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TERRESTRIAL FAUNA FROM CAVITIES IN NORTHERN AND CENTRAL SLOVENIA, AND A REVIEW OF SYSTEMATICALLY ECOLOGICALLY INVESTIGATED CAVITIES

KOPENSKA FAVNA VOTLIN SEVERNE IN OSREDNJE SLOVENIJE TER PREGLED SISTEMATIČNO EKOLOŠKO RAZISKANIH VOTLIN

TONE NOVAK[1]

In memory of Jože Bole, Jovan Hadži, Zora Karaman, Zachiu Matic, Narcis Mršić, Josef Nosek, Anton Polenec, Egon Pretner, Karl Strasser, and Pëtr Us.

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Abstract UDC: 591.521(497.4):574.4

Tone Novak: Terrestrial Fauna from Cavities in Northern and Central Slovenia, and a review of systematically ecologically investigated cavities

In the years 1977-2001, the fauna of and ecological conditions in 55 cavities – caves and artificial tunnels – in northern and central Slovenia were systematically investigated. Zoogeographically, this is the meeting point of the Alpine, Pannonian and Dinaric biome. This article lists 321 terrestrial genera, 456 species and 100 subspecies belonging to 183 families, that had been recorded by 2005 in cavities of this region in the course of our own investigations, and that have been cited in the references. This taxonomical review serves as a foundation for understanding ecological and other treatise on the terrestrial fauna in the hypogean habitats of northern and central Slovenia, those that have been published ones, as well as those in preparation. The overview of the systematically investigated cavities, and the review of the methods and techniques used has been added to provide general information about the morphology of these caves, and the ecological research within them.
Key words: artificial tunnels, bibliographic review, caves, cavities, ecological research, faunal review, northern and central Slovenia, terrestrial fauna.

Izvleček UDK: 591.521(497.4):574.4

Tone Novak: Kopenska favna votlin severne in osrednje Slovenije ter pregled sistematično ekološko raziskanih votlin

V letih 1977-2001 smo sistematsko raziskovali kopensko favno in ekološke razmere v 55 votlinah – jamah in izkopanih rovih – severne in osrednje Slovenije. Zoogeografsko je to ozemlje na stičišču alpskega, panonskega in deloma dinarskega bioma. V članku je pregled 321 rodov, 456 vrst in 100 podvrst živali iz 183 družin, ki so bile do leta 2005 najdene v votlinah tega območja med lastnimi raziskavami ter po podatkih iz citirane literature. Taksonomski pregled je osnova in opora za razumevanje ekoloških ter drugih razprav o kopenski favni v podzemeljskih habitatih severne in osrednje Slovenije, ki so že objavljene in ki jih pripravljamo. V nadaljevanju so predstavljene votline, v katerih so potekale sistematske ekološke raziskave, ter naštete uporabljene metode in tehnike, s čimer je omogočen vpogled v morfologijo ekološko raziskanih votlin ter metode raziskovanja.
Ključne besede: bibliografski pregled, ekološke raziskave, favnistični pregled, jame, kopensko živalstvo, izkopani rovi, votline, severna in osrednja Slovenija.

INTRODUCTION

In 1977, systematic ecological investigation of caves and artificial tunnels started in Slovenia (Novak & Kuštor, 1977). Between the years 1977 and 2001, investigations were carried out in 55 caves and artificial tunnels of northern and central Slovenia (the UTM codes UM, VM and WM). This area shares parts of the Alpine, Pannonian and Dinaric biomes. By 1988 (Novak, 1988, 1989), 312 genera, 422 species and 23 subspecies of terrestrial taxa found in these and other cavities in the region had been recorded. Since then, further taxa have been found in cavities within the region, and some new ones have been described, therefore a complete list is now required. At the same time, this faunistic review provides the basic information for ecological considerations relevant to these 55 cavities. The ecological findings have partly been published (Novak et al. 1996, 2004a,b). To enable better understanding of these papers as well those in preparation, diagrame of these cavities – in the case of longer cavities, only of those parts under the investigation – are presented here to show their morphology, and the types of data collected are cited in summary to provide an introduction to the ecological sampling used.

The objectives of this paper are to present

- a complete list of the terrestrial taxa found in cavities of northern and central Slovenia up to 2005,
- to present the morphology of and the ecological methodology used within the cavities being investigated,
- and to provide a bibliographic review of papers, related to the terrestrial fauna in cavities of northern and central Slovenia.

MATERIAL AND METHODS

The following 55 caves and artificial tunnels in northern and central Slovenia were subject to systematical ecological investigation (Table 1; Figs. 1, 2–No. 1-54; Novak et al., 2004b: Fig. 1–No. 55). Besides general data about the cavity locality, two groups of ecological items were provided during the investigations (Fig. 3). The first group, called constant data, consists of relatively unchangeable cavity characteristics, which were provided only once. The second data group concerns seasonally changeable items, which were obtained on two visits per season made within 45-48 hours. The terrestrial fauna was recorded by systematic observations of the cavity walls, ceiling and floor, by baited pit-fall traps, and desiccation of ground material in Berlese funnels (Novak & Kuštor, 1977). Ecological parameters were measured mostly in accordance with the methods published by Stewart et al. (1974) and Rowell (1997). Details about the methods are presented in accordance with the research topics (e.g. Novak et al., 2004a). For each cavity, and the sampling site within, respectively, the data were typeset as follows.

General data

The Cadaster number of a cave (according to the Slovenian Speleological Society), or the fictive running number of an artificial tunnel, respectively; cavity name; UTM code; co-ordinates of the (main) entrance; altitude of the (main) entrance; azimuth of the (main) entrance; biome, in which the cavity occurs.

Constant data (one record in each cavity/ sampling section within a cavity)

The investigated, and the total known length of a cavity; number of entrances; geological type of rock with the cavity; vegetation type above the cavity; date (season) of investigations; polygonal distance of the sampling site from the (nearest) entrance; vertical distance of the sampling site from the surface; the size of the passage cross section; rock consistency and its suface morphology in the cavity; summary size of wall, ceiling and ground area; presence of wall and ceiling fissures and cracks; cavity origin, morphological, hydrological and ventilation type; illumination; length of the illuminated section of the cavity; floor description; weight loss on ignition (~ quantity of organic matter)

Seasonally changing data (four samplings; one each season)

Air temperature and relative humidity; ground temperature, hygricity, pH, carbonate content and colour; wind velocity; faunistic data including the sampling methodology

Most of the material collected from the cavities that were investigated is deposited in the Prirodoslovni muzej Slovenije (Slovene Museum of Natural History) in Ljubljana.

