

Tsumeb, Namibia



Tsumeb, Namibia
Michael Bak

juni 2012
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Namibia

Vi starter ca. 9.000 km. syd for Danmark...



Namibia

Til en lille by ca. 300 km. fra kysten...



Tsumeb – den korte historie...

- Tsumeb – Soomeb
- Green Hills
- Kobberforekomst
"opdaget" i 1851
- Tyskere købte
området af lokal-
befolkning
- 50.000 km³ for
300 pound, 25
pistoler, en hest
og en tønde
brandy



Tsumeb – den korte historie...



Tsumeb – den korte historie...

"I have been holding places of trust for the past 24 years, have visited various countries of the world, inspected mines, mineral outcrops, and prospecting for minerals; have been associated with the minerals gold, silver, tin, copper and lead; but in the whole of my experience, I have never seen such a sight as was presented before my view at Soomep (Tsumeb) and I very much doubt if I shall ever see such another in any other locality..." (Matthew Rogers, 1893).

Tsumeb – den korte historie...



- Mellem 1905 og 1996 blev produceret mere end 50 mio. tons malm
 - 1,7 mio. tons kobber
 - 2,8 mio. tons bly
 - 0,9 mio. tons zink
 - 80 tons germanium
 - Gns. 100 ppm sølv
 - Til sammenligning:
 - Ivigtut 3,5 mio. tons kryolit (1854 – 1987)

De Wet shaft

Tsumeb, Namibia
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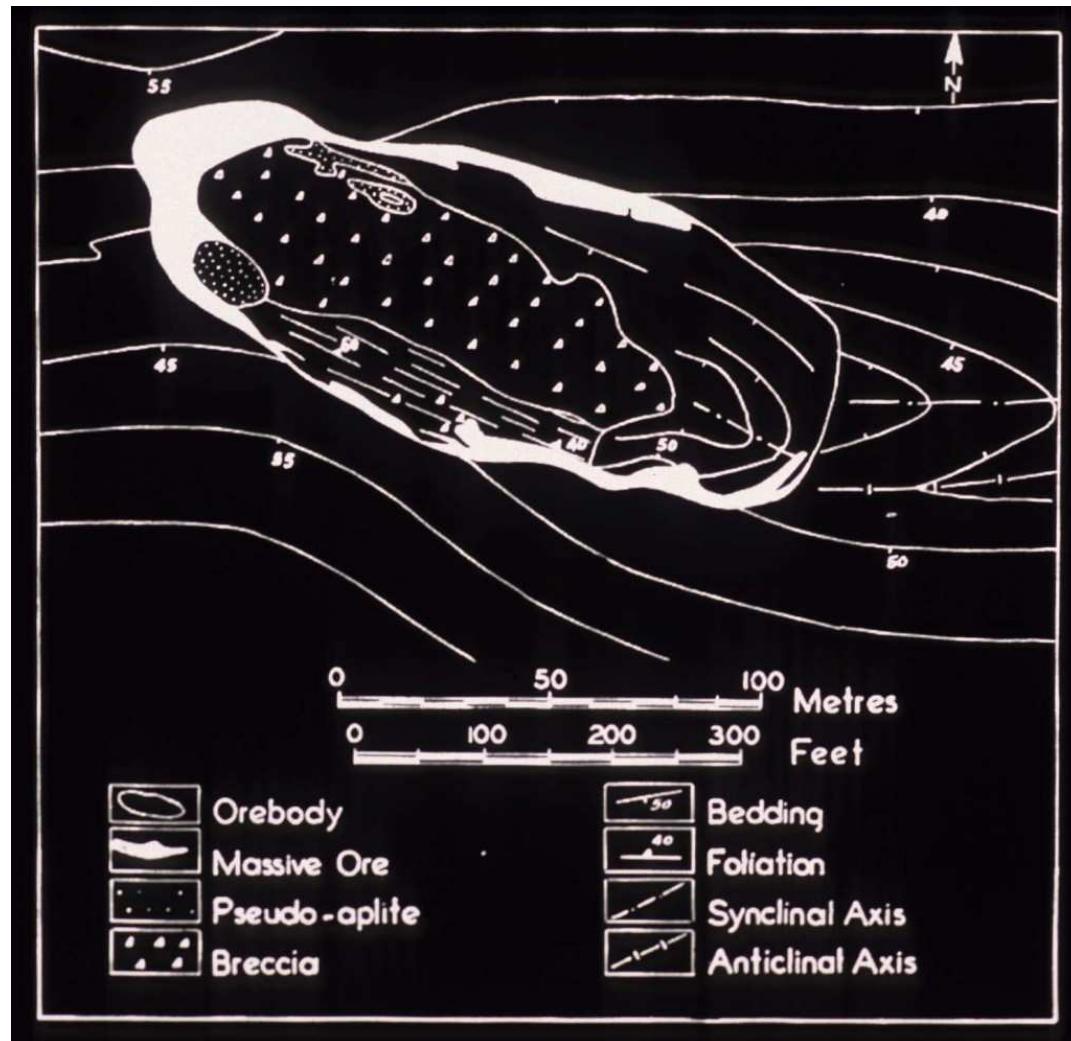
Tsumeb – den korte historie...

