SOME MINERALS FROM NAJDENA JAMA

NEKAJ MINERALOV IZ NAJDENE JAME

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France Šušteršič & Miha Mišič: Nekaj mineralov iz Najdene jame

S pomočjo rentgenske metode sva določila mineralno sestavo osmih vzorcev iz Najdene jame. Poleg kalcita, dolomita, kremena, goethita in splošno razširjenih glinenih mineralov se med karbonati pojavljajo še hidromagnezit, siderit, lansfordit in ankerit, med manganovimi minerali pa todorokit. Kot posebnost sta posamič navzoča še aragonit in variscit.

Ključne besede: Najdena jama, jamski sedimenti, minerali

Abstract UDC 551.442:553(497.4)

France Šušteršič & Miha Mišič: Some minerals from Najdena jama

Mineral composition of eight samples from Najdena jama were determined by X-ray diffraction. Beside calcite, dolomite, quartz and wide-spread clay minerals, among carbonates appear also hydromagnesite, siderite, lansfordite and ankerite, and manganese hydroxide todorokite. As somehow exotic there appears also aragonite in variscite.

Key words: Najdena jama, cave sediments, minerals

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INTRODUCTION

Najdena jama is the most important cave to the north of the Planinsko polje in Slovenia. The main stream of the Planinsko polje, the river Unica, gathers karst waters from higher level karst poljes, as well as collecting allogenic waters that originate on the flysch of the Postojna region and run into the polje through the Postojnska and Planinska jama caves. Najdena jama lies very close to the Pod Stenami group of ponors, which operate only during times of flood. Though some of these ponors are true caves they are choked after a short distance and no directly penetrable connection with the cave exists. This is emphasised during flood events, when water levels in the polje and in the cave remain some 15m vertically apart. Consequently, an effective filter between the polje and the cave must exist. Within the cave the water level itself varies by nearly 30m and during times of flood only a fraction of the normally open passages remain accessible.

There are abundant clay sediments and some relatively poor flowstone in the cave, as well as other mineral deposits. Some of these minerals are amorphous, dark brown to black aggregates, which have not been analysed and have traditionally been interpreted as psilomelane. Others take the form of a delicate white efflorescence, popularly named "cave carbide" by cavers, which has been assumed to be fibrous calcite. In order to check the validity of these conceptions, samples of some deposits were collected and their mineral composition determined by X- ray diffraction.

MINERAL COMPOSITION OF THE SAMPLES

Sample Point:	**1**
Location:	**Piparski rov 1**
Grid coordinates[1]	Y: 5441 762, X: 5081 400, Z: 453

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[1] *The cave survey is based on a high accuracy theodolite polygon, carried out by the Institute for Karst Research, Postojna, Slovenia, completed before the end of the nineteen-seventies (Šušteršič, 1982, 153). The stations of the main polygon are determined to 1cm accuracy, so that the 1m grid references of secondary points are not in doubt.*

Description: The sharp edges of many fallen rocks display a white efflorescence ("cave carbide"); exceptionally these pass into white films that cover the smooth sides of some smaller blocks.

The rock: Like the source bedrock, the fallen blocks are of Lower Cretaceous "dolomite" (see sample point 2), which forms a c. 30m-thick package between the underlying bituminous Lower Cretaceous limestone and very pure Upper Cretaceous limestone above. The dolomite is white to grey and disintegrates on weathering to a coarse dolomite silt.

General situation: The passage cross-section is about $100m^2$ and the walls and ceiling are not primary dissolution features, but have been modified by collapse. It is part of a half kilometre section of the cave that is never flooded. No significant draught has ever been felt, yet it is evident that there is always a slow air movement. The mineralization does not appear where the rocks are exposed to dripping water.

Mineral composition[/2]:

Hydromagnesite	$Mg5\ [OH\ |\ (CO_3)_2]\ .\ 3H_2O$
Siderite	$FeCO_3$
Lansfordite	$MgCO_3\ .\ 5H_2O$
Goethite	$FeOOH$
Ankerite	$CaFe\ [CO_3]_2$

Sample Point: **2**
Location: **Piparski rov 1**
Grid coordinates[/1] Y: 5441 794, X: 5081 458, Z: 451

Description: The sample is bedrock from the same site as Sample 3. See also Sample point 1.

