AROUND "PECULIARITIES"

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Viktor Ivanovich Stepanov (1924–1988), the acknowledged leader of the Moscow mineralogical community from the 1960's to the 1980's and a mineralogical tutor of mine, liked to puzzle his companions. He would show a specimen, apparently nothing special, say quartz, calcite, pyrite, or another well-known mineral, and asked us to examine it. For us to perceive any peculiarity meant a good beginning, which was half the battle. And if, in addition, you could explain why and how, you were awarded with his praise which was especially appreciated being that it emanated from Viktor, a man of legend, the country's best mineralogist, expert and ontogenist. These tasks were at the level of an advanced amateur; however, they needed a great deal of imagination, wit and logic, the qualities which Stepanov tried to develop in his disciples. A lot of such tasks were provided by him: Stepanov knew very well that each specimen possesses its own peculiarities, and he loved and was able to notice and explain them.

Since then, whenever a specimen occurs with a "peculiarity", a desire in his students appears automatically to figure out its intrigue. The solution brings a delightful self complacent sense...

I. A Specimen History in a Picture

You see in *Figure 1* an ordinary smoky quartz crystal from one of ore occurrences in the Russian Far East. Its peculiarity sticks out: amethyst accretion. That is, the crystal was growing as smoky quartz and, finally, as amethyst.

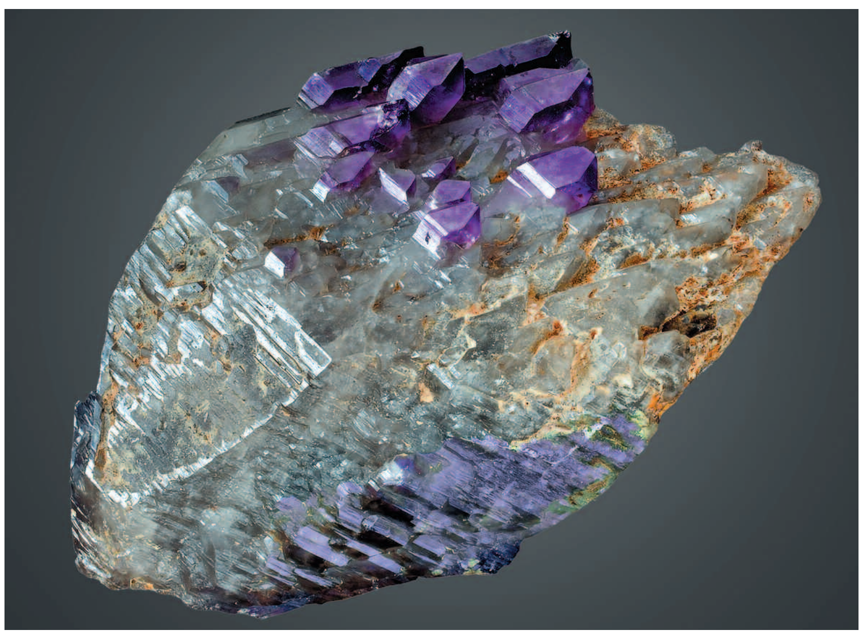


Fig. 1. **Quartz** with amethyst accretion, 8 cm high. Khabarovsk Krai, Russia. Private collection.

