

A.C. MORLOT, A GEOLOGIST AND A LESS KNOWN RESEARCHER OF KARST PHENOMENA

GEOLOG A.C. MORLOT, MANJ POZNANI RAZISKOVALEC KRAŠKIH POJAVOV

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Izvleček

UDC 551.44:929 Morlot A.C.

Rajko Pavlovec: Geolog A.C. Morlot, manj poznani raziskovalec kraških pojavov

A. C. Morlot (1820 - 1867) je raziskoval Istro in sosednje Zunanje Dinaride. V svojih delih omenja tudi kraške pojave. Skušal je pojasniti njihov nastanek, vendar njegove razlage niso vedno pravilne. Vseeno pa lahko štejemo Morlota za zanimivega raziskovalca krasa, še posebej, če upoštevamo, da je pisal sredi 19. stol.

Ključne besede: geologija, krasoslovje, zgodovina krasoslovja, Slovenija, Kras, Morlot A. C.

Abstract

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Rajko Pavlovec: A.C. Morlot, a geologist and a less known researcher of karst phenomena

A. C. Morlot (1820 - 1867) was researching Istria and the neighbouring parts of the External Dinarids in addition to other areas. Besides other geological data he also mentioned karst phenomena in his publications. He tried to establish the origin of various forms, but his explanations were not always correct. However, Morlot can be regarded as an interesting researcher of Karst, especially bearing in mind that he wrote in the middle of the 19th century.

Key words: geology, karstology, history of karstology, Slovenia, Kras, Morlot A. C.

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Adolphe Charles Morlot was born on 22nd March, 1820 in Napoli and died on 10th February, 1867 in Lausanne at the age of only 47. Taking a look at both years we can see that in the year 1995, 175 years have passed since his birth and, in the year 1997, 130 years will have passed since his death. Morlot studied mathematic and and geology in Paris, Freiberg and Bern. In the year 1846 he joined the researching activities of our countries. At that time (1843) "Der geognostisch-montanistische Verein für Innerösterreich, das Land ob der Enns und das Königreich Illyrien" was founded. Morlot was a busy researcher, especially at fieldwork. This was as well pointed out in the year 1867 by Dr. Franz Hauer, the manager of the geological institute in Vienna. According to his words Morlot was working at the field during the summer, and in the winter he was handling the material; he was hard-working and full of energy.

Morlot's field of research was very wide. He was interested in petrology and ore deposits, and he observed Pleistocene sediments. In the field of regional geology he took part in the geological mapping of East Alps, Styria and Illyria.

ABOUT THE KARST

In 1848 Morlot published his most important work regarding the External Dinarids (1848-a). In the same work he mentioned karst phenomena. In a special publication from the year 1848 Morlot describes the Lobodnica cave (Trebichgrotte; 1848-b). Morlot characterizes the Karst landscape as a limestone region with waste, stony and eroded ground. It would be quite interesting to establish whether Morlot himself created the incorrect explanation of the word karst. He thus presumed that the word derived from the Slovenian word "hrast" (*Quercus*), meaning oak. He wrote that the country was once overgrown with oaks, but there was only a treeless surface in his days. The word karst in fact derives from the word "carra", which means stone (Gams 1974).

Besides, Morlot describes stalactites, whereby all kinds of stalactites and stalagmites are meant. According to his opinion the stalactites in the so called "great caves" appeared in the "younger period" and are growing very slowly at present. According to his deductions the majority of karst phenomena appeared in the Pleistocene, which does not coincide with present opinion.

