

**Crystal Data:** Orthorhombic. *Point Group:*  $mm2$ . As lamellar inclusions in löllingite, to 1.4 mm, or intergrown with paracostibite.

**Physical Properties:** Hardness = n.d. VHN = 781 (15 g load).  $D(\text{meas.}) = \text{n.d.}$   
 $D(\text{calc.}) = 6.89$

**Optical Properties:** Opaque. *Color:* In polished section, grayish. *Luster:* Metallic.  
*Pleochroism:* Weak, pale gray with bluish to brownish tints. *Anisotropism:* Weak, reddish brown or orange, to bluish.

$R_1$ – $R_2$ : n.d.

**Cell Data:** *Space Group:*  $Pmn2_1$ .  $a = 3.603$   $b = 4.868$   $c = 5.838$   $Z = 2$

**X-ray Powder Pattern:** Broken Hill, Australia.  
2.596 (100), 2.503 (90), 1.908 (80), 2.902 (60), 4.86 (50), 1.803 (50), 3.08 (40)

Chemistry:	(1)	(2)	(3)
Co	26.7	25.6	27.70
Fe	0.6	0.8	
Ni	0.2	2.4	
Sb	57.0	56.8	57.23
As	0.3	0.3	
S	15.1	14.7	15.07
Total	99.9	100.6	100.00

(1) Consols mine, Australia; by electron microprobe, average of three grains, corresponding to  $(\text{Co}_{0.96}\text{Fe}_{0.02}\text{Ni}_{0.01})_{\Sigma=0.99}(\text{Sb}_{0.99}\text{As}_{0.01})_{\Sigma=1.00}\text{S}_{1.00}$ . (2) Getön deposit, Sweden; by electron microprobe; corresponding to  $(\text{Co}_{0.95}\text{Ni}_{0.09}\text{Fe}_{0.03})_{\Sigma=1.07}(\text{Sb}_{1.02}\text{As}_{0.01})_{\Sigma=1.03}\text{S}_{1.00}$ . (3) CoSbS.

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

**Mineral Group:** Löllingite group.

**Occurrence:** Intimately intergrown with other hydrothermal sulfides (Broken Hill, Australia); in Pb–Zn–Cu–Ag ore deposits remobilized by hydrothermal solutions from later granite emplacement (Bergslagen, Sweden).

**Association:** Löllingite, willyamite, dyscrasite, ullmannite, pyrargyrite (Broken Hill, Australia); nisbite, paracostibite, chalcopyrite, bismuth, pyrrhotite, galena, sphalerite, gersdorffite, ullmannite (Bergslagen, Sweden).

**Distribution:** In Australia, at the Consols mine, Broken Hill, New South Wales [TL]. From the Gruvåsen and Getön deposits, Bergslagen metallic province, Sweden. At Sulitjelma, northern Norway.

**Name:** For CObalt and *antimony*, STIBium, in its composition.

**Type Material:** National Museum of Natural History, Washington, D.C., USA, R849A.

**References:** (1) Cabri, L.J., D.C. Harris, and J.M. Stewart (1970) Costibite (CoSbS), a new mineral from Broken Hill, N.S.W., Australia. *Amer. Mineral.*, 55, 10–17. (2) Rowland, J.F., E.J. Gabe, and S.R. Hall (1975) The crystal structures of costibite (CoSbS) and paracostibite (CoSbS). *Can. Mineral.*, 13, 188–196. (3) Zakrzewski, M.A., E.A.J. Burke, and H.W. Nugteren (1980) Cobalt minerals in the Hallëfors area, Bergslagen, Sweden: new occurrences of costibite, paracostibite, nisbite and cobaltian ullmannite. *Can. Mineral.*, 18, 165–171.

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