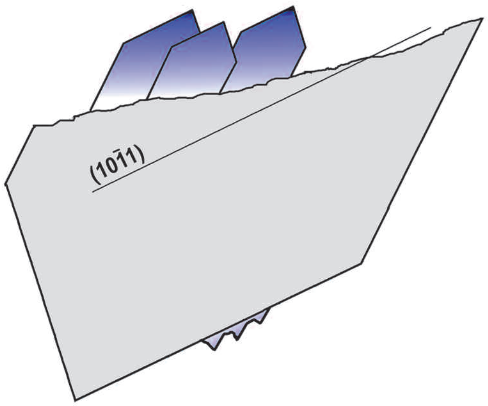
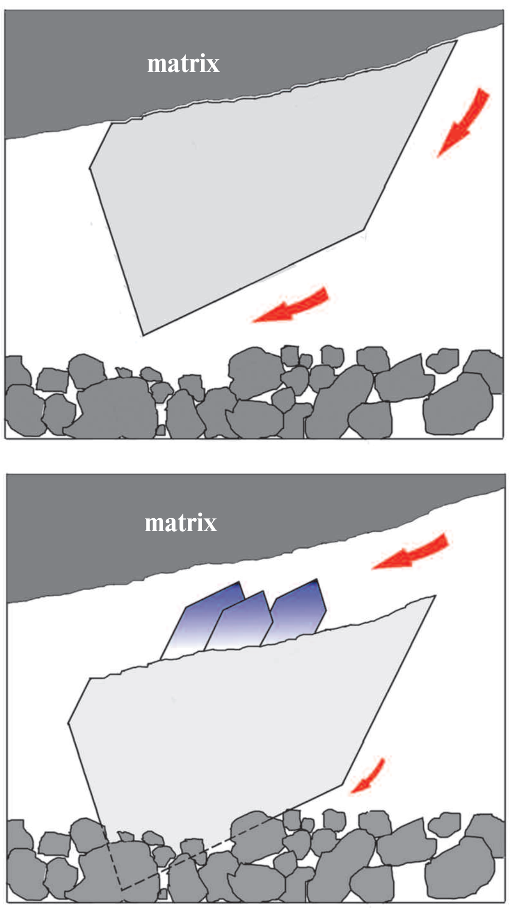


Fig. 2. Scheme of specimen shown in *Fig.* 1.

Fig. 3. The crystal positions before and after separation from matrix.



The change of the quartz color to amethyst is usually attributed to a change of the feeding solution composition. We assume that this is true ; however, there is not enough as we do not know and are not able to learn what exactly was the change that took place in the present case. To fantasize about this is certainly a dead end.

But what is interesting to scratch one's head over is why the amethyst grew differently upon different sides of the crystal: somewhere more, somewhere less. This is a task in the Viktor I. Stepanov style, just for a mineral amateur.

Amethyst is developed mostly on the upper (*Fig. 1*), side of the smoky crystal. At the final stage, it even evolved into a multi-headed growth, and a group of separate crystals appeared that grew autonomously in parallel orientation.

Meanwhile, just this side is nothing of a crystallographic surface (*Fig. 2*): it is either a crystal fracture or, more likely, the surface of contact with the matrix on which the crystal had been growing and, finally, separated from. In the process of the crystal growth, the feeding solution was circulating somewhat within the capillary space between the crystal and matrix, and little by little the deposit of the crystallizing matter created a wedging force sufficient for the crystal to separate, finally, from the matrix under the influence of its own increasing gravity. Since then, this side became fully accessible for the feeding solution. But this was possible on the condition that the crystal grew in nearly the same position as it is pictured in *Figure 1* i.e. with its termination downwards, having been initially attached to the matrix with its upper side (*Fig. 3*, top).

In this case, after separation from its matrix, the crystal had to fall upon the cavity bottom. There it apparently turned out to be surrounded with other crystals that rested there, rock fragments, clay, debris (*Fig. 3*, bottom). As a result, the situation changed radically: the feeding solution (with a new composition that has changed "in favor" of amethyst) found its way to the crystal upper part formerly blocked by the matrix; whereas the solution access to the rest of the crystal surface was prevented by the crystal's new surroundings.

In addition, the newly exposed upper surface of the crystal, unlike the smooth crystal faces, abounded with matrix prints, i.e. tiny sockets and ledges. Such inequalities are known to concentrate the crystal's outer force field, just the tool to catch and hold particles of crystallizing matter from the solution. In the process of growth, these were traps for the particles, so the amethyst accretion proceeded here at an accelerated rate. The most "active" inequalities turned to be the new centers for predominant growth, as if separate crystals appeared there: thus the growth became multi-headed. While the crystal faces, being obstructed with rock chips, were drowsily providing small steps, a whole layer of amethyst managed to grow on the free surface.