- I dag ca. 15.000 indbyggere
- Og en lukket mine (oversvømmet)

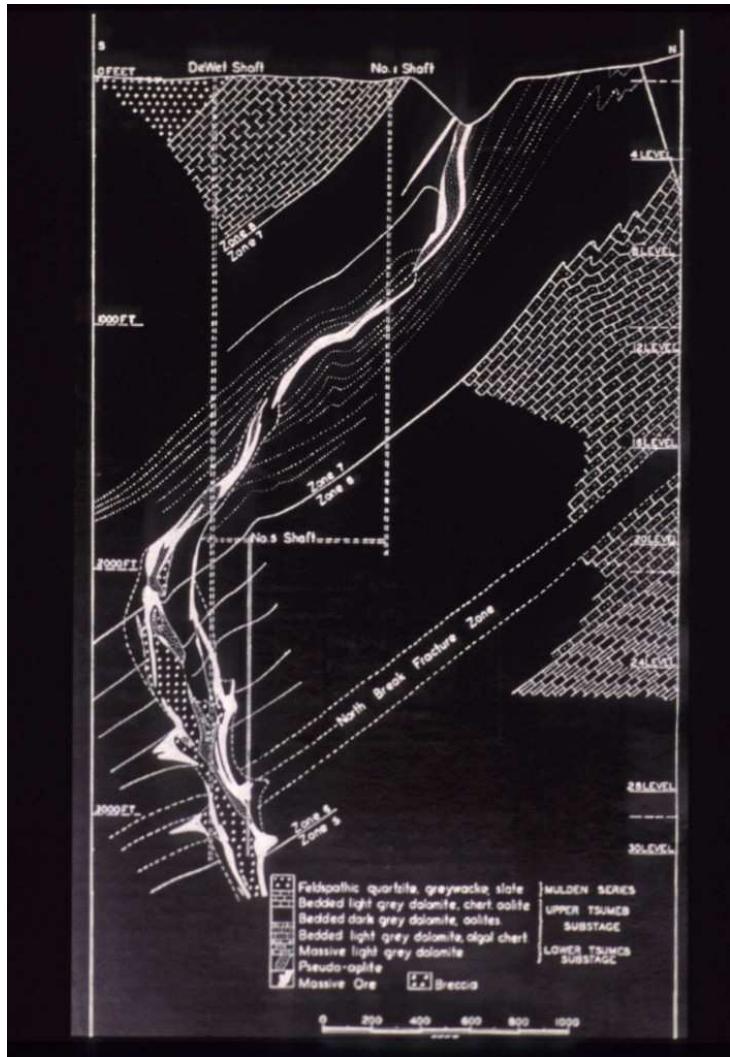


Tsumeb – lidt geologi

- For ca. 2 mia. år siden dannede store have et mere end 5 km. tykt klippe lag af kalk og dolomit
- Havet blev hævet i forbindelse med dannelsen af Damara bjergkæden for ca. 650 mio. år siden



