

A BRIEF HISTORY OF GOLD

SMEDG



GOLD – A 5,000 YEAR LOVE AFFAIR





*Gold is the child of Zeus,
neither moth nor rust devoureth it,
but it devours the mind of man.*

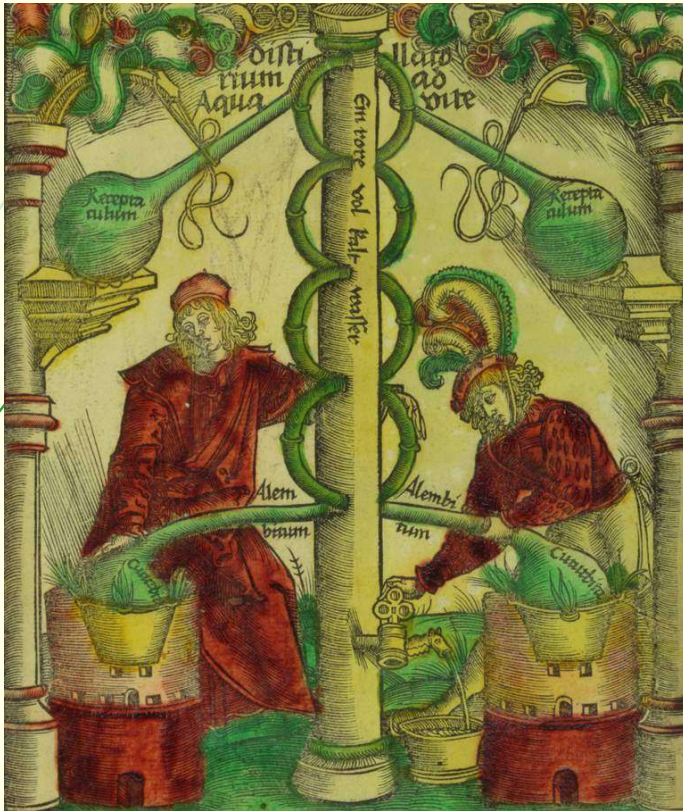


Pindar,
5th century BC Greek lyric poet

Bretton Woods, New Hampshire



ALCHEMY



CHINESE ALCHEMY

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This Taoist alchemy manual from the Qing Dynasty sold at Christies in Paris recently for \$US771,000



The search for a Golden Elixir often ended in mortality rather than immortality!

