**Paraguanaujaitite**  
Bi$_2$(Se, S)$_3$

©2001-2005 Mineral Data Publishing, version 1

**Crystal Data:** Hexagonal.  
*Point Group:* $\overline{3}2/m$.  
Intimately intergrown with guanajuatite.

**Physical Properties:**  
*Cleavage:* Perfect on {0001}.  
*Hardness:* 2 VHN = 27–50  
(10 g load).  
*D(meas.)* = 6.2–7.0  
*D(calc.)* = [7.704]

**Optical Properties:**  
*Opaque.*  
*Color:* Pale yellow, commonly tarnished lead-gray.  
*Luster:* Metallic.  
*Pleochroism:* Distinct in air.  
*Anisotropism:* Distinct.

**Cell Data:**  
*Space Group:* $R\overline{3}m$ (synthetic Bi$_2$Se$_3$).  
$a = 4.133$  
$c = 28.62$  
$Z = 3$

**X-ray Powder Pattern:** Synthetic Bi$_2$Se$_3$.  
3.03 (100), 2.23 (60), 1.404 (40), 4.80 (30), 2.07 (30), 1.907 (30), 1.320 (30)

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bi</td>
<td>62.8</td>
<td>63.64</td>
</tr>
<tr>
<td>Se</td>
<td>36.4</td>
<td>30.08</td>
</tr>
<tr>
<td>Te</td>
<td>5.13</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>0.8</td>
<td>1.48</td>
</tr>
</tbody>
</table>

Total 100.0  
100.33

(1) Mexico; by electron microprobe, corresponds to Bi$_{1.86}$(Se$_{2.85}$S$_{0.15}$)$_\Sigma=3.00$.  
(2) Kawazu mine, Japan; by electron microprobe, corresponds to Bi$_{1.97}$(Se$_{2.47}$Te$_{0.26}$S$_{0.30}$)$_\Sigma=3.03$.

**Polymorphism & Series:** Dimorphous with guanajuatite.

**Mineral Group:** Tetradymite group.

**Occurrence:** Intergrown with guanajuatite in contact metamorphic as well as in hydrothermal veins (Santa Catarina mine, Mexico).

**Association:** Guanajuatite, bismuthinite, ferroselite (Santa Catarina mine, Mexico).

**Distribution:** From Mexico, in Guanajuato, in the Santa Catarina [TL] and Leon mines. From Falun, Kopparberg, Sweden. At the Kawazu mine, Shizuoka Prefecture, Japan.

**Name:** From the supposed relation to guanajuatite.

**Type Material:** n.d.

**References:**  
(2) (1949) Amer. Mineral., 34, 619 (abs. ref. 1).  
(4) (1967) Amer. Mineral., 52, 1588 (abs. ref. 3).  

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of Mineral Data Publishing.