Tsumeb – lidt geologi

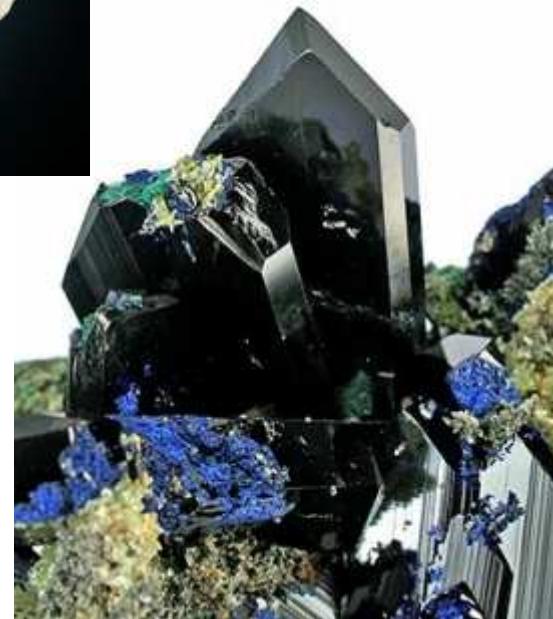


- Over de efterfølgende 500 mio. år blev kalkstenen eroderet ned til den oprindelig klippe mere end 2,1 mia. år gammel
 - De kalkholdige klipper blev utsat for karstifikation, som er en proces, hvorved stenene opløses af let surt vand og der dannes enorme huler og grotter
 - For 600 mio. år siden begyndte landet igen at hæves og under Tsumeb blev dannet en stort rørformet grotte.

Tsumeb – lidt geologi

- Grotten kollapsede og dannede et synkehul som efterfølgende blev fyldt af sand
- I de senere stadier af bjerg-udviklingen berigede varme mineralske kilder sandstens-klippen med store mængder metaller, som følge af den kemiske reaktion mellem det metalholdige hydrotermale vand og den kalkholdige sandsten
- I tertiær og kvartær tiden fra ca. 3 mio. til ca. 10.000 år siden bliv klimaet igen mere fugtigt og bjergene blev igen utsat for karstifikation. Det er i løbet af denne tidsperiode at vandet oxiderede og opløste de primære malmineraler og dannede de sekundære oxidationsmineraler som Tsumeb er kendt for.
- Og de mineraler skal vi se mere på nu...

Tsumeb - Mineraler



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Tsumeb - Mineraler

- 279 forskellige mineraler (IMA godkendte)
- Typelokalitet for 69 mineraler
- En række germanium-mineraler er alene fundet i Tsumeb
- Særligt kendt for sekundære mineraler med Pb, Cu, Zn, As, Sb, Ge, Ga og Cd



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Tsumeb – Mineraler...

- *Azurite*
- *Malachite*
- *Cerussite*
- *Dioptase*
- *Calcite*
- *Anglesite*
- *Copper*
- *Cuprite*
- *Duftite*
- *Leadhillite*
- *Tsumcorite*
- *Adamite*
- *Wulfenite*
- *Tennantite*
- *Smithsonite*
- *Mimetite*



Azurite

Empirical Formula:	$\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$
Environment:	Secondary mineral in the oxidized zone of copper ore deposits.
IMA Status:	Valid Species (Pre-IMA) Prehistoric
Locality:	Tsumeb near Otavi, Namibia.
Name Origin:	From the Persian lazward, meaning "blue."