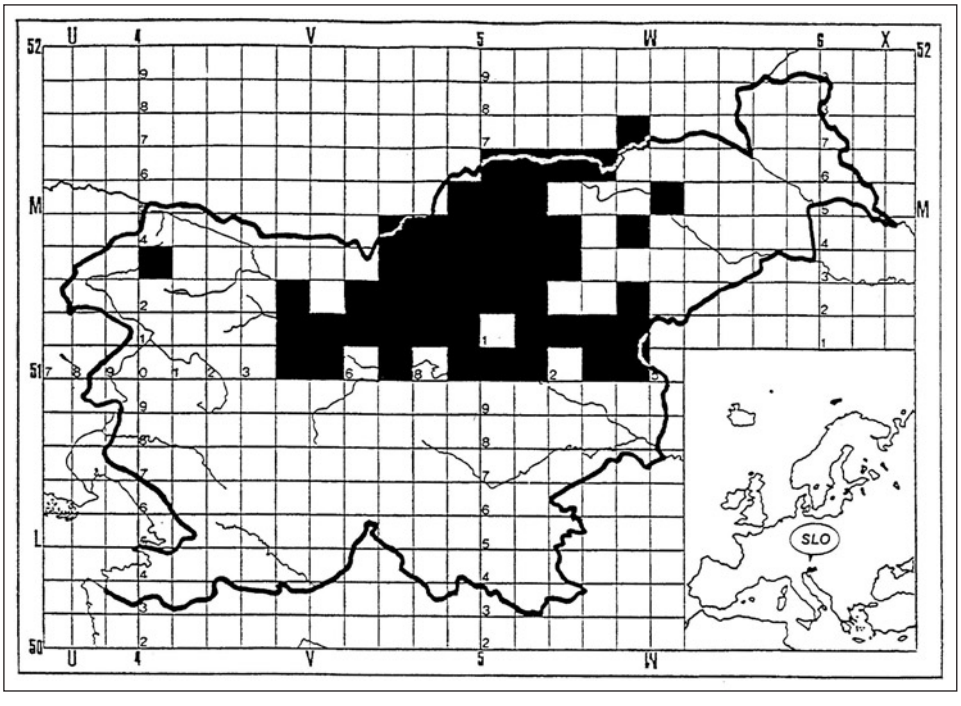


Figure 1: The area in the 10 x 10 km UTM grid, where the cavities were subject to systematical ecologicaly investigation in the years 1977-2001.
Slika 1: Območje v UTM mreži 10 x 10 km s sistematsko ekološko raziskanimi votlinami v letih 1977-2001.

No.	Name	Cad. No.	UTM	X	Y	altitude
1	**Ivačičeva jama**	2399	VM03	5411950	5137610	2435
2	**Jama pri taboru**	367	VM42	5441880	5126050	460
3	**Štinetova jama**	240	VM41	5446720	5116120	395
4	**Godova jama**	3462	VM40	5442180	5104550	520
5	**Babja luknja**	35	VM51	5453370	5110310	330
6	**Jama 2 na Jurcetovih Percah**	2327	VM50	5455390	5106460	408
7	**Urhova jama**	505	VM62	5462620	5124250	465
8	**Lisičja luknja**	401	VM61	5462400	5110670	530
9	**Zijalka nasproti Ribče peči**	4605	VM74	5471470	5141700	820
10	**Rački pekel**	465	VM73	5478540	5138520	590
11	**Zijalka v Dovji Griči**	376	VM72	5474640	5129020	1515
12	**Boštonova jama**	757	VM71	5475650	5110370	330
13	**Ihanšica**	46	VM70	5472850	5108450	390
14	**Korančevka**	2503	VM84	5483610	5148230	1010
15	**Zamernikova jama**	B2	VM83	5485180	5138324	860
16	**Podkrajnikova zijalka**	2697	VM82	5483575	5125210	820
17	**Lovrišnikova jama**	758	VM81	5485060	5111700	480
18	**Jama pri Votli peči**	3263	VM95	5498160	5155920	400
19	**Skobirjeva votlica**	3956	VM94	5498450	5146460	940
20	**Mozirska jama na Golteh**	563	VM93	5492780	5136120	1250
21	**Krapljetova jama**	484	VM92	5497180	5126780	850
22	**Jama v Lipovici**	1182	VM91	5491950	5112800	510
23	**Brdajsova jama**	3497	VM90	5492335	5108125	651
24	**Umetni rov v Dravogradu**	U1	WM06	5501931	5159942	350
25	**Objekt pri Žnodru**	B1	WM05	5504332	5151680	550
26	**Rdečka jama**	3488	WM04	5504790	5144860	858
27	**Lokoviška jama**	3959	WM03	5501500	5135550	400
28	**Tanjšekova jama 2**	4194	WM02	5506400	5129600	347
29	**Jama v Burgi**	1091	WM00	5503780	5103780	600
30	**Umetni rov v Bistriškem grabnu**	U2	WM16	5510125	5166905	480
31	**Zapečke peči**	3208	WM15	5517200	5155870	610
32	**Jama Školjka**	3311	WM14	5513720	5141040	552
33	**Zgornja Steska jama**	169	WM13	5512550	5129850	365
34	**Špegličeva jama**	3512	WM12	5515350	5128375	400
35	**Ocvirkova jama v Štadlerjevem gozdu**	5348	WM11	5514400	5118200	320
36	**Kapelarjevo brezno**	4706	WM10	5515700	5107360	640
37	**Jama pod Herkovimi pečmi**	1849	WM26	5520520	5164730	545
38	**Jaklova luknja**	4636	WM24	5521080	5148540	1000
39	**Lindeška jama**	2304	WM23	5525150	5134025	550
40	**Fantovska luknja 2**	3967	WM21	5523900	5117750	480
41	**Umetni rov nad Šturmovo grabo**	U3	WM36	5535231	5161610	600
42	**Jama v kamnolomu pri Suhem**	4632	WM31	5530790	5111210	500
43	**Glija jama**	84	WM30	5534200	5107450	515
44	**Jama 2 v Repoluskovih pečinah**	4371	WM47	5547450	5170800	480
45	**Luknja pri Naceku na Planici**	2407	WM44	5543800	5148000	730
46	**Jama v kamnolomu nad Studenicami**	252	WM42	5547750	5128300	400
47	**Rov**	U4	WM41	5545980	5112834	270
48	**Gruška jama**	1374	WM40	5544435	5105500	310
49	**Jama pri Pruhu**	4380	WM55	5555350	5153250	246
50	**Pavlijeva luknja**	3142	WM14	5517850	5164125	590
51	**Ovčje peklo nad Radljami**	3192	WM16	5518550	5164150	520
52	**Pilanca**	520	WM14	5513600	5141420	646
53	**Jama pod južnim vrhom Tisnika**	521	WM16	5513400	5141150	725
54	**Huda luknja pri Radljah**	3191	WM14	5517500	5163900	450
55	**Železna jama**	2678	VM71	5472450	5110275	340

Table 1: Cavities given a systematic ecological investigation in the years 1977–2001.
Tabela 1: Sistematično ekološko raziskane votline v letih 1977–2001.

