Pseudomorphs II

Sheep in Sheep's Clothing (Paramorphs) and Wolves That Remain After the Sheep Are Gone (Casts / Epimorphs)

ACANTHITE PARAMORPH ARGENTITE, IMITER MINE, MOROCCO

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Paramorphs : Quartz After Beta-Quartz

Pseudomorph is a general term for a mineral that formed initially in its usual way but then underwent a change in its chemical composition or in its structural form. This results in a new mineral arising to take the habit of the original. The term pseudomorph is an umbrella term that encompasses different subtypes of pseudomorphs and different processes that result in this phenomenon. One such subcategory is a paramorph. Many minerals can have different forms under different conditions. Sometimes this is due to higher temperatures or pressures pressing or packing the structure into a form that is unstable under more relaxed conditions. So, as it cools, the mineral changes form. Cristobalite, Keatite, Mogánite, Quartz, Quartzbeta, Seifertite, Tridymite , Tridymite, UM2000-61-SiO,and Xiexiandeite are all polymorphs of quartz. Beta- quartz is the most stable form of quartz when the temperature is greater than 573 degrees Celsius. (Cristobalite is stable when the temp is greater than 1050C, etc.) When the initial specimen forms at a high temperature, it is first beta-quartz which then slowly reverts to the (alpha) quartz as it cools. (Alpha) quartz is the polymorph that exists at surface temperatures and pressures – the one that is commonly known. Beta-quartz cannot exist at surface conditions. Close attention to the termination shows subtle differences. Typical quartz is tricyclic with 3 larger faces and 3 smaller faces, while the beta quartz was hexagonal with 6 faces all equal and regular.

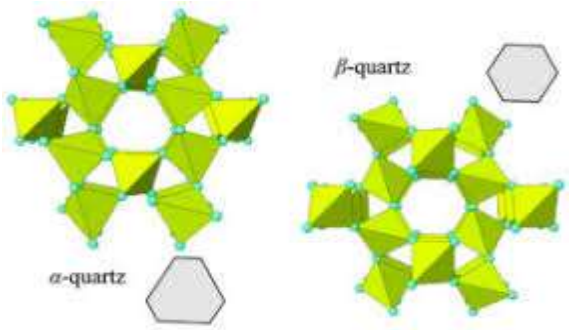

Figure 1. Schematic of quartz and beta-quartz. From Libra Text

Figure 2. Subtle differences. The left photo is typical quartz in the tricyclic habit with 3 larger and 3 smaller termination faces. The right photo is quartz paramorph beta quartz where all 6 crystal faces are regular and the same size denoting a hexagonal system. Note also the overall shape of the termination. The right is a full hexagon and the left is irregular. Right phot: Fabre specimen and photo.

Figure 3. Specularite var hematite with quartz paramorph beta quartz from Florence Mine, England. This combination is probably the most collected paramorph specimen and is a classic English piece. FossilEra specimen and photo

Paramorphs : Acanthite After Argentite

Both argentite and acanthite are silver minerals with the chemical formula of Ag_2S. Argentite is cubic which means that it forms cubes, octahedrons, and dodecahedrons. Often in sulfides, these forms repeatedly twin and are called spinel law twins. Argentite also is a sliver sulfide with the same chemical formula of Ag_2S, but it is monoclinic which means it is usually prismatic with a blade type termination. Argentite forms at high temperatures ans is unstable at conditions below173 degrees Celsius. There are two classic localities that are known for these paramorphs, San Juan de Rayas Mine in Guanajuato, Mexico as in the figure below, and Imiter Mine in Morocco as in the title photo on page 1.

Figure 4. A thumbanil specimen of Acanthite Paramorph Argentite from the classic silver mines of Guanajuato, Mexico. Note the sharpness of the octahedrons and the lovely spinel law twinning present. Origin Minerals specimen and photo.

Epimorphs (Casts): Stibiconite After Stibnite

Epimorphs (or casts) are a neat and easily understood pseudomorph where one mineral forms with a second minerals coating all or part of it. The original underlying mineral then decomposes or is otherwise removed, leaving behind only the second mineral. The remaining mineral creates an outline in the shape of the original. Sometimes the original mineral is unstable and decomposes or is reconstituted back into the melt or hydrothermal fluids yet within the pocket or even after extraction.

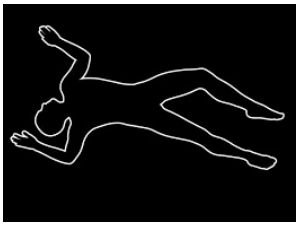

Figure 5. Chalk Epimorph Victim

Figure 6. Lovely and striated crystals of stibnite from China. Note the shining gray color and mirror surface

Figure 7. Stibiconite cast Stibnite from San Luis Potosi, Mexico. This is a classic cast which the stibnite has completely weathered out from inside the weathered, dry looking stibiconite. Note the loss of detail especially on the inside surface of the stibiconite

Stibnite is an antimony sulfide (Sb_2S_3) that breaks down into stibiconite ($Sb_2^{5+}O_5(OH)$) with exposure to oxygen and / or water. This creates an outer coating of stibiconite that remains after the stibnite has altered and crumbled away.

Figure 8. Quartz Epimorph Fluorite from England. Quartz has a much higher melting point than fluorite and is also more stable to weathering. As such, the quartz is intact while the fluorite is completely gone.

Figure 9. "Copper Skull" Centennial Mine, Michigan, USA. Thought to represent native copper casted over a previous datolite nodule. The datolite is gone leaving a hollowed cast of copper that itself is highly weathered with a rich and colorful patina. It is interesting what happened here, because in other nearby areas, datolite nodulese are relatively common, although not found with native copper surrounding them.