**Bernardite**

**Crystal Data:** Monoclinic.  **Point Group:** 2/m.  Crystals are thick tabular, partly corroded and striated, with prominent {100}, {012}, {210}, and {201}, {201}, {010}, to 4 mm.

**Physical Properties: Fracture:** Subconchoidal to uneven.  **Hardness:** ~2  **D(meas.) = 4.5(1)**  **D(calc.) = 4.105**

**Optical Properties:** Semitransparent.  **Color:** Black.  **Streak:** Red.  **Luster:** Dull.

**Optical Class:** Biaxial.

R₁ − R₂:  
- (400) 29.6−32.3, (420) 28.9−31.8, (440) 28.1−31.3, (460) 27.4−30.6, (480) 26.8−29.9, (500) 26.0−28.9, (520) 25.4−27.8, (540) 25.0−26.7, (560) 24.5−25.8, (580) 24.0−25.1, (600) 23.6−24.4, (620) 23.3−23.9, (640) 23.1−23.4, (660) 22.9−23.0, (680) 22.8−22.8, (700) 22.8−22.5

**Cell Data:**  
- **Space Group:** P2₁/c.  
- **a = 15.647(4)**,  
- **b = 8.038(3)**,  
- **c = 10.750(3)**,  
- **β = 91.27(3)°**  
- **Z = 4**

**X-ray Powder Pattern:** Alšar, Macedonia (calculated).  
3.06 (100), 4.28 (74), 4.46 (65), 3.07 (65), 3.68 (63), 2.68 (59), 3.72 (55)

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tl</td>
<td>23.3</td>
<td>22.7</td>
<td>24.46</td>
</tr>
<tr>
<td>As</td>
<td>43.7</td>
<td>35.2</td>
<td>44.84</td>
</tr>
<tr>
<td>Sb</td>
<td>0.1</td>
<td>10.4</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>31.5</td>
<td>29.8</td>
<td>30.70</td>
</tr>
<tr>
<td>Total</td>
<td>98.6</td>
<td>98.1</td>
<td>100.0</td>
</tr>
</tbody>
</table>

(1) Alšar, Macedonia; by electron microprobe, corresponding to Tl$_{0.93}$(As$_{4.75}$Sb$_{0.01}$)$_{5}$S$_{8.00}$
(2) Do.; by electron microprobe, corresponding to Tl$_{0.96}$(As$_{4.04}$Sb$_{0.74}$)$_{5}$S$_{8.00}$
(3) TlAs$_{5}$S$_{8}$

**Occurrence:** In a hydrothermal deposit with other As–Tl sulfide minerals.

**Association:** Realgar, orpiment, hutchinsonite, wallisite, hatchite, lorandite, edenharterite, ernigglite, stalderite (Binntal, Switzerland).

**Distribution:** From Alšar (Allchar), near Rošden, Macedonia [TL]. At the Lengenbach quarry, Binntal, Valais, Switzerland.

**Name:** In honor of Dr. Jan H. Bernard, mineralogist, Geological Survey of Czechoslovakia, who first noted the mineral.

**Type Material:** Národni Museum, Prague, Czech Republic; Natural History Museum, Vienna; Institute for Mineralogy and Crystallography, University of Vienna, Austria.

**References:**  
(2) (1990) Amer. Mineral., 75, 1209 (abs. ref. 1).