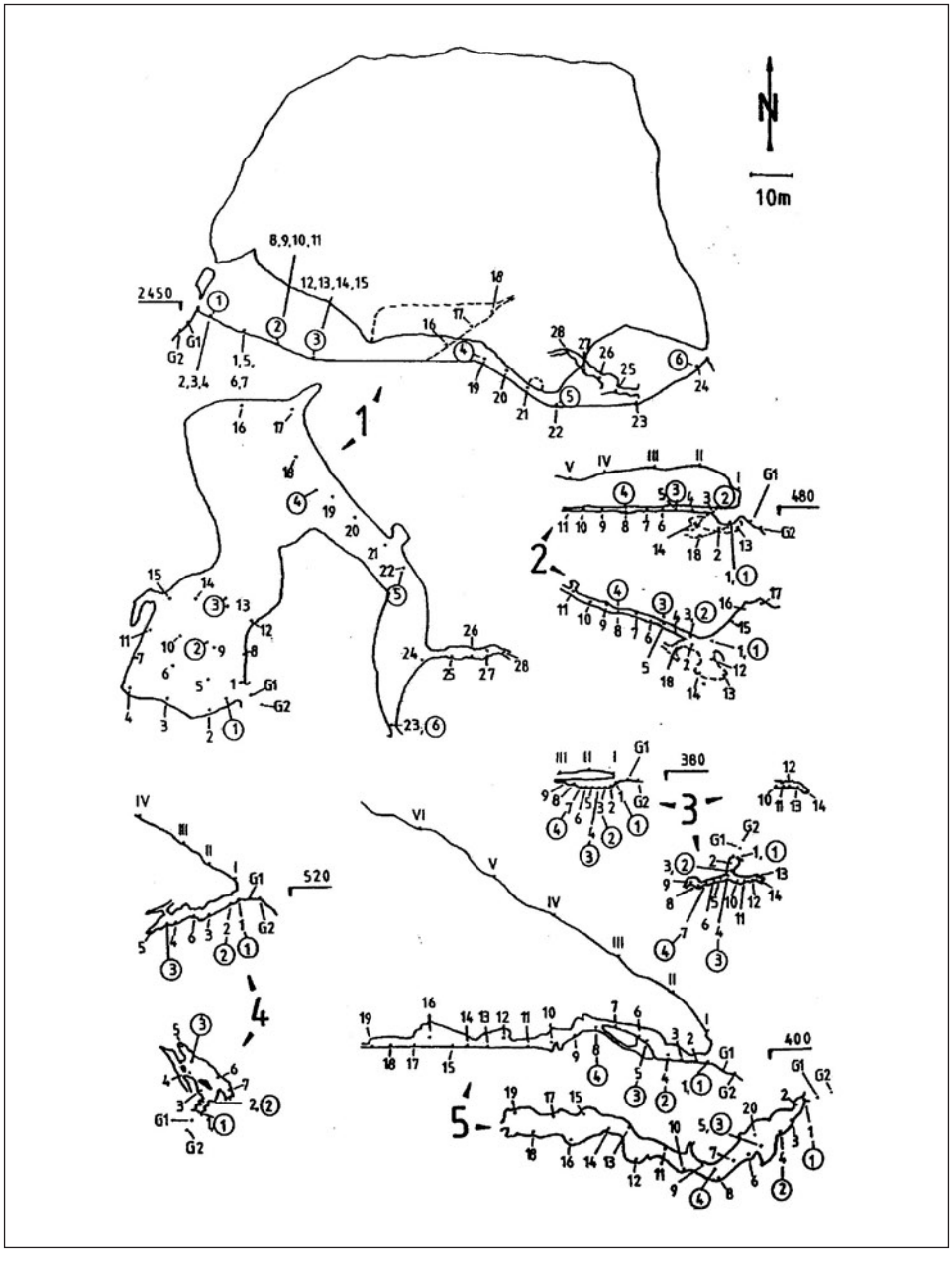
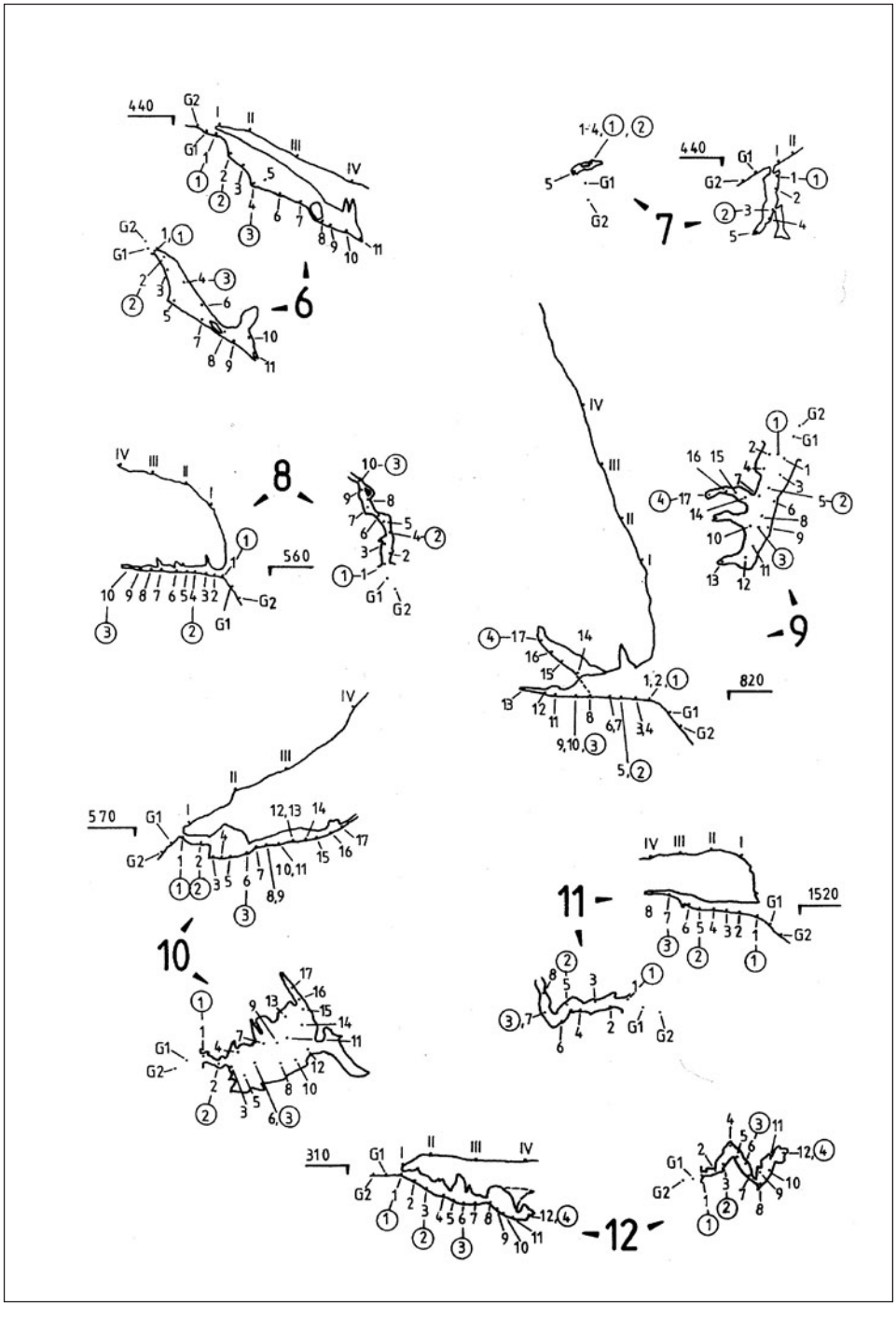


Figure 2: Survey of 54 cavities subject to systematical ecological investigation in the years 1977-2001 (for cave 55, see Novak et al., 2004b).
Slika 2: Pregled 54 votlin, sistematsko ekološko raziskanih v letih 1977-2001 (za jamo 55 glej Novak et al., 2004b).