Azurite



**Tsumeb, Namibia
Cabinet, 9.5 x 9x 3 cm**

Tsumeb, Namibia
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Azurite



**Tsumeb, Namibia
Cabinet, 12 x 5 x 3 cm**

Azurite



**Tsumeb, Namibia
early 1960s "Charlie Key pocket"
Large Miniature, 6 x 2 x 2 cm**

Tsumeb, Namibia
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Azurite



**Tsumeb, Namibia
Cabinet,
9 x 7 x 2 cm**

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Azurite

**Tsumeb, Namibia
Miniature,
3.5 x 3.5 x 2.5 cm**



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Azurite

Tsumeb, Namibia
large cabinet, 16.7 x 13.2 x 10.5 cm





**Tsumeb Mine (Tsumcorp Mine), Tsumeb,
Otjikoto (Oshikoto) Region, Namibia
cabinet, 10.0 x 7.0 x 6.4 cm.**

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Malachite

Empirical Formula:	$\text{Cu}_2(\text{CO}_3)(\text{OH})_2$
Environment:	Secondary mineral in the oxidized zones of copper ore deposits.
IMA Status:	Valid Species (Pre-IMA) Prehistoric
Locality:	Nizhne-Taglisk, Ural Mountains, Russia.
Name Origin:	From the Greek, malache, - "mallow" in reference to green leaf color.

Malachite



**Tsumeb Mine, Tsumeb, Namibia
cabinet, 14.0 X 9.4 X 6.0 cm**

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Malachite



Tsumeb, Namibia
Small Cabinet, 7.5 x 4.5 x 3 cm



Tsumeb, Namibia
Small Cabinet, 8 x 6 x 4.5 cm

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Malachite



**Tsumeb, Namibia
cabinet,
9.6 x 7.9 x 5.0 cm**

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**Tsumeb Mine, Tsumeb, Namibia
cabinet, 12.2 x 6.8 x 4.1 cm**

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Malachite



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**Tsumeb Mine, Tsumeb, Otjikoto
(Oshikoto) Region, Namibia**
small cabinet, 6.5 x 6 x 2.5 cm.

