

**Rajko Pavlovec**

**MONOGRAFIJA O POMEMBNOSTI LEZIK PRI NASTAJANJU  
KRASA**

Mladi raziskovalec z Inštituta za raziskovanje krasa ZRC SAZU dr. Martin Knez je napisal obsežno delo o problematiki nastajanja kraških pojavov (**Vpliv lezik na razvoj kraških jam. Primer Velike Doline, Škocjanske jame.** - Zbirka ZRC, 14, 186 str., 81 slik, 18 preglednic, 26 tabel slik, ISBN 961-6182-12-9). Vprašanje nastajanja kraških jam je že dolgo živo. Velik del speleologov in morda še bolj geologov se je navduševal nad tektonskimi pojavi, ob katerih naj bi voda začela prodirati v globino. Drugi so iskali vzrok v različnosti karbonatnih kamnin. Tretji so videli kraške pojave tesno povezane z lezikami, vendar takšna razlaga doslej ni bila dovolj podprta z dokazi v naravi. Martin Knez se je lotil prav tega, pri čemer je kritično upošteval še druge faktorje. To pojasnjuje že kar v uvodu, ko pravi: "Osnovno vprašanje, na katerega sem skušal odgovoriti, je izšlo iz popolnoma laičnega spoznanja v Veliki Dolini v Škocjanskih jamah. Vsak pozornejši obiskovalec namreč opazi, da se jamski rovi, njihovi fragmenti in drugi sledovi podzemnega zakrasevanja ne pojavljajo poljubno razmetani v stenah, ampak so zbrani vzdolž majhnega števila lezik. Ker podobna skladanja opazimo tudi v nekaterih jamah Notranjske, je bilo vprašanje, ali gre pri tem za širšo zakonitost, in kje so njene korenine, samoumevno".

Marsikdo se bo ob branju Knezove monografije vprašal, zakaj se je podal prav na področje Škocjanskih jam. To sam pojasnjuje. Po eni strani so kljub svoji slavi Škocjanske jame v geološkem smislu relativno slabo raziskane. V njih je plastnatost izrazita, bilo je pričakovati zanimiva opazovanja prav v zvezi z lezikami in njihovem pomenu za nastajanje krasa. Škocjanske jame ima M. Knez tudi za tipičen vzorčni model kraških pojavov na matičnem Krasu.

Razlog, da se je M. Knez odločil prav za Škocjanske jame in predvsem udornico Veliko Dolino, pa je bil tudi preučevanje tektonskih in litoloških podatkov, speleografija Škocjanskih jam in okolice, opazovanja lezik in hidrografskih razmer danes in v preteklosti. Knez loči lezike, ki so bile deformirane ob prelomih, gubah ali medplastnem zdrsu, in lezike, ki niso bile deformirane, vendar pa so neprevodne za vodo. Pri tem je M. Knez prišel do mnogih drobnih, vendar zanimivih podatkov in razlag. Osnova nastajanja kraškega prostora je ta, da voda skozenj prenika, da kamnino topi, raztopino odnaša, a s tem ne zamaši vodnih poti. Ob upoštevanju številnih podatkov iz okolice Škocjanskih jam je prišel do številke, da je malo več kot en jamski vhod na kvadratni kilometer. Največ kraških pojavov je v turonijskih apnencih. V vremskih plasteh ni veliko kraških pojavov. To razlaga s specifično sedimentacijo v času nastajanja vremskih plasti.

Martin Knez nadalje razpravlja o oblikovanju udornic, kar je zelo kompleksen pojav. Razni avtorji ga sicer malo različno razlagajo, vendar je vzroke za nastanek udornic gotovo treba iskati v tektonskih elementih, v poškodovanosti kamnin (v razpoklinskih conah), v debelini plasti pa celo v krioklastičnih pojavih in drugem.

