fine and unique specimens of various borate minerals which I eventually learned were difficult to sell to collectors. The mine at Asbestos produced wonderful specimens orange hessonite garnets as some of the best prehnite, pectolite and Idocrase specimens I the world. These proved to be much more saleable. The miners often had specimens in abundance and sold them cheaply compared to the retail prices I was used to paying. It was difficult just to buy a few specimens for my collection and soon I got the idea that I could buy a lot of them, keep the ones I wanted, sell the rest and sometimes even make a profit! Boy! This was a lot easier than moving the rock myself and a lot more productive of good specimens. Although I kept my day job, I was well on the way to becoming a mineral dealer and didn't even know it.

Visiting foreign countries to get specimens is not all that hard and I can offer some advice that may help. You have to get a passport, a visa for the country(s) you want to visit, perhaps some vaccinations to protect you from disease. Then all you have to do is buy a plane ticket and go. You can do all kinds of planning for your trip. Read all the literature on the place, talk to as many people as you want, but basically you just have to go there find out what is really going on and get the rocks. I found that most of the advance planning I did was not worth very much. It helps if you speak the language but you can usually manage without it. It helps if you pick a place that is currently producing specimens because the odds of you being able to get specimens will be higher that way. The price you pay for specimens at a locality is directly proportional to how many people go there to buy specimens. If you are the one of the first ones into a locality to collect and buy specimens the specimens will be very cheap but there will also not be that many specimens to get. If you come to the locality late in the game the prices will be much higher, but there will also be many more specimens to buy because the locals have become aware of their value and have been working to produce them. The dynamics of this kind of business have changed from what they used to be. This is because

of the advent of the internet. Everyone now has access to the internet and even miners in the most remote places can visit an internet café, visit the websites of the top internet dealers, and stare in disbelief at the incredible prices that are being asked for specimens. Imagine the impact of this on a miner who was selling his good specimens for a few dollars each, and seeing the same specimens now for sale at \$1000 each or more. However they quickly learn that it is all very nice to know what a specimen may be potentially worth or sell for, but they can seldom access that market and soon learn to sell their specimens for what they can get. You can't eat rocks after all.

My first experience in going to a foreign country to get minerals was in India back in 1972. Boy! what a shock it was, all that poverty and the press of humanity in Bombay. Fortunately I did know some people there and they looked after me in a very considerate fashion till I could get over the initial culture shock and could get my legs under me. I would not recommend visiting a poor third world country as your first buying trip outside the United States. unless you have someone there to show you the ropes. What an eye opening experience that was. The family I stayed with was interested in mineral specimens, but knew little about them. They knew where some of the quarries were but knew little about minerals, how to collect them, trim them or pack them safely for shipment. Over several years I developed a friendship and working relationship with the family and I imported and sold tons of zeolite specimens.

It was interesting to observe other Americans arriving in Bombay for their first visit to a poor country. Typically they would arrive in the early morning hours in Bombay and go directly to their hotel which was often the Taj or other five star hotel down at the tip of the island. The next morning they would leave the hotel for a walk around the hotel. As soon as they left the grounds of the hotel they were set upon by beggars usually sporting deformities real or cosmetic, usually women with a crying baby and/or small children, begging for money. Each beggar had their well defined stretch of turf that they would patrol and/or defend as the occasion warranted. As soon as a tourist entered the territory of the first beggar, he would be set upon by the beggar, who would walk in front of the tourist as much as possible pleading for money. They would gently tug on the tourists clothing and reach out and try and touch any exposed skin with damp fingers. As soon as the tourist crossed the invisible line into the next beggars territory the next beggar would take up the assault. This experience combined with the efforts of the local shop keepers trying to drag them into their little tourist trap shops set up around the hotel would often cause the tourist to flee back to the safety of their hotel where they would immediately take a bath and make a reservation out on the next available plane. Fortunately I had some friends who walked me through all of that and showed me that India was probably the most interesting and diverse country in the world and that kind of assault by beggars was something that had developed only around a few of the better known tourist destinations.