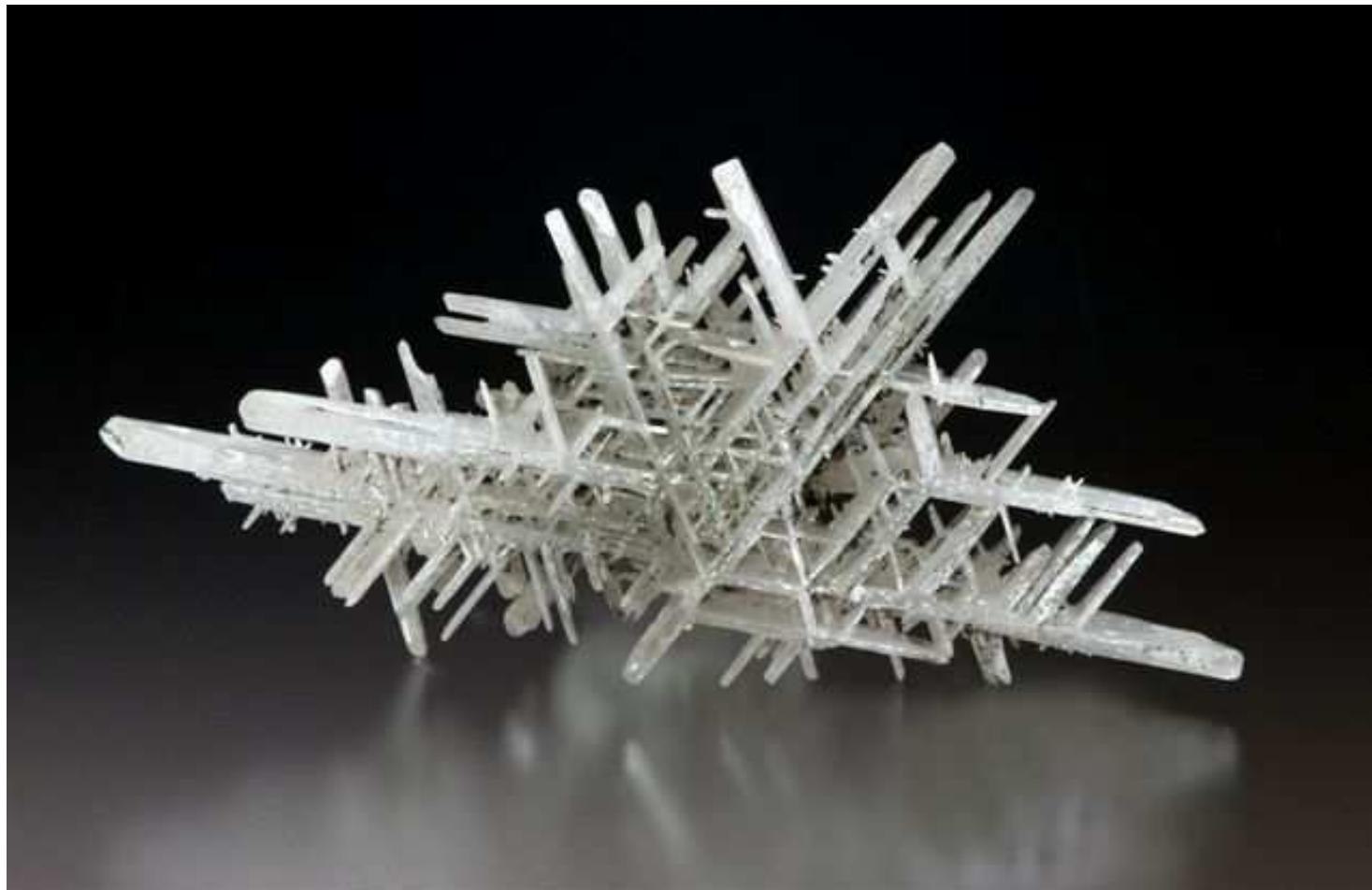


**Tsumeb Mine, Tsumeb, Otjikoto
(Oshikoto) Region, Namibia**
miniature, 3.2 x 3.2 x 3.0 cm.

Cerussite

Empirical Formula:	Pb(CO ₃)
Environment:	
IMA Status:	Valid Species (Pre-IMA) 400 BC
Locality:	
Name Origin:	From the Latin, cerussa, meaning "white lead."

Cerussite



Tsumeb, Namibia
Small Cabinet, 9.75 x 5 x 2.5 cm

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Cerussite



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**Tsumeb, Namibia
Cabinet, 12 x 11 x 4 cm**

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Small Cabinet, 9 x 4.5 x 2.5 cm

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Cerussite



**Tsumeb, Namibia
thumbnail, 2.5 x 2.4 x 1.6 cm**

Cerussite



**Tsumeb Mine, Tsumeb, Otjikoto
(Oshikoto) Region, Namibia**
thumbnail, 2.5 x 1.8 x 1.1 cm.

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Tsumeb, Namibia
miniature, 3.8 x 2.7 x 2 cm

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Anglesite

Empirical Formula:	Pb(SO ₄)
Environment:	Secondary, weathered deposits of lead ore.
IMA Status:	Valid Species (Pre-IMA) 1832
Locality:	Tsumeb, Southwest Africa.
Name Origin:	Named after the island of Anglesey (Wales, Great Britain).

Anglesite

(1st Oxidation Zone), Tsumeb, Namibia
Small Cabinet, 7 x 6 x 3.5 cm



Anglesite

(1st Oxidation Zone), Tsumeb, Namibia
Small Cabinet, 8.5 x 5 x 4 cm



Dioptase

Empirical Formula:	$\text{CuSiO}_2(\text{OH})_2$
Environment:	Secondary mineral in oxidized zones of copper deposits.
IMA Status:	Valid Species (Pre-IMA) 1797
Locality:	Tsumeb and Cochab, Namibia. Altyn Tube, Russia.
Name Origin:	From the Greek, dia - "through" and optomai - "vision."