The rock: Coarse-grained late diagenetic calcitic dolomite (Pettijohn, 1975, 360, Fig. 10-43). Even before X-ray diffraction results were available the rock was considered to be "dolomite" by the surveyors, and this term is retained in this text. The percentage composition values are on the limit between dolomite and calcitic dolomite and hence it is acceptable to keep the old terminology.

General situation: The sample was fresh bedrock, from which sample 3 was also collected.

[/2] *The percentage values were not determined (except for one sample). The minerals are listed according to apparent proportions in the sample, beginning with the most abundant.*

Mineral composition[2]:

Dolomite	$CaMg\ [CO_3]_2$ (89 %)
Calcite	$CaCO_3$ (11 %)

Sample Point: **3**
Location: **Piparski rov 1**
Grid coordinates[1] Y: 5441 794, X: 5081 458, Z: 451

Description: See sample points 1 and 2. Where the passage walls are permanently wet due to percolation water, and not freshly broken, there are deposits of grey silt. If the generally modest water flow is locally stronger, it can move the particles, arranging the silt into formations, appearing similar to the flowstone. At some points the silt is washed away and redeposited in small pools.

The rock: As described at sample point 2.

General situation: The sampled (silt) material is disintegrated bedrock.

Mineral composition:

Dolomite	$CaMg\ [CO_3]_2$
Calcite	$CaCO_3$

Sample Point: **4**
Location: **Platke**
Grid coordinates[1] Y: 5441 829, X: 5081 477, Z: 442

Description: Dark brown to black crusts covering ledges on the wall below an aven appear to have originated from a single point or a very limited location, and then spilt like a very viscous liquid. The deposits are some centimetres thick, with an earthy consistency and a brittle rather than plastic texture, probably due to secondary cementation. Traditionally the material was dismissed as either psilomelane, or bat excrement, even though the location is wet, and not close to the cave entrance.

The rock: Bituminous Lower Cretaceous limestone. The beds are about 30cm thick, and many are rich in fossil shells, possibly *Requienia ammonia sp.* The base of the dolomite package (see sample points 1 to 3) is some 10m higher.

General situation: A chamber about 8m wide and 10m high has been enlarged from an oblique phreatic tube of modest dimensions by dripping water originating from two avens. The mineral deposit appears much younger than the passage. At the top of the chamber is a squeeze with a very strong draught, but the draught is not felt close to the deposit. Due to the permanent dripping from the avens the air is generally saturated with water, and passage floor becomes a lake during normal floods, while the sample location remains without the reach of normal floods.

Mineral composition:

Quartz	SiO_2
Illite[/3]	$(K,H_2O)Al_2\ [(H_2O,OH)_2\ |AlSi_3O_{10}]$
and/or Paragonite[/3]	$NaAl_2\ [(OH,F)_2\ |AlSi_3O_{10}]$
Goethite	FeOOH
Todorokite	$(H_2O,..)_{\leq 2}\ (Mn,..)_{\leq 8}\ (O,OH)_{16}$

Sample Point: **5**
Location: **Velika Štirna**
Grid coordinates[/1]: Y: 5441 808, X: 5081 442, Z: 420

Description: Dark brown to black stained coarse flowstone on the wall and floor below a small aven with a permanent water drip.

The rock: Bituminous Lower Cretaceous limestone. The beds are about 30cm thick, and some are rich in fossil shells, possibly *Requienia ammonia sp.* The base of the dolomite package (see sample points 1 to 3) is some 20m higher.

General situation: The sample site is on a ledge in the wall of a large chamber some tens of metres high and wide. It lies within the reach of normal flooods and all the neighbourhood is covered by thick layers of loam, but the actual site is completely washed by a small, permanent and relatively intense water drip. The chemical composition of the water has not yet been studied, but it appears that water is neither calcite precipitating nor aggressive at present. During normal floods, i.e. for several months each year, the site is completely submerged.

Mineral composition:

Quartz	SiO_2
Calcite	$CaCO_3$
Illite	$(K,H_2O)Al_2\ [(H_2O,OH)_2\ |\ AlSi_3O_{10}]$
Dolomite	$CaMg\ [CO_3]_2$

Sample point: **6**
Location: **Medvedji rov (Cave Bear's Passage), roof**
Grid coordinates[/1] Y: 5441 876, X: 5081 378, Z: 458

Description: Dark brown to black loamy infill between coarse gravel choking the passage continuation. Locally the sediment appears to be laminated.