Kot dokazno gradivo in kot osnovo svojih izvajanj je M. Knez pregledal več sto vzorcev in mikroskopskih preparatov. Najbolj pomembne dele opazovanega terena je prikazal tudi v geoloških stolpcih, v katerih so poleg osnovnega profila podatki o plastovnih značilnostih in teksturah, o fosilih, o kalcitnih žilah in poroznosti. Takšnih stolpcev je osem. Navedene so tudi podrobnosti o pogostosti ortokemov, alokemov, raznih fosilov, bioklastov in druge, kar bi v kakršnikoli obliki pomagalo pri reševanju osnovnega vprašanja nastajanja krasa. Posebej zanimive so seveda razpoke in kalcitne žile, zlasti v neposredni okolici nosilnih lezik. Tako je Knez poimenoval lezike, ki so bistveno pripomogle k nastanku freatičnih kanalov. Kakor mnoge druge, je tudi te Knez prikazal na številnih diagramih. Navaja tudi rezultate meritev množine kalcijevega karbonata. Vsi ti in še številni drugi podatki in opazovanja so ga pripeljali do zelo prepričljivih sklepov o nastajanju kraških pojavov. Takole pravi: "Samoumevna se mi zdi misel, da je vendar že davno dokazano, da se jame razvijajo tako ob tektonskih deformacijah kot tudi po lezikah. Takšno mnenje povzema neko neopredeljeno, navidezno predznanje in je verjetno prav zato dolgo odvrčalo pozornost speleologov od nekaterih postavk. Šele detaljne raziskave postrežejo z na prvi pogled malenkostnimi ugotovitvami, ki pa vendarle prinašajo preciznejše in predvsem konkretnije odgovore". Iz tega izvaja M. Knez trditev, da osnovni podatki in zapažanja niso na makroskopskem nivoju, ampak v podrobnih raziskavah. Pravi, da so se začetni kraški procesi odvijali na mikroskopski ravni, čeprav so pozneje lahko nastali ogromni podzemni prostori.

Na koncu zelo jasno postavlja trditev, da bo treba v bodoče makrotektonsko in mikrogeološko znanje sestavljati, združevati in dopolnjevati. V preteklosti so razmišljali predvsem o značaju kamnine in morda še o zdrobljenih conah. Martin Knez pravilno ugotavlja, da so doslej premalo pozornosti posvečali medplastnim zdrsom ali poškodovanim lezikam. Prav tako trdi, da se na začetku razvoja krasa matične kamnine in lezike obnašajo različno.

Velika vrednost Knezovega dela je v tem, da se je naslanjal skoraj izključno na geološke podatke, da je vse natančno preveril in preizkusil, in da skoraj ni golega vizuelnega opisovanja vidnih pojavov. Knez sam pravi, da je v svoja razmišljanja vključil geološki čas od nastanka kamnine do prvega kopnega, do tektonskih deformacij in današnjega površja. Takšen pogled je izredno kompleksen in je zagotovo pripeljal do pomembnih rezultatov.

Martin Knez je naredil pionirsko delo v pogledu nastajanja krasa. To, kar so nekateri teoretično razpravljali ali slutili, je potrdil in dopolnil s številnimi dokazi. Knezova monografija ni samo osnovno delo za vse bodoče tovrstne raziskave, ampak je izredno dobro dokumentirana s podatki, diagrami, slikovnim

gradivom, tablami in drugim, tako da je to resno znanstveno delo. Obsežna literatura je imeniten pripomoček za podobne študije.

Ob koncu lahko rečemo, da smo monografije dr. Martina Kneza izredno veseli zaradi njene bogate in nove vsebine. Še posebej smo veseli zato, ker prihaja ta monografija iz naših krajev, iz rojstne dežele krasa.

#### **A MONOGRAPH RELATED TO THE INFLUENCE OF BEDDING-PLANES ON KARST ORIGIN**

Dr. Martin Knez, a researcher from the Karst Research Institute ZRC SAZU wrote a comprehensive work dealing with karst phenomena origin (**The influence of bedding-planes on development of karst caves**. An example of Velika Dolina, Škocjanske Jame.- Zbirka ZRC, 1996, 14, 186 p. 81 figs. 18 diagrams, 26 tables of figures, ISBN 961-6182-12-9). The question of cave origin is actual for a long time. An important number of speleologists, maybe geologists even more, argued for tectonic phenomena along which the water was supposed to infiltrate into depth. Others searched the reasons in variability of carbonate rocks. The third found karst phenomena tightly connected with bedding-planes but such an explanation was not enough supported by the evidences in nature. Martin Knez set to study this last hypothesis but he critically considered all other factors. He explains it in the introduction already when he says: "The basic question I wished to answer derived from an entirely laymen recognition in the Velika Dolina in Škocjanske Jame. Each thoughtful visitor perceives that cave passages, or parts of them and other traces of the underground karstification do not appear scattered on the walls at random but they are gathered along small number of bedding-planes. As similar accordance may be found in other caves of the Notranjska karst the question arose whether it is a general lawfulness and, obviously, what is its reason".