6
7
8
9
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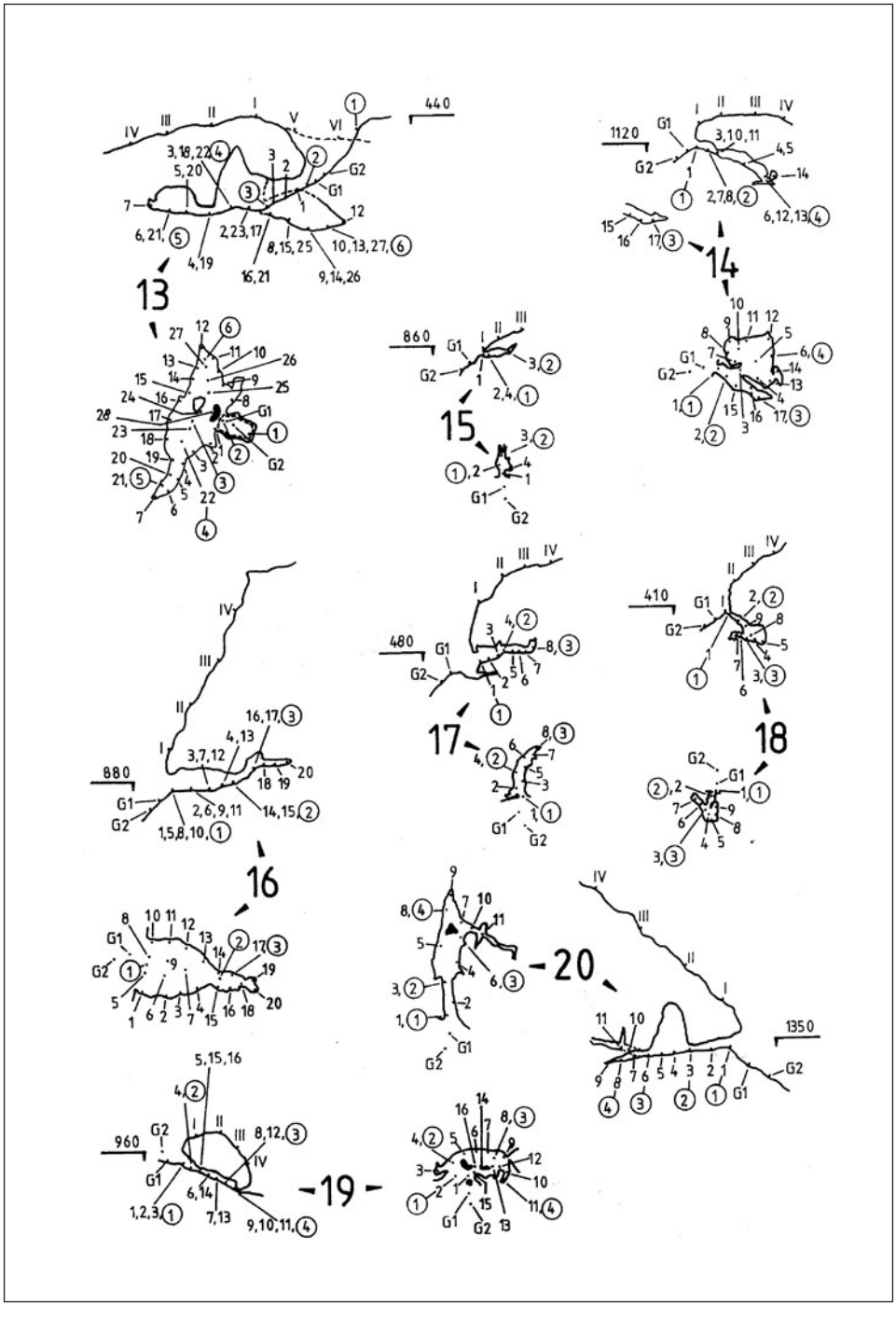
11
12
440
560
820
570
1520
310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1120
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880
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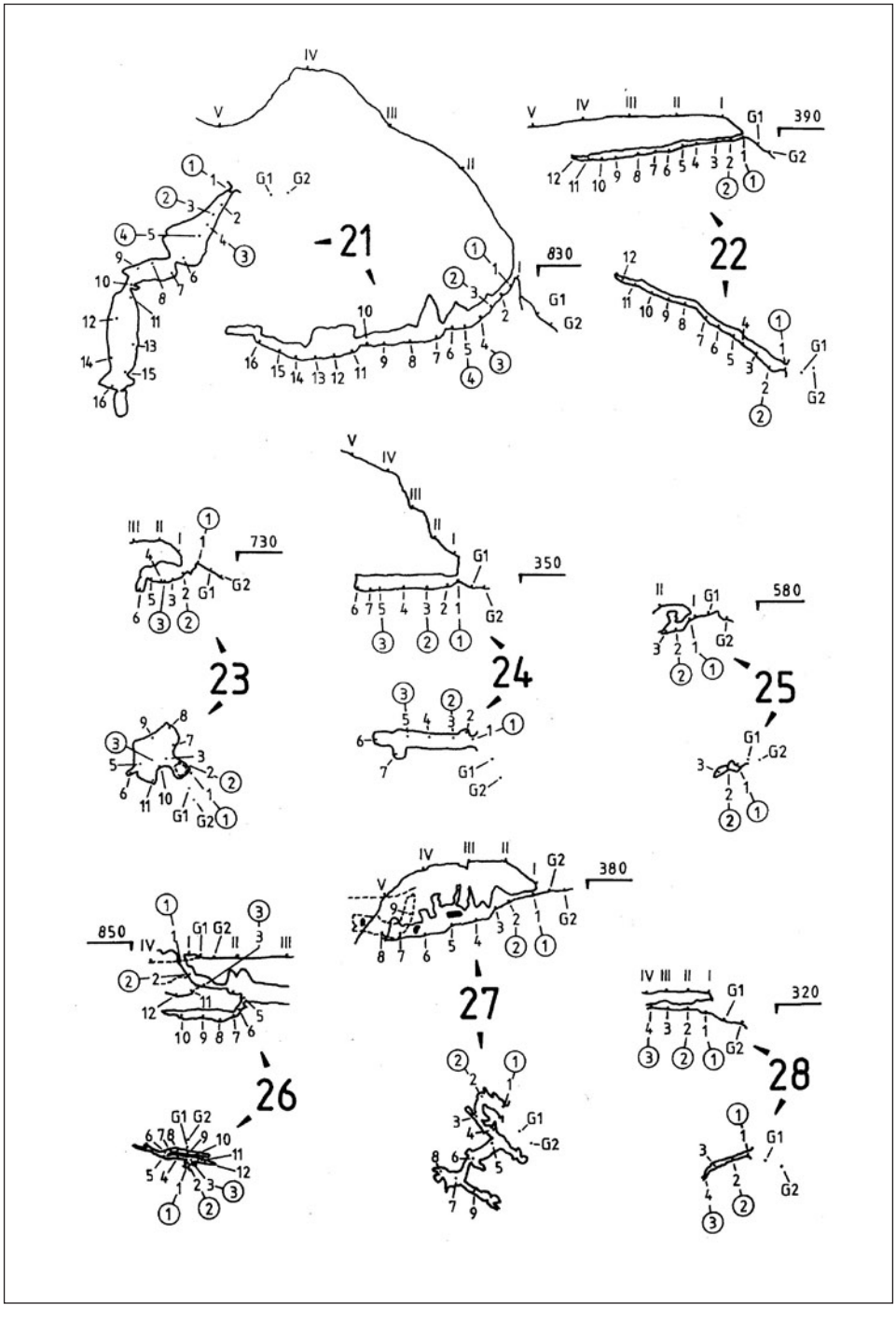
1350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27
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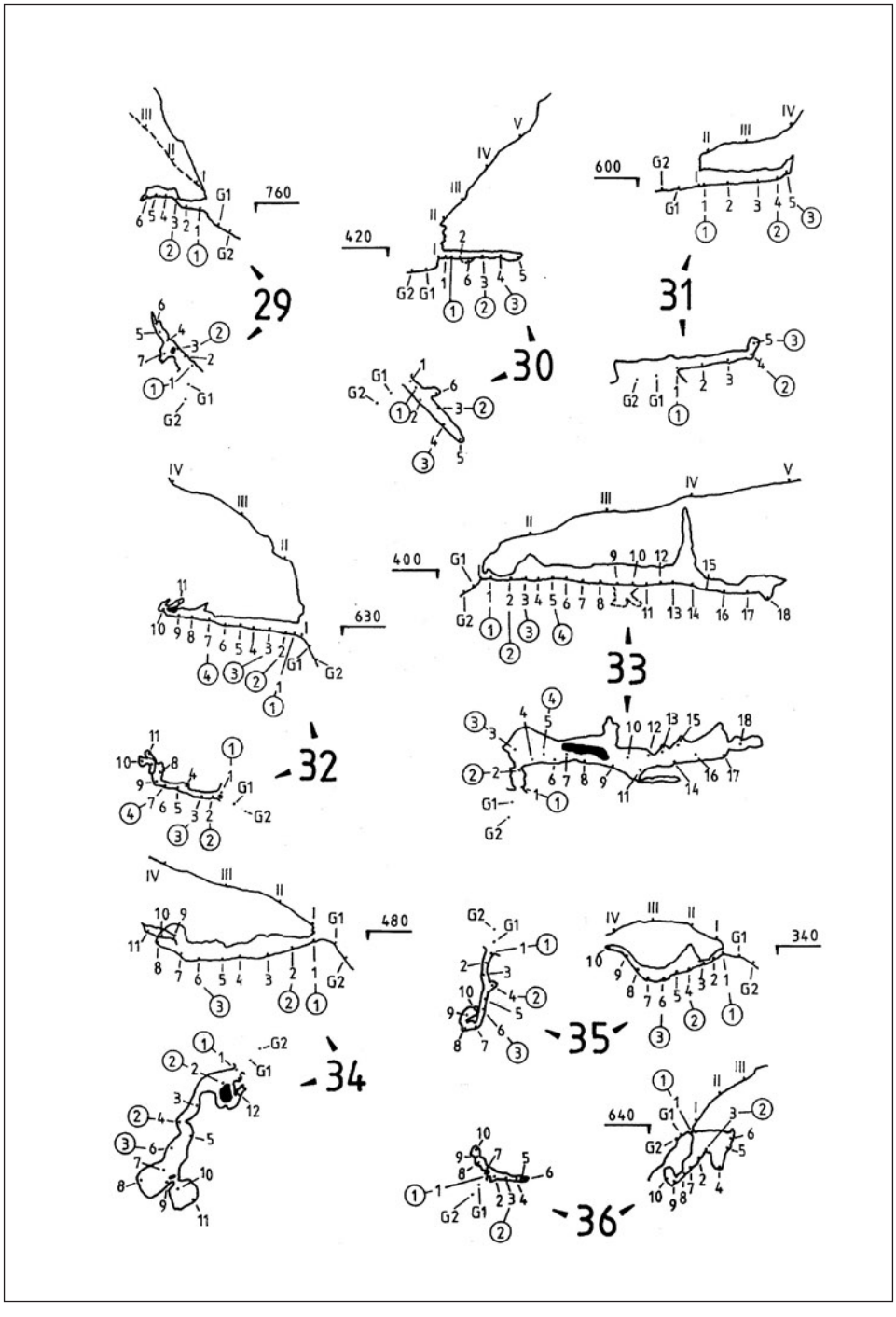
390
830
730
350
580
850
380
320