Dioptase



**Tsumeb, Namibia
Miniature,
3.5 x 2.5 x 2 cm**

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Dioptase



Small Cabinet, 7 x 6 x 5 cm

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Cabinet, 14 x 11 x 4.5 cm

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**Tsumeb, Namibia
cabinet, 9.5 x 5.5 x 3.5 cm (4 inches
across)**

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Tsumeb, Namibia
small cabinet, 6.2 x 4 x 3.2 cm

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Dioptase



**Tsumeb Mine, Namibia
small cabinet, 6.9 x 5.5 x 2 cm**

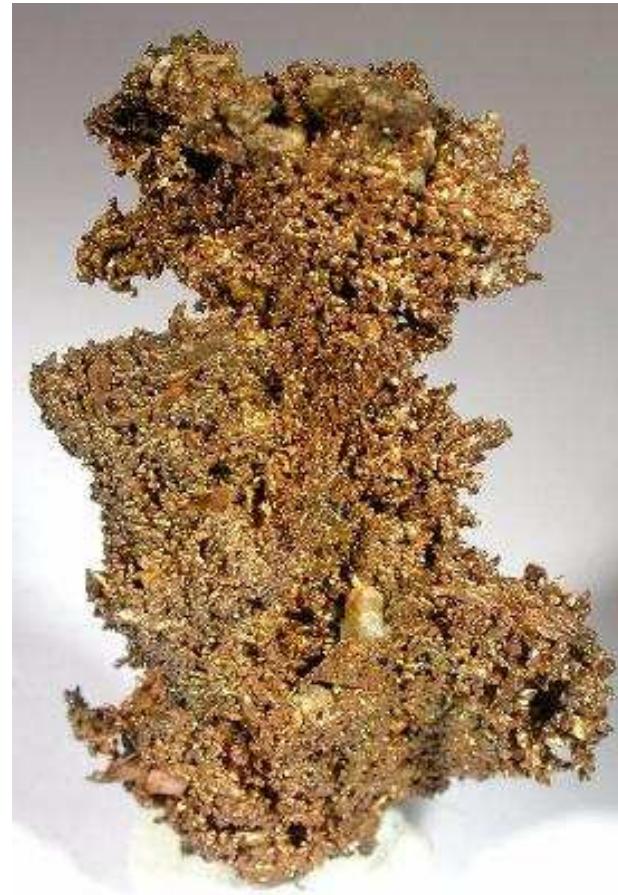
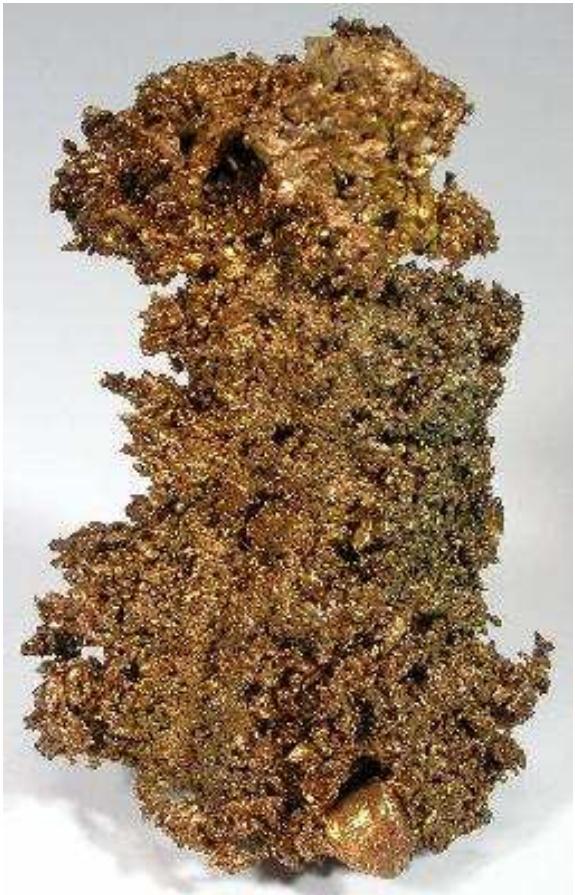
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Copper