While chatting up miners and buying specimens, I learned that some of them always seemed to have better specimens than others and this seemed to be related to the jobs they held. These jobs put them in near to working face of the mine where they had a good opportunity to collect specimens. Logically you might think that the manager of the mine or perhaps the geologists, might be in the best position to get specimens, but I subsequently found out that is usually not the case. The management is mainly interested in putting "rocks in the box". This means that they are only interested in moving as much rock or as much rich ore as they can to the crushers and through the refinery. Anything that detracts from that goal is bad and

must be eliminated. At some mines it is a firing offence to collect specimens or to even bend down and pick up a rock. Occasionally you can talk management into letting you collect specimens from their mines but often, your pleas to save a few specimens for future generations, will fall of deaf ears. Also, never ask a mine manager for permission to buy specimens from his miners. Such a request is like asking a fine French chef if you can have permission to dump a five gallon bucket of cockroaches into his kitchen. If you buy specimens from the miners you are encouraging them to collecting specimens when they should be working putting rocks in the box. Not all people who work at mines have an equal opportunity to get specimens. Some miners have jobs that put them in a position to collect many more specimens than others. The jobs vary from mine to mine, but if you are really serious about getting specimens from miners you should find out which jobs those are and then talk to the men doing those jobs.

In most mines the geologists have the freedom to go where they want in the mine and so you would think that they would be good sources of specimens. Sometimes they are, but they must first have an interest in mineral specimens but in many cases they do not. Often mines are not pleasant places to work. They are often very hot or cold and/or wet and with out exception quite dirty. In many third world mines, the geologists are highly educated compared to the local miners and really don't want to get their hands dirty if they can help it. Their ideas of getting specimens is to ask the miners for them. Unless the miners get paid for the specimen, they are likely just to pick up any old rock and give it to the geologist. Your better off sticking to the miners. At mines there is usually a sample man who's job it is to collect samples of the ore to take to the lab for analysis. Frequently this man can get many good specimens. Often the man in charge of drilling and blasting can get good specimens. He is responsible for loading the blast holes at the working face and checking it after the blast to make sure that the explosives worked as they were supposed to. Often electricians and men in charge of water and compressed air pipes are good sources. They are often doing work at or near the working faces of the mines. In some open pit mines, the guy in charge of moving the big electrical cable that supplies power to the big shovels has access to specimens at or near the working face. In many poor countries, the mining is still quite primitive and still revolves around the drill, blast, muck cycle and the mucking is still done by hand. Often times the guys doing the men doing the mucking can collect specimens as they shovel the muck piles into the ore cars. Such was the case of the black miners in Tsumeb. This job was relegated to the black miners and the specimens they collected usually had a lot of damage as you might imagine would be the case of specimens collected from a blast pile. The white head miners or level bosses usually got the best specimens. In Peru when I went to the mines to buy specimens from the miners, the first thing you wanted to do is to find out in which part of the mining camp the actual hard rock miners lived as opposed to the men that work in the mill or at administrative jobs. It was good to visit the mining camps on Sundays if you could, because this was when the miners were not working underground and your chance of getting specimens was much better. Often you had to wait till the miners got off work in the afternoon to have much chance of getting specimens. The wives were reluctant to sell their husbands specimens. Often, each locality will have somewhat different customs and conditions and you must adapt yourself to them as you encounter them. As the automation of mining increases, people will be kept increasingly busy operating machines and away from direct contact with the rock they are moving and the chances of collecting specimens.