29
30
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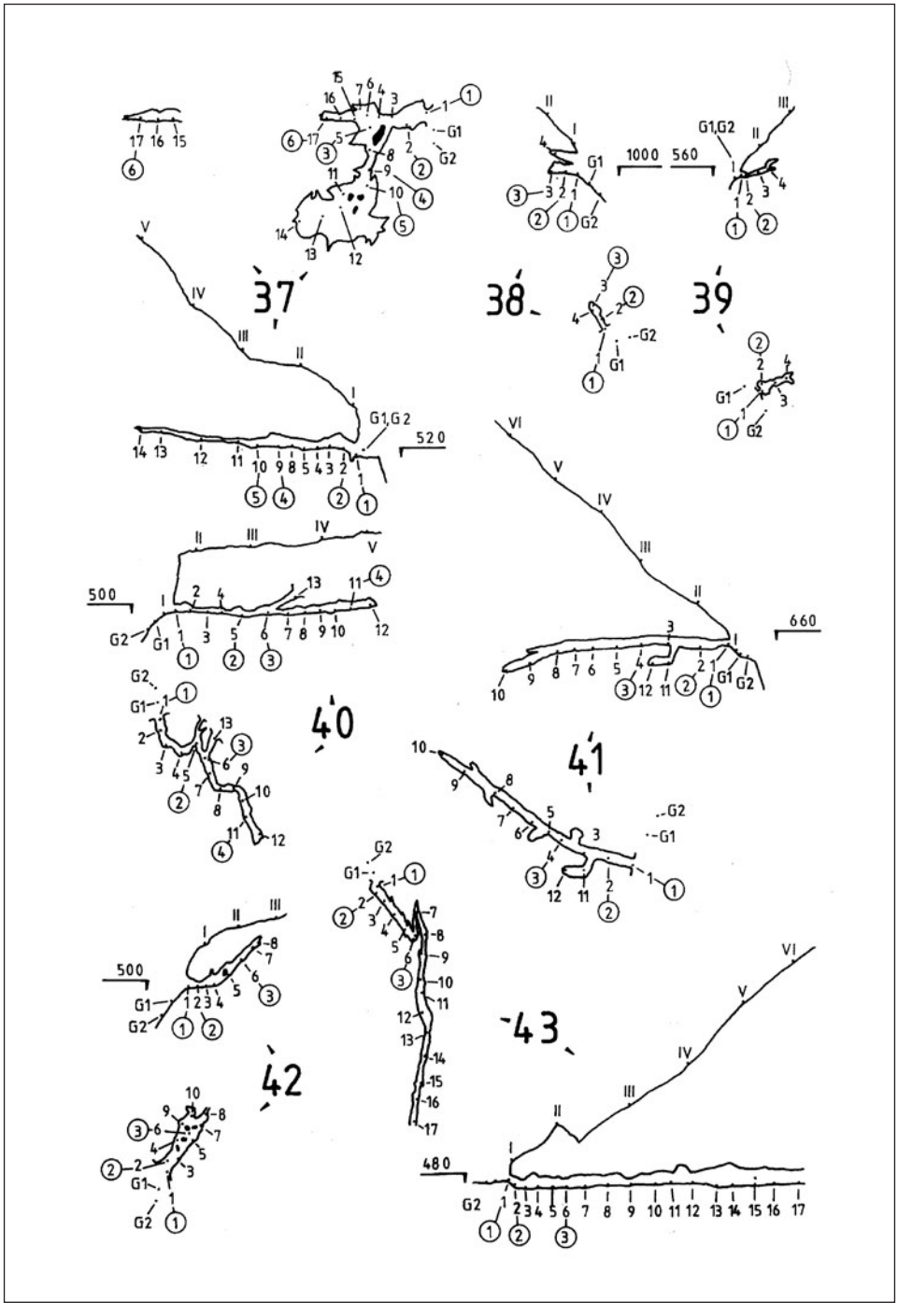
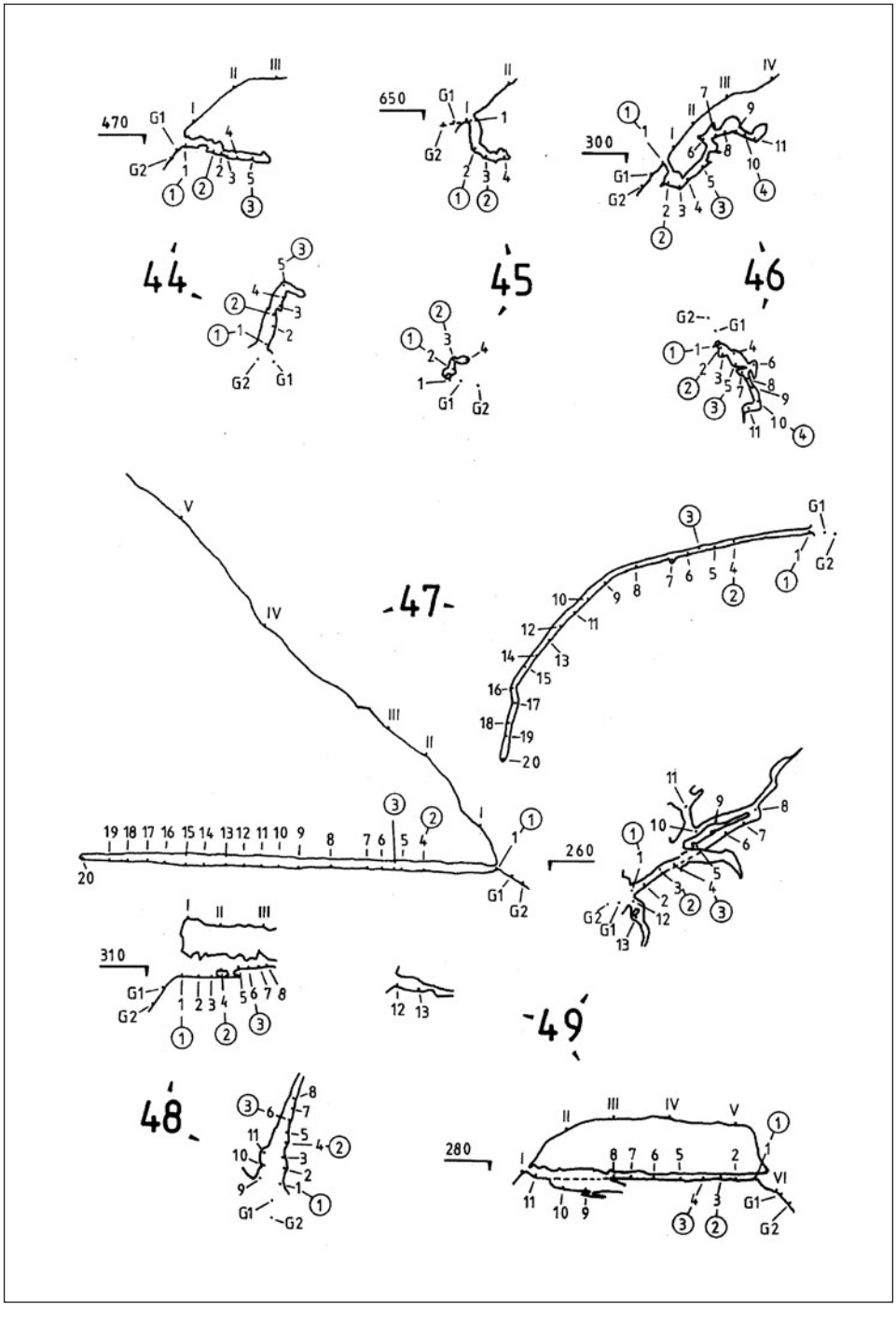
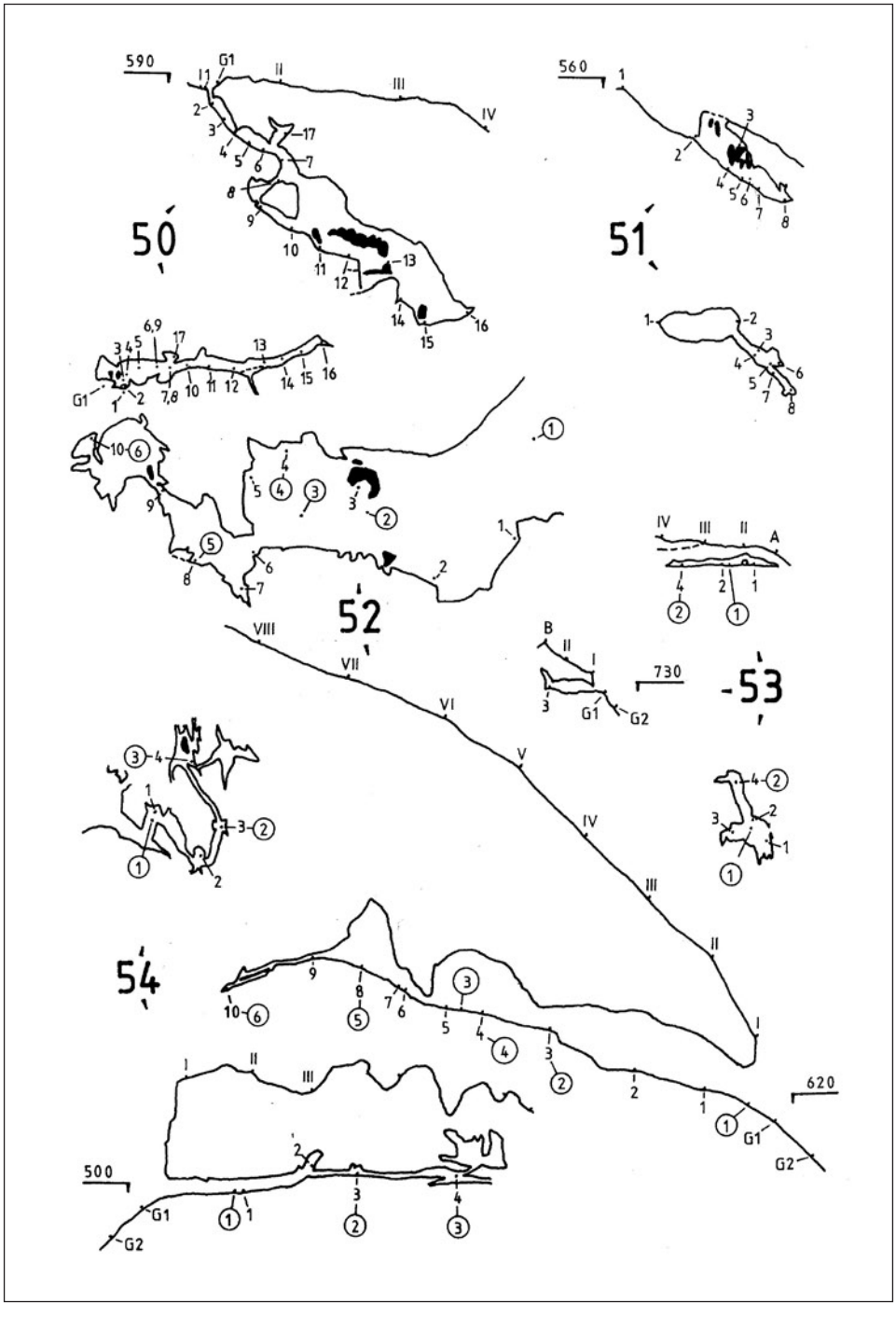
34
35
36
760
420
600
630
400
480
340
640