Reading the book of Knez someone may ask why he set to work at Škocjanske Jame. He explains it himself. On one hand Škocjanske Jame were relatively poorly studied from the geological point of view in spite of their fame. The bedding there is well pronounced and it was expected that the observations would give interesting results related to bedding-planes and their importance for karst development. Also M. Knez considers Škocjanske Jame as a typical model of karst phenomena in the classical Karst.

Deciding Škocjanske jame and for the collapse doline Velika Dolina in particular led M. Knez to study tectonic and lithological data, speleography of Škocjanske Jame and vicinity, observation of bedding-planes and hydrographical properties today and in past. Knez differs between bedding-planes that were distorted along the faults, folds or interbedded slides and bedding-planes that were not distorted and are impervious for water. By such a way Knez achieved several tiny, yet very interesting data and explanations. The basic feature of karst means that water percolates through the rocks, dissolves the

rocks and transports the solution without blocking the water conduits. Considering numerous data around Škocjanske Jame he calculated that there is slightly more than one cave entrance per square kilometre. Most of karst phenomena occur in Turonian limestones. In the Vreme beds there are not many karst phenomena. This may be explained by specific sedimentation during the development of the Vreme beds.

In continuation Martin Knez discusses the formation of collapse dolines which is a very complex phenomenon. Various authors explain it in different ways, as reason for a collapse doline origin must be searched, without doubt, in tectonic elements, in lithology (fissure zones), in thickness of beds and even in cryoclastic occurrences and in other.

Martin Knez examined more hundred samples and microscopic thin-sections to argument and to found his conclusions. The more important parts of studied terrain he presented in a geological column which displays basic profile data about bedding properties and textures, fossils, calcite veins and porosity. There are eight such columns. He also quotes details about the frequency of orthochems, alochems, various fossils, bioclasts and others that might in any form help to solve the basic question of karst origin. Fissures and calcite veins in immediate vicinity of formative bedding-planes are particularly interesting. Knez named formative bedding-planes those bedding-planes that essentially helped to initiate phreatic channels. These also are shown in numerous diagrams. He also cites the measurement results about the level of calcium carbonate. All these and numerous other data and observations gave very persuasive conclusions related to karst phenomena origin. These are his words: "I find obvious a thought that it was from ever proved that caves develop along tectonic deformations and also along bedding-planes. Such an opinion implies undefined, apparent knowledge and probably this is the reason that the attention of speleologists was for such a long time diverted from some facts. Only detailed researches that offer by first sight trifle facts, can yield more precise and mostly more concrete answers." Thus M. Knez concludes that basic data and observations do not exist on macroscopic level but in detailed researches. He says that the initial karst processes started to develop on microscopic level although later huge underground spaces may derive.

At the end he clearly sets up an affirmation that in future macrotectonical and microgeological knowledge must be combined, associated and complemented. In past the character of the rocks and maybe broken zones were in foreground. Martin Knez correctly states that in past too little attention was focused on interbedded slides or damaged bedding-planes. Also he claims that at the very beginning of karst origin parent rock and bedding-planes acted differently.

A great value of Knez work consists in fact that he almost entirely used geological data, that he precisely checked them and that there is almost none

pure visual description of phenomena. Knez himself says that he included into his research geological time since the origin of the rock to the appearance of land, to tectonical deformations and to actual surface. Such view is very complex and surely leads to important results.

The research of Martin Knez means a pioneer work related to karst origin. He confirmed and complemented by numerous proofs the theoretical ideas or premonitions of others. Knez's monograph is not only a basic work for all the researches of the kind to come but also very well documented work with data, diagrams, figures, tables and other; it is a serious scientific work. An exhaustive references list is an additional resource for similar studies in future.

At the end one may say that we are very glad that this monograph was published due to its rich and new content. In particular we are glad that this work comes from our places, from native land of the classical Karst.