

■ EPIDOTE “BOW TIES” FROM PAKISTAN

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1. **Epidote** ‘bow tie.’ 2.9 cm long.
Ras Koh Mts, Kharan District, Balochistan,
Pakistan. Specimen and photo: John Rakovan.

2. **Epidote** ‘bow ties’ on a calcite matrix.
4.1 x 4.0 cm. Ras Koh Mts, Kharan District,
Balochistan, Pakistan. Specimen: Ziga Mineral.
Photo: Jeff Scovil.



Described in the literature of mineral ontogeny as an example of a split crystal or an intermediate morphology in spherical crystal formation (Grigor'ev 1965; Godovikov 2003; Kantor 2003), bow ties or the bow tie habit (a description more commonly used in the Western literature) are well known in certain minerals; the archetypical example being stilbite. Other minerals, such as apatite, are found in this habit but very rarely. A recent find in the Ras Koh Mountains, Balochistan, Pakistan has yielded some fantastic examples of this mineralogical curiosity in epidote. They are found as isolated single bow ties (Fig. 1), clusters of two or more bow ties, and more rarely isolated bow ties on matrix (Fig. 2). Although epidote has the tendency to form sprays or fans of crystals, the highly exaggerated bow tie morphology of these recent specimens is unique, and their size is exceptional¹. These first appeared in the summer of 2017; David Ziga of Ziga Mineral first showed samples in September of that year. Apparently there have been several finds since that time, and at the Tucson show this year (2019) a couple of dealers including Fine Art Minerals, Saphira Minerals, Spirifer Minerals, and Ziga Mineral had many nice specimens for sale.

References

- Godovikov, A.A. (2003)* Natural Mineral Forms: Exhibit In Fersman Mineralogical Museum, Russian Academy of Science. *Ocean Pictures Ltd.*
- Grigor'ev, D.P. (1965)* Ontogeny of Minerals. Israel Program for Scientific Translations.
- Kantor, B.Z. (2003)* Crystal Growth & Development: interpreted from a Mineral's Present Form. *Mineralogical Almanac*, vol. 6.

¹ *Editor's Notes*

The epidote bow tie crystals were also found in Peru and, especially, Morocco (Imilchil in High Atlas Mts). Both the bow tie and the fan-like habits are the results of the same splitting process. The difference lies behind the seed crystal initial position upon the matrix. If the seed has adopted the lying position (parallel to the matrix), the crystal is able to grow and split by both of its terminations; the product of such development to be the bow tie habit. Conversely, at the seed upright or inclined position, the crystal is able to grow and split by its only one loose termination, the result to be the fan-like habit. But to adopt lying position is, all other things being equal, much less probable for a seed than to take any of the countless other (upright or inclined) positions. That's why the bow tie crystals are much rarer compared with the fan-like ones of the same species.