[/3] *It was not possible to determine definitively whether the mineral in question is illite or paragonite.*

The rock: Bituminous Lower Cretaceous limestone. The beds are about 30cm thick and many of them are rich in fossil shells, possibly *Requienia ammonia sp.* The base of the dolomite package (see sample points 1 to 3) is some 5m higher.

General situation: The location is at the blind end of a 1m-wide and high passage, choked by coarse limestone cobbles. The passage appears to be a secondary development, parallel to the main passage of Vranja and Najdena jama. In the floor, very close to the sample point, are bones of the cave bear, *Ursus spelaeus sp.* Conditions in the passage appear to have remained effectively unchanged since the bear's body was washed in by flood water. Currently the passage is about 15m above flood level and is never flooded. Because of the blind end to the passage the air is static.

Mineral composition:

Quartz	SiO_2
Illite	$(K,H_2O)Al_2\ [(H_2O,OH)_2\ \|AlSi_3O_{10}]$
Goethite	$FeOOH$
Calcite	$CaCO_3$

Sample point: 7
Location: **Medvedji rov (Cave Bear's Passage), floor**
Grid coordinates[1] Y: 5441 876, X: 5081 378, Z: 457

Description: Dark brown to black loamy to sandy infill between the coarse gravel choking the continuation of the passage. At some places the sediment appears to be laminated.

The rock: As described at sample point 6.

General situation: See sample point 6. The sample was taken on the floor, about one metre below sample 6, close to the bones of the cave bear, which have partly disintegrated into a silty mass.

Mineral composition:

Quartz	SiO_2
Calcite	$CaCO_3$
Illite	$(K,H_2O)Al_2\ [(H_2O,OH)_2\ \|AlSi_3O_{10}]$
Variscite	$Al\ [PO_4]\ .\ 2H_2O$
Todorokite ?	$(H_2O,..)_{\leq 2}\ (Mn,..)_{\leq 8}\ (O,OH)_{16}$

Sample point: 8
Location: **Medvedji rov (Cave Bear's Passage), floor**
Grid coordinates[1] Y: 5441 876, X: 5081 378, Z: 457

Description: White needles in "sea-urchin-like" structures on dark brown to

black stained coarse cobbles, lying within the material described at sample point 6.

The rock: As described at sample point 6.

General situation: See sample points 6 and 7. When discovered (November 1964), parts of the wall and several cobbles on the floor were covered with clusters of white, 0.5 - 1 cm - long needles. By analogy with deposits in neigbouring caves, the explorers assumed that the needles were aragonite, without carrying out tests. During the following years the material progressively disappeared. The final surviving example was taken by the authors in summer, 1972, and is part of the mineral collection in the Department of Geology, University of Ljubljana.

Mineral composition:

Aragonite $CaCO_3$

DISCUSSION

This paper is a presentation of the results of analyses of well-known mineral occurences, rather than a study of cave mineralogy. X-ray diffraction analysis confirmed only one "naked-eye" determination, that of aragonite. If psilomelane ($(Ba,Mn^{2+}...)_3$ $(O,OH)_6Mn_8O_{16}$) is accepted as a general term for mixed manganese hydroxides, then two of the guessed determinations of the dark, amorphous masses were also reasonably close. However, two of the guesses missed completely, and the nature of the white amorphous mineral was also misdetermined. Thus, one broad conclusion is that the use of analogy led to "geofantasy". However, other, more serious, conclusions can be drawn.

The mineral composition of Sample 1 is dominated by hydrated magnesium carbonates (hydromagnesite and lansfordite). It is possible that they are derived from the dolomite that forms a significant proportion of the bedrock, and the hydrated magnesium carbonates crystallized probably due to evaporation. It must be noted that "cave carbide" is not common in Najdena and neighbouring caves, but where present it occupies positions affected by slight air movement.

The iron minerals detected (goethite, siderite and ankerite) might be of similar origin, as some ankerite is normal in dolomitic rocks. In this case goethite and siderite might originate from disintegrated ankerite. However, it must be noted that analysis of the bedrock (Sample 2) did not reveal ankerite. If its presence was not simply obscured by the other two carbonates, it is possible that iron was washed from the red soil on the surface and brought into localised parts of the cave by percolation water.

The complex hydrated oxide of manganese (todorokite) was found at two locations in the cave. The accumulations are relatively young, though not recent or sub-recent. It is evident that at the time of deposition the

todorokite was part of a viscous, loamy fluid that moved down the walls and/ or penetrated between the cobbles. In both situations it was mixed with quartz and illite, both of which are characteristic of recent (and some older) Unica river sediments. It appears that some time after the upper parts of the cave tier had been abandoned, manganese was added to clayey material that was being washed down from older cave fillings. It must be added that manganese is not present in the cave loams in general, but has been transported downwards by percolating water recently at some localities.