Pizarro and Atahualpa: The Curse of the Lost Inca Gold

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Pizarro



Atahualpa



Ruminahui

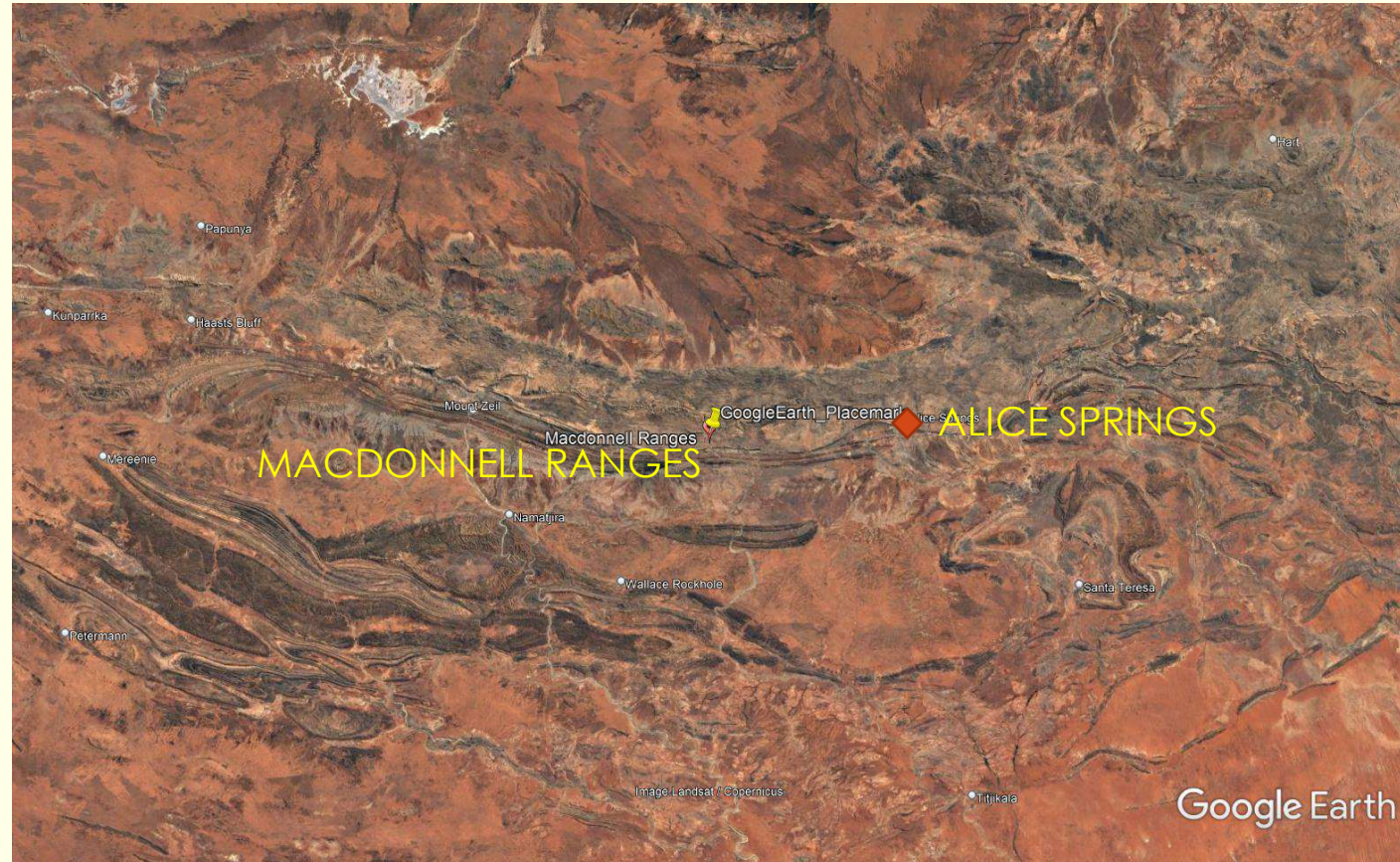
Source: <https://www.worldhistory.org/>

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Harold Lasseter



LASSETER'S LOST REEF

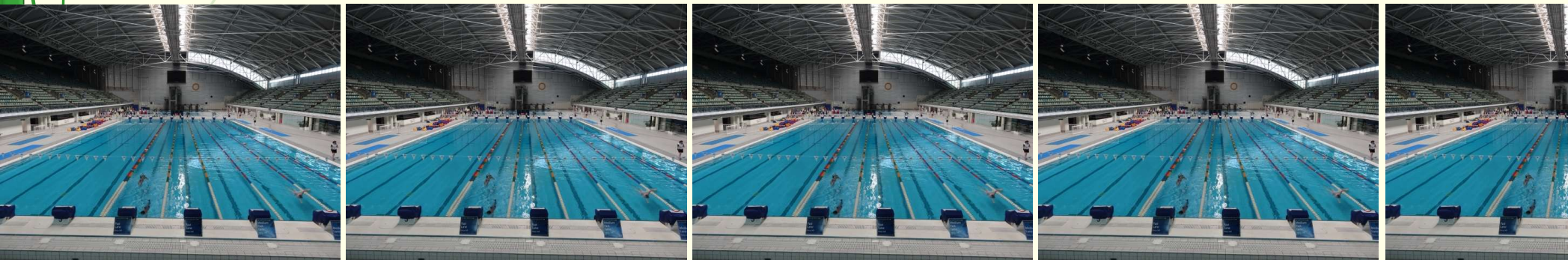


SOME BASIC FACTS ABOUT GOLD:

- The yellow metal, with the chemical symbol: **Au**, from the Latin '*aurum*'
- Its atomic number is 79 and atomic weight is 197
- High but by no means the highest – mercury, lead, bismuth and uranium are higher
- So is radon and that's a gas!
- So what is it about gold that makes it so attractive to us?
- What drives all you energetic young geos to endure the heat, dust and flies of the outback in the hope of stubbing your toes on a nugget?
- In essence, it is simply the combination of gold's properties and its rarity that create value

SOME BASIC FACTS ABOUT GOLD:

- First: rarity - how much gold has been mined throughout history?
- The World Gold Council estimated (Feb 2025) that in all of history only 216,265 tonnes of gold have been produced
- How much is that?



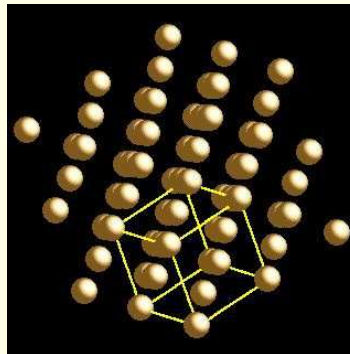
All the world's mined gold put together into one piece would amount to a cube just under 23m on each side

Over 90% of all the gold ever mined is still available

MORE BASIC FACTS ABOUT GOLD:

