

Review: Dr Emil Silvestru, *The Cave Book*, Master Books, Green Forest, AZ, May 2008

Pages: 79

Wonderland of the Underland

A neglected area of study, karstology offers some surprising insights into the the history of mankind, geomorphology of the world, and modern-day applications such of water harvesting from karst aquifers.

Far from the primitive evolutionary view, caves show that early humans (e.g. ‘Neandertals’) had language, sophisticated artwork, and burial and religious customs. They were simply groups of early people trying to survive after Noah’s Flood having limited technology and resources in chilling climates.

Since it is estimated that by 2025, 50% of drinking water will come from karst aquifers, this field of study will only grow in importance, and it also highlight the grace of God in providing vast drinking water sources after judging the world by flood.

Overall, a very accessible introductory guide.

Introduction (pp. 6-7)

It is estimated that by 2025, 50% of drinking water will come from karst aquifers.

I) (pp. 8-21)

Any pre-Flood caves would have been destroyed by the global cataclysm.

Human cave prints are sometimes superimposed on cave prints.

The cave bear (*Ursus spelaeus*), cave lion (*Felis spelea*), and cave hyena (*Crocuta spelea*) were all large cave-dwelling creatures.

The oldest cave tools were found in Longgupo Cave in China, 'dated' at 1.96-1.78Ma.

Cave paintings were made with charcoal or mineral pigments and a one-stroke drawing technique. Pigments were from ground red clays mixed with animal fats.

Cave rooms have unique points of resonance and it is here that paintings are often found.

Caves were thought to be entrances to "Mother Earth".

Almost all cave art is from Western Europe.

Glaciation events are said to destroy cave paintings, yet thousands have survived in Europe.

The Lower Palaeolithic is said to be the "dawn of humanity" and has the Oldowan tool industry (from the Olduvai Gorge site in Northern Tanzania).

The Mesolithic is the Middle Stone Age.

Neandertal fighting was based on close-quarter thrusting.

II) (pp. 22-29)

Mayan caves were said to be the openings to the Xibalban Underworld (“Place of Fears”).

Bats are troglophiles. Females give birth dropping their young, but other lower females spread their wings to catch the newborn pups.

Trogloxenes are foreign cave creatures which became cave dwellers by accident, and troglobites simply choose to live in caves.

The Cave olm (*Proteus anguinus*) can reach 30cm long.

Cave fauna include the cave salamander, whip spider, cockroach, and pseudo-scorpion.

Caves probably did not exist before the Flood.

Sulfur-rich water rising from below form subterranean lakes in cave pockets providing bacterial food sources. Small arthropods then eat this and so the food chain progresses. Cave bacteria do not need light so it is a “chemotrophic” food chain.

Caves have attracted exobiologists since studying similar bacteria living near hot vents in the sea is difficult!

When exposed to light, the olm develops pigmentation which proves it was once a land-dwelling creature.

The more time spent in isolation, the longer a persons sleep-wake daily cycle will get (e.g. some people can stay awake for 20 hours then sleep for 12).

Caves have three micro climates: disturbance at the entrance which fluctuate 10°C, transitional at less than 10°C, and stable less than 1°C. Stable micro climate temperatures depend on heat flow from below and the surface temperature.

Cave humidity is high and can reach 90%.

Air circulation can be uni or bi-directional.

The steeper the cave floor, the more intense the air current.

There is an abundance of negative ions in caves (usually oxygen ions with an extra electron) because the thick rock shields out most cosmic radiation. This is useful for speleotherapy.

III) Caves and Karst-Some of the More Technical Details (pp. 30-37)

A cave is defined as being longer than it is deep and at least 10m in length.

Rainwater mixed with carbon dioxide forms a weak carbonic acid which eats into limestone formations.

Dolomite is a mixture of calcium and magnesium carbonates which cause rock shrinkage and fragility.

Rock gypsum is $\text{CaSO}_4 \cdot \text{H}_2\text{O}$

Evaporite rocks are formed when salt dissociates from water into sodium and chlorine ions.

Endogenetic caves are formed in igneous rocks by moving lava; the longest being in Hawaii at 61km. After the flow stops a tube drains out leaving the cave.

Exogenetic caves are the result of chemical or physical processes.

Karsting processes form caves by penetrating into rocks via acidic liquids. A base level cuts into water-filled cracks and joints triggering a drainage flow of the *karst aquifer*.

Karst rivers or springs emerge at the surface and can move 115m^3 of water per second. The largest is Fontaine de Vaucluse in France which is the source of the river Sorgue.

Sulfuric acid eats limestone much faster than carbonic.

IV) (pp. 38-47)

Active caves have a flowing stream and may be inflow, outflow, or through caves.

Caves can be above or below the water table.

Spelethems are secondary crystalline formations. Columns are formed when stalactites and stalagmites merge in a cavern.

“Cave coral” looks like popcorn.

Calicte crystals from stalactites are called helictites, and those from stalagmites are heligmites. Natural electrical charges from the ionized atmosphere may contribute to eccentric formations.

Cave pearls develop like pearls. Since they form on the bottom of caves they should have a flat bottom but they don't.

Saturated cave pool water is very calm and can precipitate out “cave rafts”.

Aragonite is a rhombic CaCO_3 . Anthodites are gypsum flowers.

Angel hair are fine needles of mirabolite ($\text{NaSO}_4 \cdot 10\text{H}_2\text{O}$).

“Moonmilk” are carbonate micro crystals.

Speleothems contain ^{234}U which decays into ^{230}Th and from its half life and the usual assumptions are ‘dated’ at over 100,000 years old. It is inconceivable that surface dripping points supplying stalactites would remain in the same location for such timeframes!

V) (pp. 48-72)

Body heat is lost very quickly in caves.

Lighting is a combination of acetylene burners and LED lights.

Water silting reduces visibility to nil.

Descent is usually via a rope anchored to a large tree.

High cave humidity increases light absorption which impacts cave photography.

Water loses most of its acidity after 10m below the surface.

Karstologists use geochemistry and hydrogeology (which is a combination of hydrology, geology, and chemistry).

A water budget is calculated for a given area, part of the most important study of karsts (i.e. modelling aquifers).

A cenote is a water-filled shaft.

At Chichen Itza in Mexico, humans were sacrificed and thrown in a cenote.

Carbon dioxide from visitors increases speleothem growth rates.

Caves begin forming from rising hydrothermal solutions dissolving diagenised rocks. Later tectonic uplifts raise the underland until a surface breach occurs, then rain from above contributes detrital sediments.

Colder water stores more CO₂.

A cable ladder is often used for descents.