In the other dark sediment in the Cave Bear's Passage, goethite appears to be responsible for the staining, while in the Velika Štirna, where the sample point is exposed to regular floods, the staining might be due to organic matter.

That variscite might appear close to the bones of the cave bear is self-evident, though it is fair to ask why no other phosphates are present. It may be simply because the sample was not taken from the mass that obviously includes weathered bones, but from about 30 cm away. Perhaps variscite is just the most mobile among a number of possible bone-decay minerals.

The common occurrence of illite and quartz has been mentioned as characteristic for sediments derived from flysch. In Najdena jama these minerals appear in samples that either originate in old Unica river sediments, or are exposed to present floods. However, similar sediment is also found on the surface, evidently released from denuded old caves, and its appearance is not very informative. On the other hand, its non-appearance in some samples indicates that the sample site was not "polluted" with such material and that the mineralization is only locally controlled.

The question of aragonite appears to be more interesting. In Slovenia, aragonite needles were first described in Ravenska jama (F. Hochenwart, 1832, cit. D. Kuščer et al., 1959, p. 21), about 60 km NW of Planinsko polje. Our further (unpublished) explorations have revealed other cave aragonite occurrences in the wide area between Idrija and Ljubljana (See also T. Petek, 1995). All of them belong to the region of isolated karst (P. Habič, 1982) of west-central Slovenia, which is characterized by interchange of clastic and carbonate sediments (at times intercalated with pyroclastic material), and very complicated tectonics.

Najdena jama lies a few kilometers south of the southern limit of this geological region, in the Dinaric karst of southern Slovenia, which is characterized by different (exclusively carbonate) rocks and a different tectonic setting. Thus, though a regional link appears evident, there is no obvious geological connection.

Detailed study of the Ravenska jama aragonites was first performed by D. Kuščer et al. (1959), and later extended by P. Placer et al. (1989). They agreed that aragonite was deposited due to temporary very high concentrations of magnesium in percolating water, and not due to higher temperatures.

In this case, the probable source of magnesium was in nearby pyroclastic rocks.

In the case of Najdena jama such a source is missing. However, a 30 m-thick dolomite layer directly above the location might play a similar role. On the other hand, all the described localities lie below or within this dolomite layer, but aragonite was deposited only in the Cave Bear's Passage. Only one difference is evident at first glance. The aragonite locality is in a remote, dead, corner of a blind passage, where air movement is virtually absent, and the compact roof permits only minute dripping. The other localities lie in relatively open space, everywhere exposed to abundant wetting, and significant draughts.

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[4] *The given pagination includes the whole text. In order to make the reference list more understandable, the titles quoted are of summaries/abstract.*

NEKAJ MINERALOV IZ NAJDENE JAME

Povzetek

UVOD

Najdena jama je najpomebnejša med jamami severno od Planinskega polja, od koder se napaja. Vodna gladina v njej niha za okrog 30 m in ob poplavah ostane dostopen le majhen del njenih prostorov. Zato je zelo bogata z ilovnatimi odkladninami. Sige je sorazmerno zelo malo, še manj pa drugih mineralov, ki jih najdemo le posamič. Netaketeri od njih se pojavljajo v obliki brezobličnih temno rjavih do črnih skupkov, ki smo jih doslej "na oko" imeli za psilomelan. Druge najdemo v obliki belega oprha oz. nekoliko bolj kompatnih skupkov, ki jim jamarji pravimo "jamski karbid", zraven pa si mislimo, da gre za vlaknati kalcit. Redke pojave belih iglic smo vedno imeli za aragonit, to pa je bil verjetno vzrok, da so kmalu "dobili noge". Da bi dognala, za kaj v resnici gre, sva vzorčila nekaj najpomebnejših nahajališč in vzorce preiskala z rentgensko metodo.

MINERALNA SESTAVA VZORCEV

Vzorčno mesto: **1**
Kraj: **Piparski rov 1**
Gauss-Krügerjeve koordinate Y: 5441 762, X: 5081 400, Z: 453

Opis: Ostre robove mnogih podornih blokov prerašča bel oprh ali kompaktnejši skupki ("jamski karbid"). Izjemoma se pojavlja tudi bela prevleka na gladkih straneh manjših kosov.