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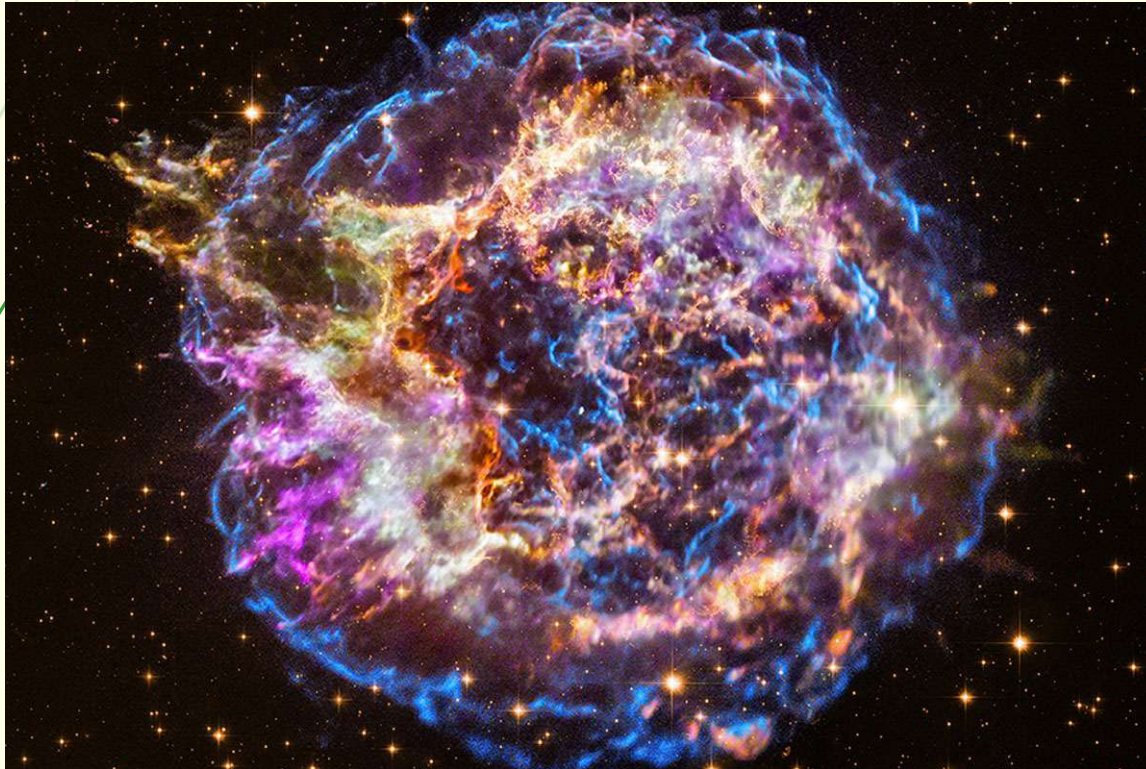
- Gold is sold by the Troy ounce, equal to 31.1 grams and today is worth around \$A5,200 per oz
- Gold purity measured in carats: 24 ct gold is pure gold
- A kilogram of gold is today worth about \$A170,000
- Gold is one of the heaviest substances – 19.3 tonnes for each cubic metre; much heavier than lead or silver
- A block of gold the size of a 1 litre milk carton would weigh as much as a packed suitcase
- A suitcase filled with gold would weigh as much as a small car
- This is because gold atoms pack together tightly into cubic crystals
- So a lot of value can be squeezed into a small space



WHERE DOES GOLD COME FROM IN THE FIRST PLACE?

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- Elements up to iron are made by nuclear fusion inside stars
- Heavier elements like copper, zinc and nickel require exploding stars – supernovas



**Supernova Remnant
of Cassiopeia A
Captured by NASA's
Chandra X-ray
Observatory**

WHERE DOES GOLD COME FROM IN THE FIRST PLACE?

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- But for really heavy elements, like gold, platinum and uranium, even a supernova is not hot enough – something bigger and hotter is needed
- To make gold you need a **kilonova** – the collision of two neutron stars
- Confirmed in 2017 from gravity waves

Gold is kilonova ash



A teaspoonful of
neutron star
stuff would
weigh more than
5 billion tonnes

>5,000,000,000
tonnes

WHERE DOES GOLD COME FROM IN THE FIRST PLACE?

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- A **magnetar flare** – a neutron star with a magnetic field trillions of times stronger than Earth's

A New Source of Gold

Gold and other heavy elements are produced in extreme environments like neutron star mergers. However, these rare events do not account for all the heavy elements we see today. Researchers have discovered a new source of these elements, resolving a long-standing mystery in astrophysics.

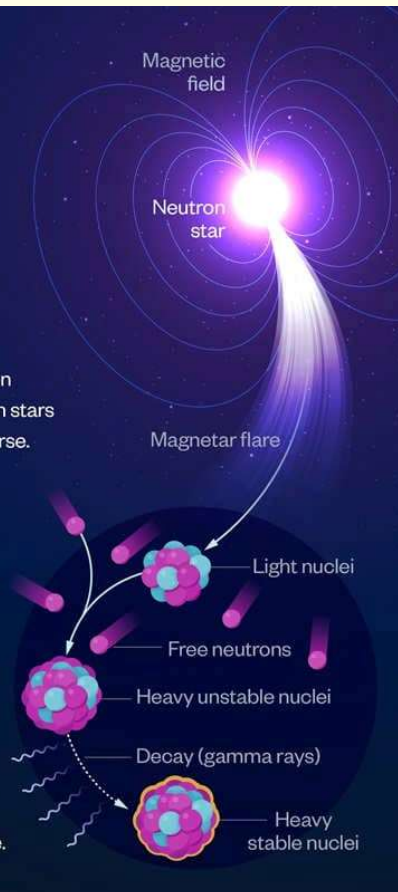
Forged in Fire

Neutron stars are the compact bodies left over when stars explode in supernovae. Magnetars are neutron stars harboring the strongest magnetic fields in the universe.