For your first effort out of the country pick a second world country like Brazil or Mexico. Try and find someone there that will help you get familiar with the way things work there. No

since trying to reinvent the wheel if you don't have to. The most important thing however is just to go there. On several occasions I have arrived in a country knowing little more than the names of specimen localities that I had seen in labels or in books. In these situations it helps if you stay at least the first two or three nights in a good hotel. The people in reception will always speak some English and will always offer good advice. During the first two or three days you can become familiar with the local currency and the exchange rate. You can also find out how to get around and ask for advice from various people. Since you want to get mineral specimens your first place to visit should be the local University and their geology department. Here you will be able to find a professor who speaks some English and knows about the geology and minerals of the country and can advise you best about what mines to visit, and the best way to go about it. I found that asking the professors if they could recommend a geology student who could travel with me, was a good way to proceed. From this point on it is pretty much up to you to make the best of the opportunities you encounter.

Each producing locality soon develops its own cadre of specimen dealers and they have their own "specimen culture", stories and legends. In some countries like Brazil these are many generations old. But business is business and the buying and selling of things is an ancient practice and the same principals and ethics apply almost universally with various local twists. After a while when you go to a new country and you encounter people selling specimens whether it be at the mine level or a local wholesaler, you say to yourself, "This isn't really much different than the other places I have been and you feel right at home very quickly.

What advice can I offer about places to go, get good specimens, and achieve fame and fortune? Well, it depends on how tough you are and how much hardship you are willing to put up with and the kinds of risks you are willing to take. There are still a lot of places in the world that are producing good specimens and that in the future are going to produce many more. If I were a young man full of ambition I would consider visiting these tough countries: Burma, Vietnam, Mozambique, Angola, the Congo (Brazzaville Congo) or perhaps Algeria. Start with Brazil, Mexico or China. These are relatively easy countries to work in and you can probably get enough good things to keep you going. The profits won't be as high as in some of the tough countries listed above, but where ever you go, good luck!

On what will happen to your specimens when you die.

Since you can't take your specimens with you, you should pass them along into competent hands before you die or make some provision for them in your will. Whatever you do with your specimens, you will not likely be able to invent some new thing to do with them that has not already been done many times before. Your choices are limited. They can be sold or given away. You can also just decide to do nothing with them and let your family, friends, and/or perfect strangers fight over them or throw them away after you die. In general, whoever pays the most for them will likely take the best care of them.

Unless your collection is pure junk, it represents a considerable financial asset you may want your family or friends to benefit from. If the money is not important, then give your specimens away to those you think most deserving. Arthur Montgomery had a wonderful collection and gave it all away to friends, students, and institutions. If you can't afford to give it away, then you will want to sell or donate it. If you donate it to a suitable school or museum, at least in the United States, you can get an appraisal of its value and write the appraisal value off against your taxes. If you decide to sell your collection, then you will want to sell it in a way that will generate the maximum return relative to the amount of effort you want to expend.

Gifts of minerals to schools and museums may not insure that they will be taken care of. Institutions, in general, have a terrible long-term track record on taking care of collections. If you give your collection to a museum or school which currently has a knowledgeable and responsible curator, the specimens will be well cared for while that curator is there. When the curator leaves he may be replaced by one who is an academic and knows nothing about specimen value or the care of them. Even worse, the institution may decide it is too expensive to have a curator of minerals and decide to make your specimens a teaching collection, turn it over to the art department, or put the collection in storage. Once this happens students may run scratch or chemical tests on specimens worth thousands of dollars and/or pilfer the specimens. The specimens may be used in art projects. It is always the gold, silver, diamonds, rubies, emeralds and tourmalines that disappear first.

Some institutions are currently doing a great job of curating their collections and have done so for many generations. Others have spotty records. Fashions in museum exhibits change with every generation. Currently dinosaurs are big and minerals are not. The Academy of Science in Philadelphia is into dinosaurs and has decided to place its historical and important mineral collection up for sale. This has created a flap in the mineral collecting community because the collection at the Academy was given to them with the hope and written agreement that that the specimens would be kept there forever. But, forever is a long time and the needs of society and its museums and schools change. Even is the outcry from the mineral collecting fraternity is enough to stop the sale of the Academies collection, it will not make them curate it and cherish it as it was in the past. Perhaps the specimens would be better off being sold and distributed to new collectors.