Although Morlot made a vivid description of karst phenomena it was not he who found that limestone country was full of caves. He stated that limestone countries were so porous that no drop of water could stay there. According to his opinion such a country was similar to a great porous sponge. Morlot mentioned various caves, as for example the caves of Škocjan (Škocjanske jame), Lobodnica (Trebichgrotte), the caves in the neighbourhood of Opčine (Opicina) and Bazovica (Basovizza) near Trieste, the Postojna cave, the Cerknica polje (Cerkniško polje) and others. Morlot spent quite a lot of time on some of them. He seemed to be fascinated by the research activities in

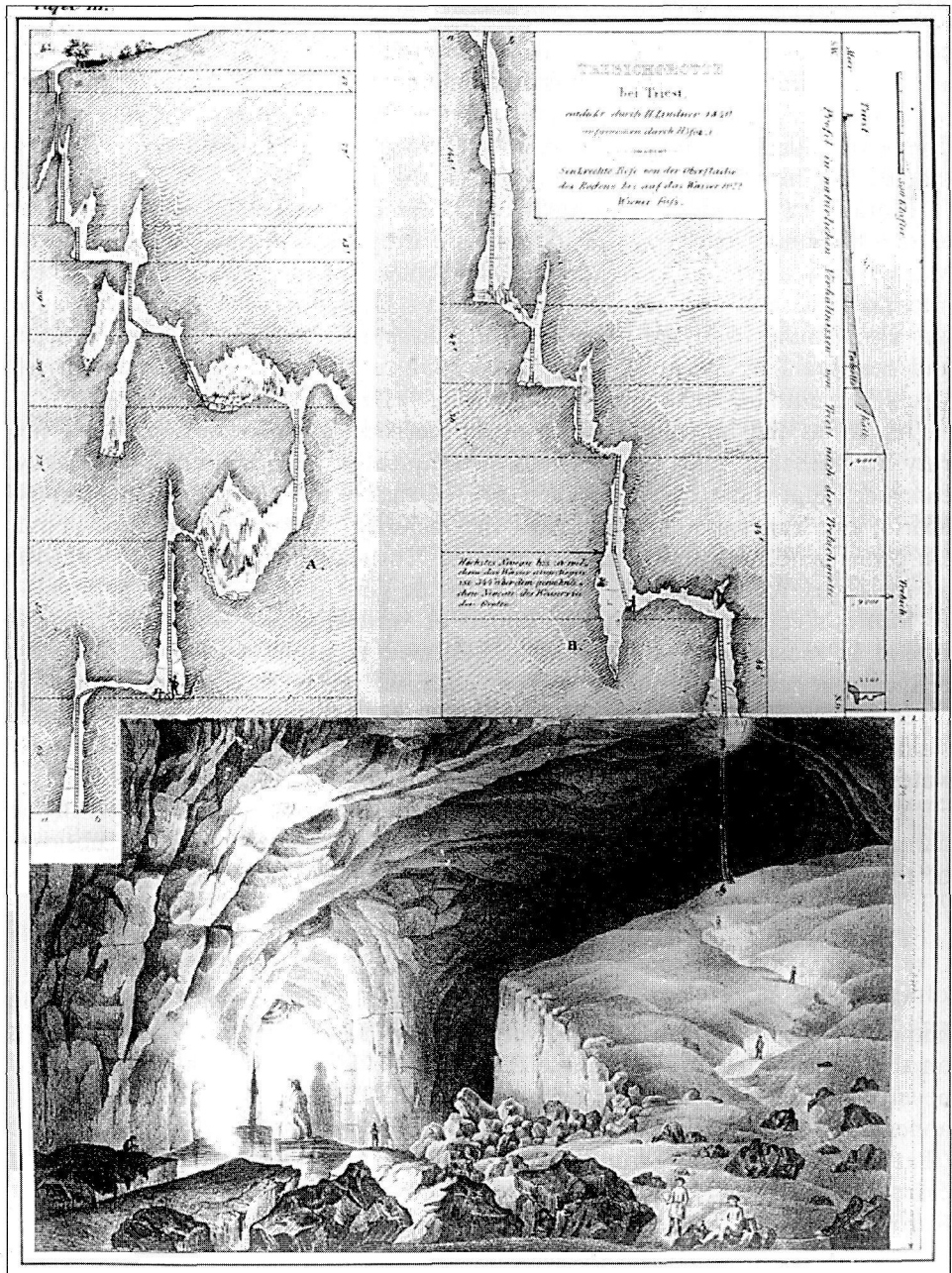


Fig. 1: "Tafel III" of Morlot's work "Über die geologischen Verhältnisse von Istrien mit Berücksichtigung Dalmatiens und der angrenzender Gegenden Croatiens, Unterkraains und des Görzer Kreises" (1848) showing Trebich Grotte (Labodnica).