Empirical Formula:	Cu
Environment:	Cap rock of copper sulfide veins and in some types of volcanic rocks.
IMA Status:	Valid Species (Pre-IMA) Prehistoric
Locality:	Northern Michigan, USA, Cyprus island, Greece.
Name Origin:	From the Greek, Kyprios, the name of the island of Cyprus, once producing this metal.

Copper



**Tsumeb, Namibia
miniature, 5.5 x 3.5 x 1.5 cm**

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Copper



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Tsumeb Mine, Namibia
large cabinet, 16 x 10 x 9 cm

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Wulfenite

Empirical Formula:	Pb(MoO ₄)
Environment:	Secondary lead mineral. Forms a series with stolzite.
IMA Status:	Valid Species (Pre-IMA) 1845
Locality:	Bleiberg, Villach, Kärnten (Carinthia), Austria.
Name Origin:	Named after the Austrian mineralogist, Franz Xaver von Wulfen (1728-1805).

Wulfenite



Tsumeb, Namibia
Cabinet, 9 x 4 x 4 cm



Tsumeb, Namibia
Small Cabinet, 9 x 7 x 4 cm

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Wulfenite



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Tsumeb Mine, Namibia
small cabinet, 6.0 x 5.0 x 2.5 cm.

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Wulfenite



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**Tsumeb, Namibia
Miniature, 5.5 x 5 x 3 cm**

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Mimetite

Empirical Formula:	$Pb_5(AsO_4)_3Cl$
Environment:	Secondary mineral in lead ores.
IMA Status:	Valid Species (Pre-IMA) 1835
Locality:	Treue Freundschaft Mine, Johannegeorgenstadt, Erzgebirge, Saxony,
Name Origin:	From the Greek mimethes - "imitator" , because of its resemblance to pyromorphite.



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Tsumeb, Namibia
Small Cabinet, 8 x 5.5 x 4.5 cm

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Mimetite



**Gem Pocket 1971, Tsumeb, Namibia
Small Cabinet, 6.25 x 5 x 3 cm**

Tsumeb, Namibia
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Calcite

Empirical Formula:	Ca(CO ₃)
Environment:	Found in sedimentary, igneous, and metamorphic rocks.
IMA Status:	Valid Species (Pre-IMA) 1845
Locality:	Common world wide.
Name Origin:	From the Latin, calx, meaning lime.

Calcite



**Tsumeb, Namibia
Cabinet, 14 x 10 x 4 cm**

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Calcite



Tsumeb, Namibia
Cabinet, 10 x 7 x 6 cm

**Calcite with oriented inclusions
of Mottramite**



Calcite



**Tsumeb Mine (Tsumcorp Mine), Tsumeb,
Otjikoto (Oshikoto) Region, Namibia
cabinet, 10.9 x 9.0 x 5.2 cm.**

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Calcite



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Tsumeb Mine, Namibia
miniature, 3.5 x 2.8 x 2.4 cm.

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Cuprite

Empirical Formula:	Cu_2O
Environment:	Oxidized zone of copper deposits.
IMA Status:	Valid Species (Pre-IMA) 1845
Locality:	Commonly in the copper deposits of SW USA and in Chile.
Name Origin:	From the Latin, cuprum, meaning copper. Chalcotrichite from the Greek, meaning "hairy copper."