37
38
39
40
41
42
43
1000
560
520
500
660
480
G1
G2
G1,G2


470
650
300
44
45
46
47
260
310
48
49
280


590
560
50
51
52
53
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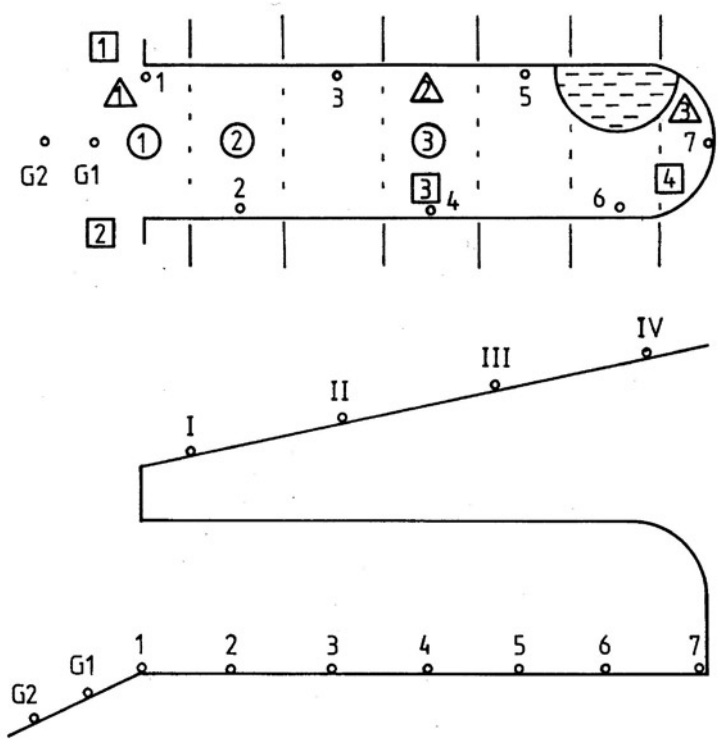
730
620
500
G1
G2
I
II
III
IV
V
VI
VII
VIII
A
B