For the maximum return on your collection you will need to do what all retail mineral dealers do. You must make up nice labels for each specimen and put current retail prices on them. You may need some assistance from a friendly mineral dealer to do this since people late in life usually do not know what the current market prices are. Then you will need to book space in some of the major gem and mineral shows, providing you can get a space in them, and haul your specimens to the shows putting them out for hopeful sale to collectors and museums. This is hardly ever done because people late in life do not have the interest or energy to do what retail dealers must do. Another way is to auction off your specimens. You can do this via E-bay on the Internet or at other auction sites or through someone who is running live auctions. This method is not often used for disposing of collections. Sometimes a dealer will sell a collection for 15% to 30% commission. The percentage of the dealers commission is negotiable depending on the quality of the specimens in the collection. If your collection consists of poor or common specimens with vague and/or missing labels, you may not be able to find a dealer willing to sell it on commission. If you sell your collection on a commission make sure you can trust the dealer. Most collections are too large to keep track of each and every specimen, and ultimately you must trust in the dealer to be honest. Some dealers have been known to paint rosy pictures of how much they can get you for your specimens, and when they get their hands on the collection will sell only the outstanding pieces and then return the balance of the collection to you unsold. It was only the best specimens he wanted anyway since that is where most of the value resides. Often collections are sold outright to dealers. This is probably the most common form of sale. Unless you get cash up front for the collection, again you must find a dealer you can trust.

Or, you can do nothing at all, trusting that fate will treat your collection kindly. A collector in California recently died, and a church was given the estate. The man who bought the

collection from the estate was more interested in the guns and the fishing tackle, but thought the display cases which housed the specimens were nice. He bought the display cases for \$2000 but on the condition that he take the “rocks” with them. He realized about \$200,000, for the specimens and the mineral dealer who bought them sold the specimens for somewhere in the \$750,000 to one million dollar range. If you want to read about all the terrible things that can happen to mineral collections once supposedly knowledgeable and caring collectors and/or institutions get their hands on them, read “Mineral Specimen Mortality”, in the Mineralogical Record, V. 32, August 2001.

On why we collect mineral specimens.

Perhaps I should have started the article with this topic, but for various reasons I have placed it last. I hope that if you have read this far you may have gained some insight into the avocation of mineral collecting and mineral dealing and in the process may be more receptive to what I am going to talk about now. Do you collect minerals because you are interested in minerals and want to learn about them? Do you collect minerals because it allows you to satisfy your desire to hoard things. Do you collect minerals because it affords you a social and recreational outlet that you might not otherwise have? Do you collect minerals because it allows you to compete with other collectors and lets you feel good when you can get one up on them and crave recognition? Do you collect minerals because they are pretty? Do you collect minerals because it is like a treasure hunt and allows you to sometimes get something of value for very little? Do you collect minerals because you think they have power and energy that you can use to make your life better? There may be other reasons also.

We would all like to think that we collect minerals because we want to learn about them; wouldn't we? If we are honest with ourselves we should realize and accept our motives are really more complex and less pure than that. Our reasons may include all of those listed above to various degrees. Even the few purists among us don't do it strictly to learning about minerals. If we were really interested in learning about minerals we would go to school and study mineralogy, geology etc, but how many of us do? If we were really interested in studying minerals we would all have large libraries filled with books about minerals and we would have read those books and the pages of our favorite texts would be dog eared and falling apart. That doesn't sound like you? It doesn't sound like me either so perhaps we should examine some of the other reasons.

Let me say that it is OK to collect minerals for other reasons than to learn about them. It has taken me more than 40 years to realize that I don't collect minerals only to learn about them. It has taken me that long to come to terms with that and gain a little insight as to the less noble reasons why I collect minerals. I am still learning. If I can help you to understand and accept why you collect mineral specimens in, say only twenty years, and be more successful in collecting them, then I will consider my work here successful.