The defining features of magnetars are their radiative outbursts — extremely energetic flares of particles that last less than a second.

Cosmic Alchemy

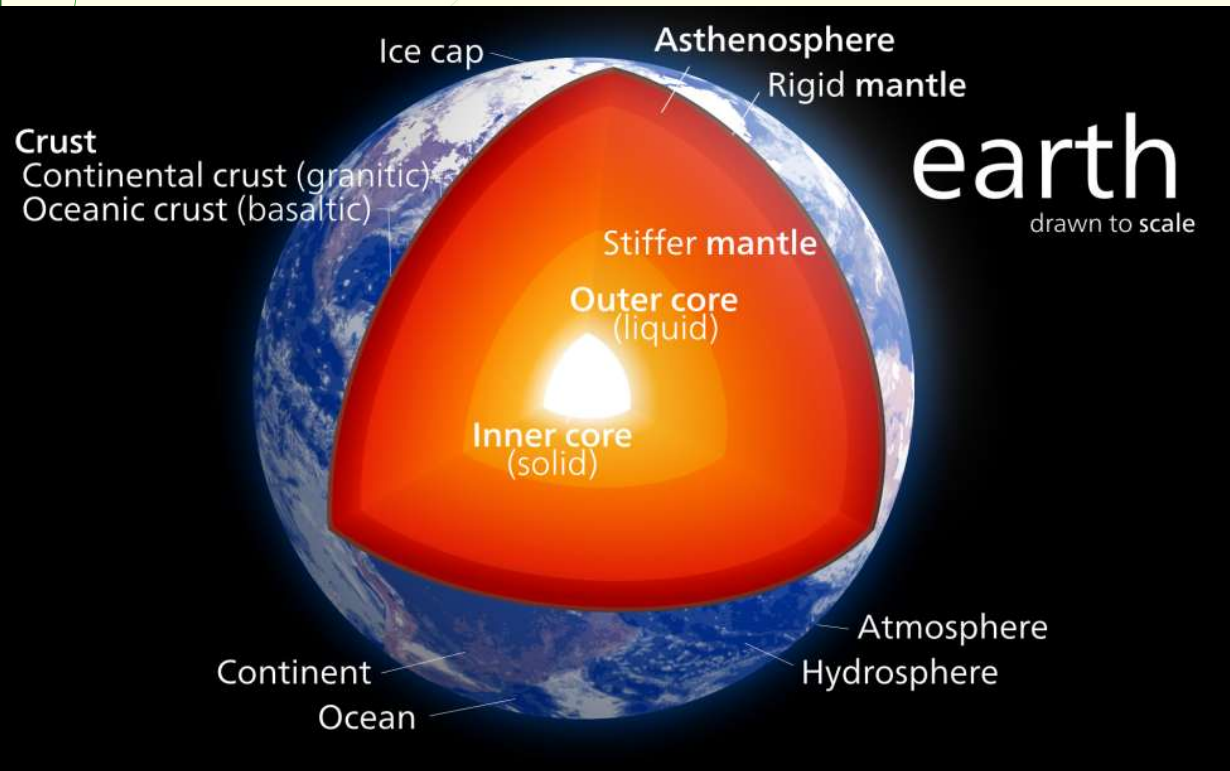
Magnetar flares eject some of the star's crust. Nuclear reactions in that crust then turn lighter elements like iron into heavy, unstable radioactive nuclei. These nuclei then decay into the stable elements we find on Earth, such as gold. The decay process produces a signature gamma-ray signal that lasts for several hours after the flare.



- A huge flare from a magnetar was detected in 2004 but remained unexplained until 2024.
- New data showed the flare released more energy in a few seconds than the sun does in a million years.
- And created vast amounts of heavy metals, gold included.

WHERE ON EARTH IS ALL THE GOLD?

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- The core has enough gold to cover the surface of the earth to 10cm depth
- The continental crust averages about 3 parts per billion gold, on that basis ...
- The top 4km of continental crust contains a total of about 6 billion tonnes of gold

WHAT IS GOLD USED FOR?