Mineralna sestava:

Hidromagnezit	$Mg_5 [OH \mid (CO_3)_2] \cdot 3H_2O$
Siderit	$FeCO_3$
Lansfordit	$MgCO_3 \cdot 5H_2O$
Goethit	$FeOOH$
Ankerit	$CaFe [CO_3]_2$

Vzorčno mesto **2**
Kraj: **Piparski rov 1**
Gauss-Krügerjeve koordinate: Y: 5441 794, X: 5081 458, Z: 451

Opis: Vzorec je vzet z matične kamnine vzorca 1. Glej tam!

Mineralna sestava:

Dolomit	$CaMg\ [CO_3]_2$ (89 %)
Kalcit	$CaCO_3$ (11 %)

Vzorčno mesto: **3**
Kraj: **Piparski rov 1**
Gauss-Krügerjeve koordinate: Y: 5441 794, X: 5081 458, Z: 451

Opis: Glej vorčni mesti 1 in 2. Kjer je jamska stena stalno mokra in ni svežih odlomov, nastaja siv melj. Če komaj zaznavno polzenje vode lahko krajevno premika posamezne delce, nastanejo tvorbe, podobne stalaktitom. Če je tok še močnejši, melj odnaša in ga odlaga v manjših lužah.

Mineralna sestava:

Dolomit	$CaMg\ [CO_3]_2$
Kalcit	$CaCO_3$

Vzorčno mesto: **4**
Kraj: **Platke**
Gauss-Krügerjeve koordinate: Y: 5441 829, X: 5081 477, Z: 442

Opis: Temno rjave do črne skorje pokrivajo poličke na steni pod kaminom. Kaže, da izvirajo iz enega samega mesta in da so se šele kasneje razlezle v obliki zelo židke tekočine. Skorje so debele do nekaj centimetrov, bolj prstene kot plastične, zelo verjetno zaradi rahle cementacije. Doslej smo to snov "na oko" ocenjevali kot psilomelan ali iztrebke netopirjev, čeprav je kraj kar daleč od vhoda in precej vlažen.

Mineralna sestava:

Kremen	SiO_2
Illit	$(K,H_2O)Al_2\ [(H_2O,OH)_2\ \|AlSi_3O_{10}]$
in/ali Paragonit	$NaAl_2\ [(OH,F)_2\ \|AlSi_3O_{10}]$
Goethit	$FeOOH$
Todorokit	$(H_2O,..)_{\leq 2}\ (Mn,..)_{\leq 8}\ (O,OH)_{16}$

Vzorčno mesto: **5**
Kraj: **Velika Štirna**
Gauss-Krügerjeve koordinate: Y: 5441 808, X: 5081 442, Z: 420

Opis: Temnorjavo do črno obarvana siga na steni ali dnu rova pod majhnim kaminom. Kapljanje je sorazmerno intenzivno tudi ob najhujši suši, ob poplavah je vzorčno mesto zalito.

Mineralna sestava:

Kremen	SiO_2
Kalcite	$CaCO_3$
Illit	$(K,H_2O)Al_2\ [(H_2O,OH)_2\ \vert AlSi_3O_{10}]$
Dolomit	$CaMg\ [CO_3]_2$

Vzorčno mesto: **6**
Kraj: **Medvedji rov, strop**
Gauss-Krügerjeve koordinate: Y: 5441 876, X: 5081 378, Z: 458

Opis: Temnorjavo do črno obarvana gmota ilovnatega izgleda med grobimi prodniki, ki zapirajo nadaljevanje rova. Sem in tja sediment izgleda laminiran.

Mineralna sestava:

Kremen	SiO_2
Illit	$(K,H_2O)Al_2\ [(H_2O,OH)_2\ \vert\ AlSi_3O_{10}]$
Goethit	$FeOOH$
Kalcit	$CaCO_3$

Vzorčno mesto: **7**
Kraj: **Medvedji rov, dno**
Gauss-Krügerjeve koordinate: Y: 5441 876, X: 5081 378, Z: 457

Opis: Temnorjavo do črno obarvana gmota ilovnatega izgleda med grobimi prodniki, ki zapirajo nadaljevanje rova. Sem in tja izgleda sediment laminiran. Vzorec je bil vzet v neposredni bližini ostankov kosti jamskega medveda, si so razpadle v meljasto kašo.