We can probably understand our reasons for collecting minerals best by looking at our collections and those of others and observing what we and they do with specimens. In many ways our collections reflect our personalities and the circumstances of our lives. Once you have become knowledgeable about mineral specimens you can look at a collection and understand certain things about the person who collecting them much in the same way an archeologist can make deductions about cultures by studying what they have left behind. You can make a pretty good guess of how well off financially the person was who built the collection and often approximately where they lived and when. You can easily tell how

meticulous and thoughtful a person was by the labels they made for their specimens and how they cared for and catalogued them.

Do you know any real mineralogists? I have known a few. The striking thing I have noticed is that their collections are usually not what most collectors would consider fine collections. They are full of all kinds of nondescript scraps of minerals. There are usually a few good ones scattered around just because they love minerals and could just not help picking up a few good ones when the opportunity presented itself. Also they have ton's of books on their book shelves. Mostly technical stuff and very few old leather bound old ones with pretty pictures in them. Their specimens are not pretty ones because they are more interested in what the minerals can teach them and for that you don't need pretty specimens. Does the above describe you? Probably not, but over the years I have learned to appreciate these people. The flame of knowledge and enlightenment burn brightly there.

What does your collection consist of? Is every nook and cranny of your house and garage filled to overflowing with specimens? Is there a big pile of rocks in your back yard that you have drug home from field trips? Are all your specimens labeled or are they just in boxes and or paper bags with a scribble on the outside indicating the content? If such is the case then you may wish to consider the possibility that you are collecting specimens to satisfy the urge to have things rather than learning about minerals. Many collectors of this type don't interact much with other collectors and are content adding yet other boxes and more bags to their hoard. One guy I know like this, collects quartz crystals and I and other friends of his have jokingly speculated that he personally feels that all the quartz crystals in the Cascade mountains belong personally to him. He has been adding to his pile for more than 40 years and it is still growing. He ran out of room so he built a 5000 sq foot building on his property to house his collection and still he has run out of room! Almost everything he has is self collected. He put about 100 flats of quartz specimens beside his house and covered them with a tarp for temporary storage. Well it turned out that temporary storage was not, and after several seasons of rain and snow the flats became nicely composted. But there is an upside to the story, because he can now collect the specimens all over again. Recently he has taken to buying cheap knap sacks at local swap meets and using those on collecting trips. When he returns home he puts them in a pile. When last I saw the pile it was about 4 feet high. And not a label on any of them. He has some amazing things in his collection but I do wish he would put labels on them and would clean the damned dead leaves and tree roots off of that ten inch Japan law twin on matrix that he has hid out in the bottom of one of his cabinets. And this is a smart, intelligent man.

Is your collection a modest one? Perhaps a couple of hundred specimens you have bought for mostly under \$100 plus a bunch of stuff you have collected on field trips of not much value. Do you enjoy going to club meetings and on club field trips. Are you an officer of the society and have you done the job of all the officers in the society, perhaps even a federation representative or president? If this is the case then you may want to consider that your interest in minerals is mostly social. I know a man like this. His collection is quite modest and he has been a stalwart member of our local mineral society for more years than I want to think about. He has held all the various offices of the society and worked his way up through the various Federation of Gem and Mineral Society offices and for a while was president of the whole shooting match. When that was done came back and still worked years for the society in various capacities. In my salad days I thought getting the best rocks was the most important thing and was not as kind and considerate of this man as I should have been. He is

a smart and thoughtful man. He made a living by running a machine shop that turned out highly intricate metal parts for satellites and other purposes. He designed, developed, manufactured and sold his own brand of rock trimmer and faceting lap which were of high quality. I know because I bought and have used both of them. If there were more men like this in the world it would be a better place.