- Gold takes and retains a high polish and does not corrode or oxidise
- Gold is highly malleable – 1kg can make a sheet to cover a tennis court
- Gold is very ductile – 1kg can make a wire 5km long
- Gold is one of the best conductors of electricity – only silver is better



Jewellery (50-60%)



Electronics (5%)



Industrial (3-4%)



Coins and medals (3-5%)



As a store
of value
(30%)

TOP TEN WORLD GOLD PRODUCERS IN 2024

	Country ↕	Tonnes ↕
China		380.2
Russian Federation		330.0
Australia		284.0
Canada		202.1
United States		158.0
Ghana		140.6
Mexico		140.3
Indonesia		140.1
Peru		136.9
Uzbekistan		129.1

Source: Metals Focus; World Gold Council
Data as of 31 December, 2024
Production volumes for 2024

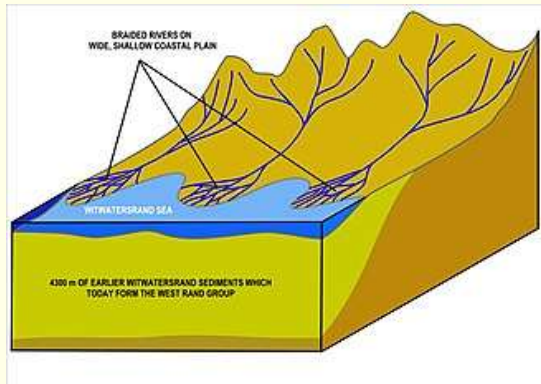
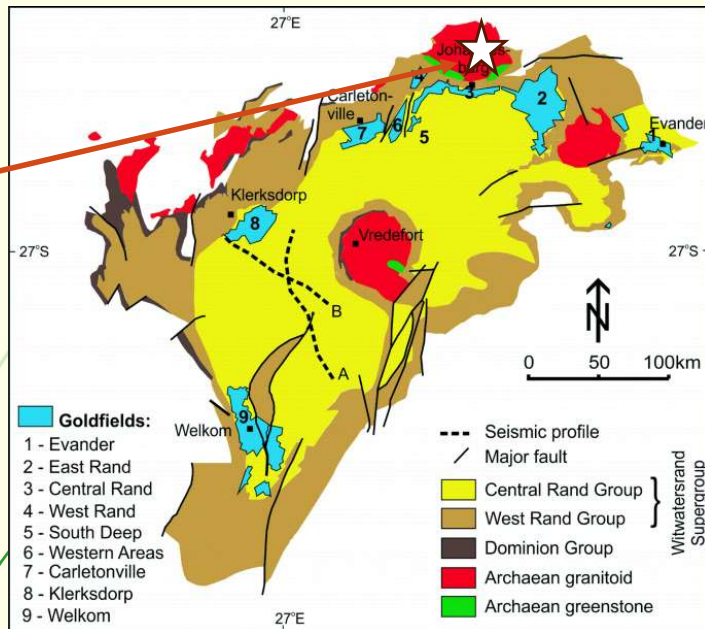
Total world gold production = 3,300 tonnes
Total world gold demand = 4,974 tonnes

South Africa was 12th with 99 tonnes

THE WITWATERSRAND GOLDFIELDS, SOUTH AFRICA

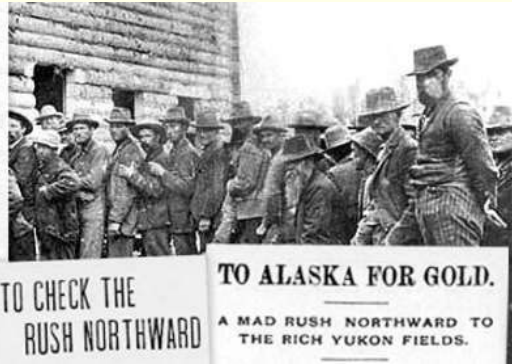
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Jo'burg

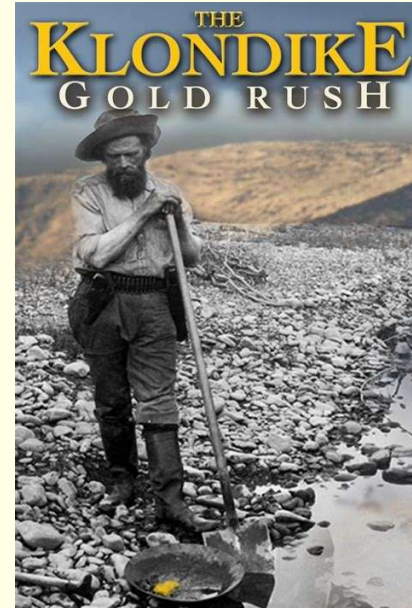


- By far the greatest goldfield on earth
- Over 60,000 tonnes of gold production
- About 25-30% of all the gold ever produced
- More than 30x Kalgoorlie's production
- Now significantly depleted, but still producing (deepest mine >4km)
- Ancient fossil placer (alluvial) deposits
- Gold grains occur with detrital pyrite (FeS_2), uranium and other heavy minerals in fossil shoreline gravels
- Formed over 2.4 billion years ago, before the atmosphere contained significant oxygen
- So the pyrite and uranium did not oxidise