Lobodnica (Morlot 1848-a, b) which was carefully measured by Sforzi, an engineer from Trieste. The cave was discovered in the year 1840, which is the almost the time when Morlot was researching these places. At that time they were searching for water to supply Trieste. As water rose at some places during the rainy weather and there was a strong current of air flowing through the cracks, they expected to find water in the underground.

Morlot was thinking about karst caves. He observed some of the approximately horizontal ones, that divide and are irregularly shaped. As an example Morlot mentioned the Postojna cave. He knew the Pivka river that vanished into the cave and appears after one hour as Unica in The Planina cave. He was also familiar with the Reka river that disappears into the caves of Škocjan and reappears at Devin (Duino). He explained that the impermeable flysch layers prevent the Reka river from flowing faster into the sea.

As far as the horizontal caves are concerned, Morlot states that they are easy to research and therefore most frequently visited. Hence, we could conclude, that most caves in Karst are of that type. However, according to Morlot one can easily find out how the majority of caves extend into depth. He gives some examples with their depths. Most probably Morlot did not visit all the caves, for many times he states that he got the data "by oral tradition".

Morlot's consideration about inclined or vertical caves, respectively, which should in most cases extend into sack-formed tubes, is very interesting. He believed that mechanical action without chemical processes could not form the caves. According to his explanations the caves are supposed to appear in a similar way as "iron ore deposits" in karst regions, where "acid mineral waters" were present.

Morlot has correctly explained the origin of karst sinkholes, which he named "die Dollinen". He believed that they had appeared due to the subsiding of the roof in the caves.

TERRA ROSSA AND BAUXITE

Morlot speaks about iron oxide that makes the surface red. Therefore he knows the red Istria (Istria rossa) very well and states that the colour depends on the fundamental rocks, because they can always be found on limestone and never on flysch. Consequently he named flysch "Tasello". Morlot compares the appearance of the red weathered soil with the appearance of brown iron oxide (that can be found in form of small grains in clay) and sediments in karst caves, where there is also a clay with brown iron ore. In the vicinity of Karojba in central Istria, Morlot found such formations at the edge of funnel-shaped holes which resemble caves that collapsed. According to Morlot's opinion they were once most probably filled with iron oxide. Bauxite deposits can in fact be found in the karst caves and gulfs near Karojba (Pavlovec 1995).

Already in Morlot's time many people were wondering 'how the enormous quantities of terra rossa in Dalmatia and Istria appeared. Morlot was obviously amazed at that, otherwise he would not have written this remark.

Sometimes Morlot most probably equated terra rossa or even bauxite with brown iron ore, but his explanation of its origin was not correct. To infer from his treatise, he obviously set his heart upon the explanation of Gressly's, describing similar phenomena in the Jura mountains. Supposedly the rising of mountains created cracks, which mineral waters enlarged into caves. The waters also brought clay and iron solutions.

LOWER AND UPPER KARST LIMESTONE (KARSTKALK)

Morlot introduced the term of lower or older karst limestone where the fossils can very rarely be found. It is light in colour, in most cases white, layered, not bituminous, and sometimes it sounds like glass or metal. On the other hand, Morlot describes fossils in that limestone. It was extracted in Roman quarries near Pula. There were many rudists in it that can also easily be found elsewhere. However, Morlot states that the limestones with the fossils differ from that without them. Most probably he classified the Cretaceous rudist limestones and Cretaceous limestones without rudists among the older karst limestones. There is coal in these beds near Lipica, at Vreme and in other parts. Morlot describes the older karst limestone as being corroded and bare. He did not know its thickness. Yet he stated that the entire Lobodnica cave (Trebichgrotte) is situated within this limestone with a thickness of 300 m.

Morlot called the upper karst limestone also the nummulite limestone. He states that the nummulite formation is spread from the Atlantic Ocean over the Pyrenees, the Alps, Turkey, Asia Minor, and Iran to the Himalayas. The rock forms thick beds, which are mostly compact, light limestone. When struck it smells like bitumen, falls into sharp pieces and very often it "sounds". Its surface is eroded and bare.