Do you collect minerals because it allows you to compete with other collectors? Competition is a fact of life and hard wired into the human species. If we did not have it we would probably not exist as a species let alone the dominant species on the planet. Although we often disparage competition, it operates within us all to a greater or lesser extent. I have heard collectors disparage trophy collectors as buying specimens only to lord it over those who can't afford fine specimens. Yet I have also noticed that most of the collectors that get upset have their own collecting specialties at which they try and excel. Do you specialize in self collected specimens, micromounts, thumbnails, miniatures, copper minerals, fluorescent specimens? Do you choose to specialize because you can't afford to have a fine general collection? If you regularly spend more than \$100 on individual specimens and place your collection or parts of your collection regularly on display? When you do display your collection do you hang around your case during the show to be able to catch favorable comments and talk to people about your specimens? Do you have people over to your house to see your collection? If you do you may wish to consider that, at least part, the reason you are collecting minerals is that you enjoy competing with your fellow collectors and enjoy the recognitions that comes with it when you are successful. Let me observe at this point, that the real mineralogists or the more academic types also compete. It is just a bit more subtle. It takes the form of how many publications you can generate and how many times your publications are cited the literature.

I know a collector who has one of the finest private collections in the United States. It is hard to find a specimen in his collection that you would not like to have in your own. Many of them are remarkable and some of them world class. The collection is wonderful to behold. He has devoted considerable effort to assemble the collection and its value represents a sizeable portion of his assets, and is more valuable than his house. Parts of his collection are sometime on display at the annual Tucson Gem and Mineral Show. He is a remarkable man and his greatest claim to fame is not even related to mineral collecting. There are a few collectors who just like the beauty of fine mineral specimens and have only a modest competitive urge. These individuals often spend a lot of money on specimens but rarely put their collections on display. I think, however, that when they see good specimens on display that they take a quiet satisfaction in knowing that they have one as good or better.

Do you collect minerals because it is a great treasure hunt and you can get something for nothing? If you are a died in the wool field collector you understand the allure of this kind of collecting. If you have been fortunate enough to actually break into a fabulous pocket of specimens and to collect the treasures within, you may find yourself hooked for life. It makes discovering an unopened ancient royal tomb pale by comparison. A royal tomb will have been there only for a few thousand years. A fine pocket of minerals on the other hand may have been there for millions and when you open it, you are the first living thing ever to see it. This is certainly high adventure that is impossible to resist. Once you have had this experience you can understand why field collectors will work for years like convict labor so they can have the experience again. If this is your bag you may wish to consider you are collecting minerals for reasons unrelated to learning about them. Although you certainly will learn about minerals

because it will help you get to the next good pocket. The stories about finding and collecting great pockets of minerals are the stuff of legend and articles about them are avidly read and appreciated by all mineral collectors. Even if you have never collected a great pocket of minerals you will have cherished war stories about the great specimens you got for practically nothing at a swap meet, or because the person you got it from didn't know what it was. I have thought that antique scouts must have a lot in common with those of us who chase around looking for good specimens at bargain prices.

Is your collection beautifully catalogued and labeled? Does your catalogue describe your specimens and how you got them, what you paid for them and what you think they are worth? Does each of your specimens have a label glued on the specimen that says where it comes from and what the species are or at the very least a number that corresponds to a number in a ledger book with information about the specimen. Sadly no collection I know is catalogued that well. So why is that? Could it be that we are really just hoarders, not very interested in minerals but more interested in getting more and better of them and to hell with the cataloguing? Sad to say there is probably more than a grain of truth here. I know all about it; been there and done that. It has taken me 40 years to get better about cataloguing my specimens. In my youth was really more interested in getting more and better specimens. In addition I knew I was never going to die and I could remember where I got each specimen, what it was, where it was from and what I paid for it. I didn't even want to spend the money to house them properly at first. After 40 years of collecting I have learned that there is always another rock coming down the road and there will always be as long as you are interested in minerals. And by the way, since you want to get so many specimens you must have a good idea of what you want to have happen to them when you die, right? You don't? You spend all your life creating a valuable collection and you have not made provisions for its disposal? Are you crazy? Well, no, your not. You are just like most of the rest of us. So, don't you agree that we collect minerals for reasons other than learning about them?