HEADLINES IN
HISTORY
 AUGUST 16, 1896
**KLONDIKE
 GOLD RUSH
 BEGINS**



“NORTH TO ALASKA”



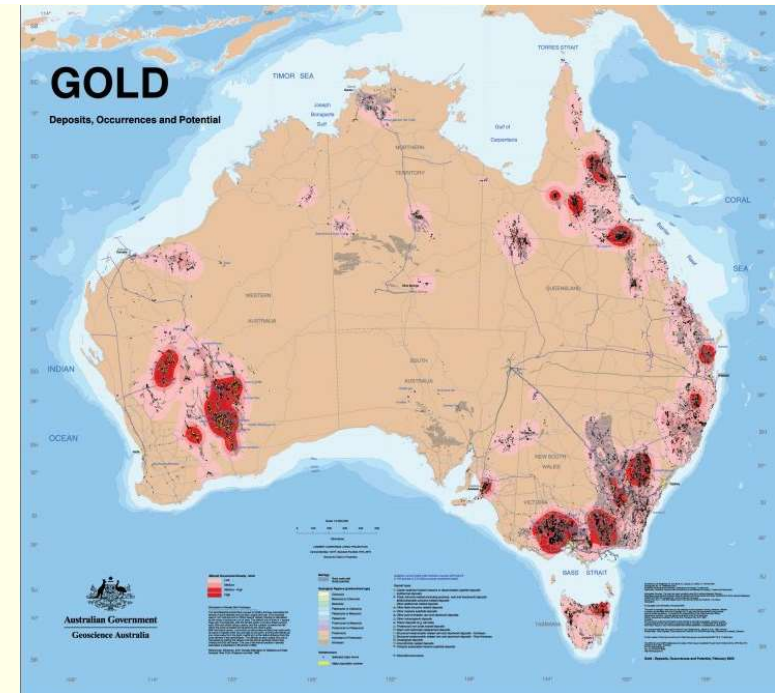
GOLD IN AUSTRALIA

- Gold has been very important in the development of our nation
- It was the quest for gold that brought so many settlers here in the 1800s
- In the late 19th century Melbourne was the richest city in the world
- This was thanks to gold from Ballarat, Bendigo and many other gold towns in the Victorian goldfields



Holtermann's nugget, the largest single piece of gold ever found anywhere (over 3,000 ozs), mined at Hill End, NSW, in 1872

Substantially photoshopped!



The map shows where in Australia most of our gold was found in the past

SOME EARLY PHOTOSHOPPING

Holtermann was not averse to a bit of “photoshopping” himself



© Mitchell Library, State Library of New South Wales



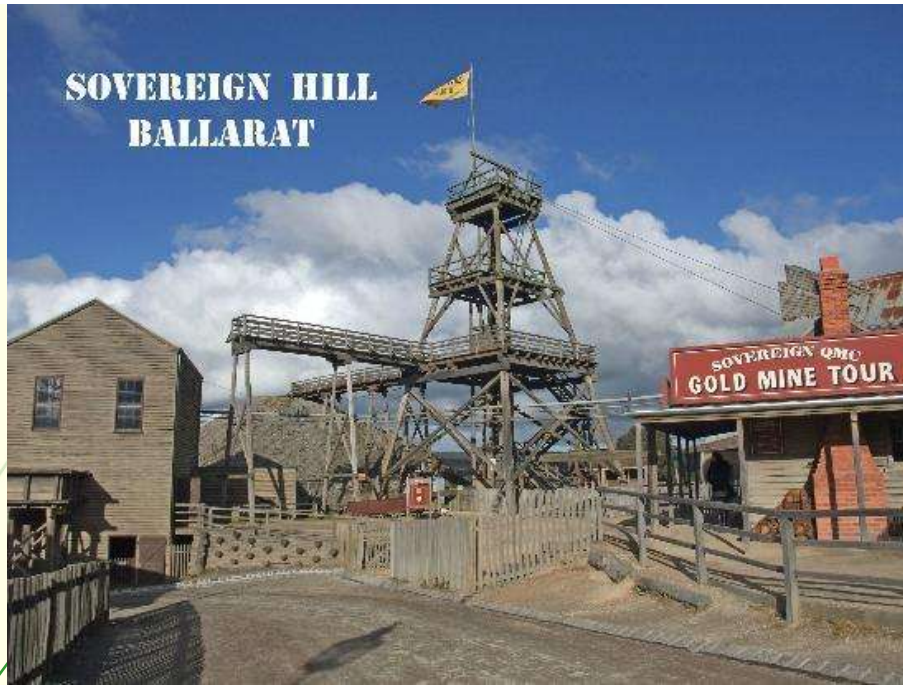
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GOLD IN AUSTRALIA

The Eureka Rebellion





GOLD IN AUSTRALIA



GOLD IN AUSTRALIA

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Russian Jack

Russian Jack, one of the many men who walked from Perth to the Goldfields.
Courtesy of West Australian Newspapers uncredited images from archival and contemporary sources.