① *Sampling site and cavity part / vzorčevalno mesto in del votline*

1 *Site of meteorological measurements / mesto meteoroloških meritev*

Mouse trap / mišja past

G1 *Deep edaphic sample at –10 cm / globinski edafski vzorec na –10 cm*

I *Sampling site above a cavity / vzorčevalno mesto nad votlino*

Border between sampling parts / meja med vzorčevalnima predeloma

Figure 3: General review of ecological sampling in the cavitites.
Slika 3: Splošni pregled pridobivanja ekoloških podatkov v votlinah.

RESULTS

The complete checklist of the terrestrial fauna in cavities of northern and central Slovenia (UTM codes UM, VM and WM) represents both data obtained in the systematically investigated caves, as well as that from other caves in the region cited in the literature. In the following review (List 1), 456 species and 99 subspecies of terrestrial animals, belonging to 321 genera of 183 families, are cited.

List 1: Review of fauna recorded in cavities of northern and central Slovenia - UTM codes: UM, VM and WM - up to 2005 (T troglomorphotic taxon, E endemite of Slovenia, c carbonates, n non-carbonates; the determinators of the own collection are added)
Seznam 1: Pregled favne votlin severne in osrednje Slovenije - UTM kvadrati UM, VM in WM - do leta 2005 (T troglomorfozni taksoni, E endemiti Slovenije, c karbonati, n nekarbonati; imenovani so določevalci lastne zbirke)

PROTOZOA not sampled			
NEMATODA indet.			c, n
GASTROPODA, alive only (VELKOVRH, F. & J. BOLE det.; lit.)			
Cochlostomatidae			
Cochlostoma s. septemspirale (RAZOUMOVSKY)			c
Pomatiasidae			
Pomatias elegans (O.F. MÜLLER)			c
Aciculidae			
Acicula stussineri (BÖTGER)	T	E	c
Clausilidae			
Charpentieria ornata (ROSSMÄSSLER)			c
Cochlodina laminata MONTAGU			c
Iphigena (*Macrogastra*) *badia* (C. PFEIFFER)			c
I. plicatula (DRAPARNAUD)			c
Ferussaciidae			
Cecilioides acicula (O.F. MÜLLER)	T		c
Zonitidae			
Aegopis verticillus (LAMARCK)			c, n
Oxychilus (*Riedelius*) *depressus* (STERKI)			n
Oxychilus sp.			c
Arionidae			
Arion sp.			
Limacidae			
Lehmannia marginata (O. F. MÜLLER)			c
Limax cinereoniger WOLF			c, n
L. maximus LINNAEUS			c
Helicidae			
Campylaea planospira illyrica (STABILE)			c, n
Trichia (*Edentiella*) *edentula* (DRAPARNAUD)			c

Trichia sp.			c
Arianta arbustorum (LINNAEUS)			c
Helix pomatia LINNAEUS			c
Carychiidae			
Zospeum a. alpestre FREYER	T	E	c
Z. alpestre bolei SLAPNIK	T	E	c
Z. isselianum (POLONERA)	T		c
Z. amoenum (FRAUENFELD)	T		c
Z. f. frauenfeldi FREYER	T	E	c
Z. f. osolei SLAPNIK	T	E	c
Z. kusceri (A. J. WAGNER)	T	E	c
Z. lautum (FRAUENFELD)	T	E	c
Z. spelaeum costatum (FREYER)	T	E	c
Z. schmidti (FRAUENFELD)	T	E	c
Pupillidae			
Spelaeodiscus hauffeni (F. SCHMIDT)	T	E	c
Discus rotundatus (O.F. MÜLLER)			n
Argnidae			
Argna (*Agardhiella*) *truncatula* (PFEIFFER)	T		c
Vitrinidae			
Vitrea sp.			c
OLIGOCHAETA			
Enchytraeidae indet.			c, n
Lumbricidae (MRŠIĆ, N. det.; lit.)			c
Allolobophora smaragdina ROSA			n
Dendrobaena octoedra (SAVIGNY)			c
D. byblica (ROSA)			c, n
Eisenia lucens (WAGA)			c, n
E. spelaea (ROSA)			c, n
E. t. tetraedra (SAVIGNY)			c
Proctodrilus a. antipai (MICHAELSEN)			c
Pannoniona leoni (MICHAELSEN)			c
Dendrodrilus r. rubidus (SAVIGNY)			c
D. r. tenuis (EISEN)			c
Aporrectodea (*A.*) *r. rosea* (SAVIGNY)			c
A. (*A.*) *smaragdina* (ROSA)			c
Octolasion tyrtaeum (ÖRLEY)			c
Octodrilus transpadanus ROSA			c
O. meroandricus MRŠIĆ			c
Octodriloides camnensis (BALDASERRONI)			c
O. zupancici MRŠIĆ		E	c
Lumbricus castaneus (SAVIGNY)			c
L. rubellus (HOFFMEISTER)			c
HIRUDIEA (SKET, B. det.)			
Diestecostomatidae			
Xerobdella lecomptei FRAUENFELD			c

ONISCOIDEA (POTOČNIK, F. det.)			
Ligidiidae			
Ligidium germanicum VERHOEFF			c, n
Trichoniscidae			
Androniscus stygius dentatus STROUHAL	T	E	c
A. (*A.*) *subterraneus subterraneus* STROUHAL	T		c
A. (*A.*) *s. nodosus* STROUHAL	T	E	c, n
A. (*Dentigeroniscus*) *d. dentiger* VERHOEFF	T	E	c, n
A. (*Roseoniscus*) *roseus* (C. L. KOCH)	T		c
Calconiscellus karawankianus VERHOEFF	T		c, n
Hyloniscus vividus (C. L. KOCH)			c
Trichoniscus (*T.*) *austriacus* VERHOEFF			n
T. (*T.*) *stammeri* VERHOEFF			c
Porcelionidae			
Porcelium f. fiumanum VERHOEFF			c
P. f. salisburgense VERHOEFF			c
Protracheoniscus a. amoenus C. L. KOCH			n
P. hernagorensis VERHOEFF			c
Trachelipus r. ratzeburgi (BRANDT)			c
T. razzauti razzauti ARCANGELI			c
Cylisticidae			
Cylisticus convexus (DE GEER)			c
Armadillidiidae			
Armadillidium vulgare LATREILLE			
SCORPIONES (NOVAK, T. det.)			
Chactidae			
Euscorpius germanus (C. L. KOCH)			c
PSEUDOSCORPIONES (HADŽI, J. det.; lit.)			
Chthoniidae			
Chthonius raridentatus HADŽI	T	E	c
Neobisiidae (lit.)			
Roncus brevimanus (JOSEPH)	T	E	c
R. (*Parablothrus*) *s. stussineri* (SIMON)	T	E	c
PALPIGRADA			
Eukoeneniidae			
Eukoenenia sp.	T		c
ARANEAE (DEELEMAN-REINHOLD, C. & A. POLENEC det.; lit.)			
Dysderidae			
Dysdera sp.			c
Harpactea lepida (C. L. KOCH)			c
Harpactea sp. n.			c
Segestria senoculata LINNAEUS			c
Clubionidae			
Anyphaena accentuata (WALCKENÄR)			c
Clubiona pallidula CLERCK			c