Cuprite



**Tsumeb, Namibia
Miniature,
5.5 x 4 x 2 cm**

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Duftite

Empirical Formula:	PbCu(AsO ₄)(OH)
Environment:	Secondary mineral in the oxidized zone of hydrothermal base metal deposits. Duftite-beta (1956) is now considered a compositional intermediate in the duftite-conichalcite series
IMA Status:	Discredited IMA 2006
Locality:	Tsumeb, Namibia.
Name Origin:	Named in 1920 for G. Duft, general manager of the mine at Tsumeb, Namibia.

Duftite



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Tsumeb Mine, Namibia
70mm x 60mm x 35mm

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Tennantite

Empirical Formula:	$Cu_{11}Fe^{2+}As_4S_{13}$
Environment:	Hydrothermal veins and contact metamorphic deposits.
IMA Status:	Valid Species (Pre-IMA) 1819
Locality:	Cornwall, England, UK.
Name Origin:	Named after the English chemist, Smithson Tennant (1761-1815).

Tennantite



**Tsumeb Mine, Namibia
miniature,
4.6 x 4.4 x 2.6 cm.**





Tsumeb, Namibia
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Tsumeb, Namibia
Cabinet, 10 x 8 x 6 cm

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Smithsonite

Empirical Formula:	Zn(CO ₃)
Environment:	Commonly found as an oxidation product of Zn-bearing ores.
IMA Status:	Valid Species (Pre-IMA) 1832
Locality:	Mendips at Derbyshire, UK.
Name Origin:	Named after James Smithson (1765-1829), English mineralogist who financed the founding of the Smithsonian Institution in Washington, DC, USA.

Smithsonite



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Tsumeb, Namibia
Small Cabinet, 8 x 6 x 4 cm

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Smithsonite



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Tsumeb, Namibia
Small Cabinet, 9 x 7.5 x 4 cm

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Smithsonite



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Tsumeb, Namibia
Miniature, 4 x 2.1 x 1 cm

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Smithsonite



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Tsumeb, Namibia
Small Cabinet, 6.5 x 5 x 3 cm

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Smithsonite

**Tsumeb, Namibia
Cabinet,
14 x 13 x 4 cm**



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Smithsonite



**Tsumeb, Namibia
Cabinet,
17 x 15 x 12 cm**

Tsumeb, Namibia
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Smithsonite

**Tsumeb, Namibia
Small Cabinet,
6 x 5.5 x 5.5 cm**



Leadhillite

Empirical Formula:	$Pb_4(SO_4)(CO_3)_2(OH)_2$
Environment:	Secondary mineral.
IMA Status:	Valid Species (Pre-IMA) 1832
Locality:	Leadhills, Lanarkshire, Scotland.
Name Origin:	Named for the locality.

Leadhillite

**Tsumeb Mine, Namibia
small cabinet,
8.1 x 5.5 x 3.1 cm.**



Tsumcorite

Empirical Formula:	$PbZnFe^{2+}(AsO_4)_2 \bullet (H_2O)$
Environment:	In the oxidized zone associated with other lead arsenates and carbonates. Forms a series with helmutwinklerite and thometzekite.
IMA Status:	Approved IMA 1971
Locality:	Tsumeb mine, Tsumeb, Namibia.
Name Origin:	Named for the TSUMeb CORporation.

Tsumcorite

**De Wet Shaft,
Tsumeb, Namibia
miniature,
3.7 x 2.9 x 1.8 cm**



Adamite

Empirical Formula:	$Zn_2(AsO_4)(OH)$
Environment:	
IMA Status:	Valid Species (Pre-IMA) 1866
Locality:	Chile, Atacama, Chañarcillo.
Name Origin:	Named after the French mineralogist Gilbert Joseph Adam (1795-1881).

Adamite



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**Tsumeb Mine, Tsumeb, Namibia
miniature, 3.9 x 3.2 x 2.1 cm**

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Tak for i dag...



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