"KALGOORLIE OR BUST"



THE KALGOORLIE GOLDEN MILE

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MINING GOLD

The Kalgoorlie Super Pit



**The fourth biggest
gold producer in
Australia**

TYPES OF GOLD DEPOSITS

Alluvial gold

– loose gold pieces eroded from rocks and washed into stream beds and banks

- ☐ Most miners in the Gold Rush days mined alluvial gold by panning or sluicing in creek and riverbanks
- ☐ But most actual gold production came from underground mines



Also called “placer” gold





The Welcome Stranger, the world's largest alluvial nugget (2,380 ozs or 74kg), found in Victoria in 1869

Australia has proven to be a good place to find alluvial gold



20oz (620g) gold nugget from WA, over \$A100,000 worth of gold



Alluvial gold from Tooloom in northern NSW

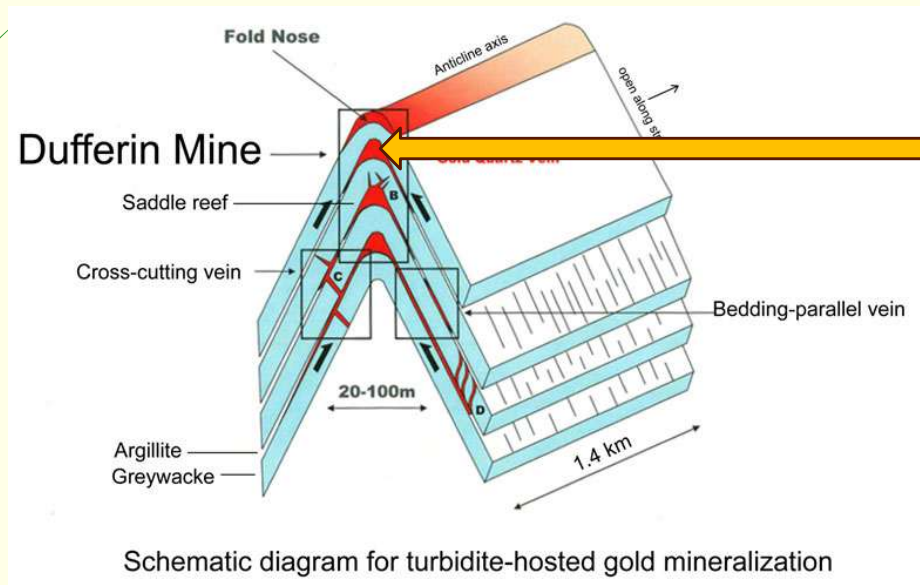


TYPES OF GOLD DEPOSITS

Bedrock gold

- ☐ Gold deposited in rock deep below the surface
- ☐ Many different types of gold deposits
- ☐ Mined in open pits or underground
- ☐ Nearly all gold produced today is mined in bedrock

Bendigo's Saddle Reef Gold Deposits



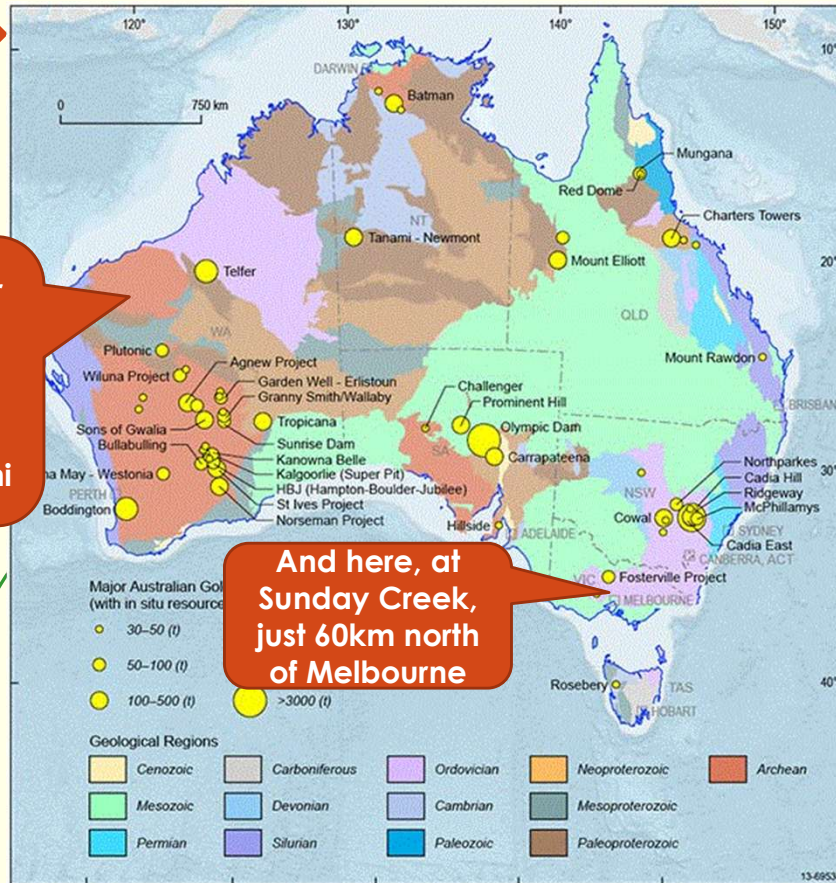
Gold in quartz from a saddle reef deposit