In addition to alveolinids and coal, Morlot mentions nummulites as a special characteristic of this limestone. This way we can conclude that Morlot joined all the Paleogene limestones, that is Kozina, miliolids and alveolina-nummulites limestones under the term upper karst limestone.

FOSSILS IN THE CAVES

Morlot did not miss out some of the fossil finds in the caves or karst shafts. He mentioned bone breccias from Roman quarries south from Pula, as well as from some other deposits. It is not quite clear whether Morlot had in mind bone breccias in fact, or whether he was thinking of some other deposits of Pleistocene mammals. He knew some bone breccias from Dalmatia, where they can be found in the cracks or open caves. The cement is red, and the

bones are broken into small pieces. Morlot states that there are mostly cervids with terrestrial and freshwater snails among the fossil finds. There are no marine fossils. Morlot based his statement on the fact that bone breccias have appeared in karst caves.

The almost forgotten data about The Pleistocene mammals from The Postojna cave are very interesting. In the year 1821 (J. Volpi) the finding of *Ursus spelaeus* was described and illustrated with good pictures. He then classified it to the *Palaeotherium* genus, but Morlot referred to it as *Ursus spelaeus*. As the cave bear was found among pieces of stalactites, Morlot inferred that the animal had fallen into the cave and had not been washed in.

CONCLUSION

Adolphe Charles Morlot was not an expressive researcher of karst. However, as a thorough and meticulous describer of geological and other phenomena, he met karst caves and other karst phenomena. He tried to explain them as much as possible — consistently with the opinions of the middle of the last century. Although Morlot did not make a great contribution to the field of karstology and speleology, he was one of the most interesting researchers during the time of the first serious attempts to get to know karst phenomena in our country.

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Povzetek

Adolphe Charles Morlot (Napoli 1820 — Lausanne 1867) je predvsem poznan po raznih področjih geologije, med drugim pleistocena, sedimentologije, petrologije, rudnih ležišč, regionalne geologije, manj na področju krasa. Raziskoval je tudi v Dinaridih, kjer ni šel mimo kraških pojavov.

Izvor besede kras si je Morlot napačno razlagal, češ da pride od hrasta, s katerim je bila poraščena ta pokrajina. Za kapnike je bil prepričan, da jih je večina pa tudi večina drugih kraških pojavov nastala v pleistocenu, danes jih nastaja malo. Morlot omenja vrsto kraških pojavov pri nas, med drugim Postojnsko jamo, Škocjanske jame, Lobodnico, jame v okolici Trsta, Cerkniško jezero in druge.

Morlot govori o horizontalnih jamah, vendar pravi, da so poševne oziroma vertikalne pogostejše. Sklepa tudi na to, da niso nastajale samo na mehanski, ampak tudi na kemični način. Nastanek jam vzporeja z nastankom rjavega železovca. Pri tem misli deloma tudi na jerovico, deloma na boksit, kjer naj bi povsod delovale kisle mineralne vode.

Morlot je uvedel izraza spodnji kraški apnenec, pri čemer misli predvsem na rudistni in druge kredne apnenice, ter zgornji kraški apnenec, s čemer združuje paleogenske kozinske, miliolidne in alveolinsko-numulitne apnenice. Vsi imajo zakraselo površino.

Morlot omenja kostne breče iz Istre in Dalmacije. Posebno zanimivi so podatki o odlično ohranjeni lobanji jamskega medveda iz Postojnske jame.

A.C. Morlot ni bil izraziti raziskovalec krasa. Kot vesten in dober opisovalec geoloških in drugih pojavov pa se je srečal s kraškimi jamami in drugimi kraškimi fenomeni. Kolikor je bilo mogoče, jih je skušal razložiti, seveda sredini prejšnjega stoletja primerno. Morlot na področju karstologije in speleologije ni prispeval velikega napredka, bil pa je eden zanimivejših raziskovalcev v času prvih resnejših korakov pri spoznavanju kraških pojavov pri nas.