Mineralna sestava:

Kremen	SiO_2
Kalcit	$CaCO_3$
Illit	$(K,H_2O)Al_2\ [(H_2O,OH)_2\ \vert AlSi_3O_{10}]$
Variscit	$Al\ [PO_4]\ .\ 2H_2O$
Todorokit ?	$(H_2O,..)_{\leq 2}\ (Mn,..)_{\leq 8}\ (O,OH)_{16}$

Vzorčno mesto: **8**
Kraj: **Medvedji rov, dno**
Gauss-Krügerjeve koordinate: Y: 5441 876, X: 5081 378, Z: 457

Opis: Bele iglice zbrane v skupkih, ki spominjajo na hišico morskega ježka. Podlaga so temnorjavo ali črno obarvani debeli prodniki, ki ležijo med materialom, opisanim pri vzorčnem mestu 6.

Opomba: V času odkritja (November 1964), so tudi stene delno prekrivali skupki belih iglic, ki smo jih takoj imeli za aragonit. V naslednjih letih so zbiralci opravili svoje početje tako temeljito, da sva poleti 1972 podpisana komajda rešila poslednji kos. Ta se danes nahaja v Mineraloški zbirki Oddelka za geologijo, NTF, Univerze v Ljubljani.

Mineralna sestava:

Aragonit $CaCO_3$

RAZPRAVA

Članek predstavlja rezultate rentgenskih ananliz mineralov z nekaterih dobro znanih nahajališč v Najdeni jami - nima pa namena biti krajevna študija jamske mineralogije. Analiza je potrdila le eno oceno "na oko", namreč aragonit. Če vzamemo psilomelan ($(Ba,Mn^{2+}...)_3$ $(O,OH)_6Mn_8O_{16}$) kot streho za manganove hidrokside na sploh, sta sorazmerno pravilni še dve oceni. Dve pa sta popolnoma zgrešeni, tako kot je javno mnenje napačno presodilo o tudi "jamskem karbidu".

Razprava o podrobnosti posameznih mineralov oz. nahajališč ne prinaša posebnih novosti. Širši javnosti bolj zanimivo je vprašanje aragonita. V Sloveniji je bil prvič opisan v Ravenski jami (F. Hochenwart, 1832, cit. D. Kuščer et al., 1959, p. 21), okrog 60 km severozahodno od Planinskega polja. Najino še neobjavljeno raziskovanje (Glej tudi T. Petek, 1995), kaže, da na širšem ozemlju med Ljubljano in Idrijo aragonit ni posebnost, le da so iglice praviloma velike le nekaj milimetrov.

To območje spada k osamelemu krasu severozahodne Slovenija (P. Habič, 1982), za katerega je značilno izmenjavanje klastičnih in karbonatnih sedimentov, med katere se včasih vrivajo tudi piroklastiti. Posebej Idrijsko ozemlje s širšo okolico pa je znano tudi po zelo zapleteni tektoniki.

Najdena jama leži v Dinarskem krasu južne Slovenije, le nekaj kilometrov južno od severne meje te geološke enote. Značilna je skoraj 7 km debela izključno karbonatna skladovnica in popolnom drugačna tektonska zgradba. Zato o ožji geološki povezanosti obeh ozemelj govorimo le stežka, čeprav se zdi prostorska zveza nujna.

Prvi so aragonit Ravenske jame podrobneje preučili D. Kuščer et al. (1959), njihovo delo pa so nadgradili L. Placer et al. (1989). Raziskovalci se strinjajo, da se je aragonit odlagal zaradi občasno zelo visoke koncentracije magnezija v prenikli vodi in ne zaradi povišanih temperatur. V konkretnem primeru je bila vir magnezija neposredna soseščina piroklastitov. V primeru Najdene jame tak vir manjka, morda pa bi podobno vlogo lahko igrala okrog 30m debela dolomitna skladovnica tik nad nahajališčem. Po drugi plati ležijo nahajališča vseh analiziranih vzorcev iz Najdene jame pod navedeno dolomitno skladovnico, ali pa prav v njej - argonit pa smo našli edino v Medvedjem rovu. Na prvi

pogled je razvidna le ena razlika med nahajališči: aragonit najdemo le v oddaljenem, mrtvem kotu slepega rova, kjer premikov zraka skoraj ni in kompakten strop prepušča komaj zaznavno količino vode. Preostala nahajališča so na sorazmerno precej namočenih krajih in so bolj ali manj izpostavljena stalnemu prepihu.