GOLD IN AUSTRALIA TODAY

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Several major new gold discoveries made here in the Pilbara, including Hemi



- Australia produces about ~300 tonnes of gold annually ... from around 70 mines
- Enough gold to fill an *en suite* bathroom
- But worth over \$A50 billion
- Major new discoveries continue to be made

- Boddington and Kalgoorlie in WA,
 - Olympic Dam in SA,
 - Tanami in the NT, and
 - Cadia in NSW
- are currently our biggest sources of gold

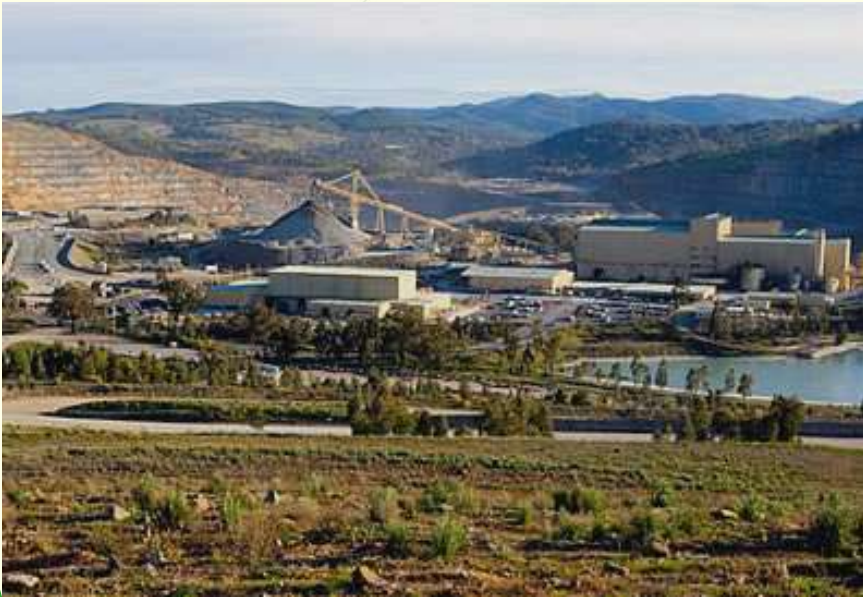
MINING GOLD

The Boddington Mine, WA
Australia's largest gold producer



MINING GOLD

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The Cadia mine, near Orange is a very large porphyry type deposit and is Australia's second largest gold producer

PROCESSING GOLD ORE TO RECOVER GOLD

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**Boddington gold mine processing plant, WA
Australia's largest gold producer in 2022
(with a little bit of copper on the side)**

PROCESSING GOLD ORE TO RECOVER GOLD

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Pouring molten gold into doré bars

A \$440,000 grin

This bar weighs 2.642kg





**There are up to
10 million ounces
of gold here,
worth \$50 billion**

THE COWAL GOLD MINE

My biggest success as a gold explorer





IF ONLY I COULD HAVE KEPT IT!

- 13 kg of gold
- Worth over \$A2 million at today's prices
- A truly concentrated store of wealth
- So, the search for new gold continues
- I have done a lot of gold prospecting over the years
- And there is still a bit of gold fever in my blood
- But there's one place I might just leave to future generations of geologists

Mars – is this where our grandkids will find their gold?

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WHAT DO PEOPLE SAY ABOUT GOLD?

“There is no honest man — not one — that can resist the attraction of gold!” — **Aristophanes**

Curst greed of gold, what crimes thy tyrant power has caused. — **Virgil**

“Gold — what can it not do, and undo?” — **William Shakespeare**

“O Gold! I still prefer thee unto paper,
Which makes bank credit like a bark of vapour.” — **Lord Byron**

“We have gold because we cannot trust governments.” — **Herbert Hoover**

“Although gold and silver are not by nature money, money is by nature gold and silver.”
— **Karl Marx**

“A gold mine is a hole in the ground with a liar standing on top of it.” — **Mark Twain**

“[Gold] gets dug out of the ground in Africa, or someplace. Then we melt it down, dig another hole, bury it again and pay people to stand around guarding it. It has no utility. Anyone watching from Mars would be scratching their head.” — **Warren Buffett**



GOLD – THE VERY LAST WORD

J. P. Morgan

*Gold is money.
Everything else is credit.*

GOLD – A NOT SO BRIEF HISTORY