C. subtilis L. KOCH	c
C. terrestris WESTRING	c
Liocranum rupicola (WALCKENÄR)	c
Scotina celans (BLACKWALL)	c
Agelenidae	
Cicurina cicurea (FABRICIUS)	c
Coelotes inermis (L. KOCH)	c, n
C. solitarius L. KOCH	c
Cybaeus angustiarum L. KOCH	n
C. tetricus (C. L. KOCH)	c, n
Histopona luxurians (KULCZYNSKI)	c, n
H. torpida (C. L. KOCH)	c, n
Tegenaria cf. *ferruginea* (PANZER)	c
T. parietina (FOURCROY)	c
T. silvestris L. KOCH	c, n
T. tridentina L. KOCH	c
Tetrilus macrophthalmus (KULCZYNSKI)	c
Tetrix sp.	c
Nesticidae	
Nesticus cellulanus CLERCK	c, n
N. idriacus ROEWER	c
Theridiidae	
Achaearanea tepidariorum (C. L. KOCH)	n
Enoplognatha ovata (CLERCK)	n
Enoplognatha sp.	c
Theridion sp.	c
Tetragnathidae	
Meta menardi LATREILLE	c, n
Metellina merianae (SCOPOLI)	c, n
M. segmentata (CLERCK)	c
Tetragnatha obtusa C. L. KOCH	n
Tetragnatha sp.	k
Araneidae	
Araneus cucurbitinus Linnaeus	c
Linyphiidae	
Bathyphantes gracilis (BLACKWALL)	c
Centromerus sylvaticus (BLACKWALL)	n
C. celarius (SIMON)	c
Centrophantes roeweri (WIEHLE)	c
Ceratinella minor KULCZYNSKI	n
Diplocephalus crassilobus (SIMON)	c
D. cristatus (BLACKWALL)	c, n
D. cf. *connectens* KULCZYNSKI	c
D. latifrons (O. P. CAMBRIDGE)	c
Drapetisca socialis (SUNDEWALL)	c
Gonatium rubellum (BLACKWALL)	c
Labulla thoracica (WIDER)	c
Leptyphantes alacris (BLACKWALL)	c
L. cristatus MENGE	c, n

L. flavipes (BLACKWALL)			c, n
L. fragilis (THORELL)			c
L. minutus (BLACKWALL)			c
L. monticola (KULCZYNSKI)			c
L. notabilis KULCZYNSKI			c
L. pallidus (O. P. CAMBRIDGE)			n
L. tenebricola (WIDER)			c
L. triglavensis MILLER & POLENEC		E	c
Linyphia clathrata SUNDEWALL			c
Macrargus rufus (WIDER)			c
Neriene pelatat (WIDER)			c
Oreonetides firmus (O. P. CAMBRIDGE)			c, n
Porrhoma convexum WESTRING			c n
P. kolosvaryi KRATOCHVÍL			c
P. mycrops ROEWER			c
P. myops SIMON			c, n
P. pygmaeum (BLACKWALL)			c
Prosopotheca monoceros (WIDER)			c
Troglohyphantes cornutus DEELEMAN-REINHOLD			c
T. diabolicus DEELEMAN-REINHOLD		E	c, n
T. diurnus KRATOCHVÍL			c
T. excavatus FAGE			c, n
T. gamsi DEELEMAN-REINHOLD		E	c
T. helsdingeni DEELEMAN-REINHOLD		E	n
T. karawankorum DEELEMAN-REINHOLD		E	c
T. navicordis THALER			n
T. cf. *poleneci* (WIEHLE)		E	c
T. polyophthalmus JOSEPH *sensu* FAGE		E	c
T. sbordonii BRIGNOLI			c
T. subalpinus THALER			c, n
T. thaleri MILLER & POLENEC			c, n
T. typhlonetiformis ABSOLON & KRATOCHVÍL	T		c
T. wiehlei MILLER & POLENEC			c
Pholcidae			
Pholcus phalanioides (FUESSLIN)			c, n
Lycosidae			
Pardosa lugubris (WALCKENÄR)			c
Trochosa terricola MILLER & POLENEC			n
Trochosa sp.			c
Thomisidae			
Diaea dorsata FABRICIUS			c
Xystichus sp.			c
Philodromidae			
Philodromus dispar WALCKENÄR			c
Amaurobiidae			
Amaurobius claustrarius HAHN			c
A. fenestralis STROEM			c
A. ferox (WALCKENÄR)			c, n

OPILIONES (GRUBER, J., J. HADŽI & T. NOVAK det.; lit.)		
Sironidae		
Siro d. duricorius (JOSEPH)		c
Cladonychiidae		
Holoscotolemon unicolor ROEWER		c
Nemastomatidae		
Nemastoma b. bidentatum ROEWER		c
Paranemastoma quadripunctatum (PERTY)		c, n
P. bicuspidatum (C. L. KOCH)		c, n
Mitostoma chrysomelas (HERMANN)		c, n
Trogulidae		
Trogulus nepaeformis (SCOPOLI)		c
T. tingiformis C. L. KOCH		c
Ischyropsalididae		
Ischyropsalis hadzii ROEWER	(T)	c
I. h. hellwigi (PANZER)		c, n
I. kollari C. L. KOCH		c
I. muellneri HAMANN	(T)	c
Phalangiidae		
Opilio dinaricus ŠILHAVÝ		c
O. ruzickai ŠILHAVÝ		c
Platybunus bucephalus (C. L. KOCH)		c
Rilaena triangularis (HERBST)		c
Lacinius dentiger (C. L. KOCH)		c
L. ephippiatus (C. L. KOCH)		c
Mitopus morio (FABRICIUS)		c, n
Gyas annulatus (OLIVIER)		c
G. titanus SIMON		c, n
Amilenus aurantiacus (SIMON)		c, n
Astrobunus helleri (AUSSERER)		c
Leiobunum rupestre (HERBST)		c, n
ACARINA (TARMAN, K. & D. TOVORNIK det.)		
Eupodidae		
Linopodes notatorius (LINNAEUS)		c
Nicolletiellidae		
Trombidiidae indet.		c, n
Phthiracaridae		
Phthiracarus italicus (OUDEMANS)		c
Ph. piger (SCOPOLI)		c
Camisidae		
Camisia biurnis (C. L. KOCH)		c
Hermanniellidae		
Hermanniella granulata (NICOLET)		c
Hermanniidae		
Hermannia gibba (C. L. KOCH)		c
Damaeidae		
Epidamaeus bituberculatus (KULCZYNSKI)		c
Spatiodamaeus verticillipes (NICOLET)		c

Belbidae	
Metabelba platynota GRANDJEAN	c
Eremaeidae	
Eremaeus oblongus C. L. KOCH	c
Carabodidae	
Carabodes marginatus (MICHAEL)	c
Opiidae	
Multioppia glabra MIHELČIČ	c
Oppia decipiens PAOLI	c
O. m. minus PAOLI	c
O. ornata (OUDEMANS)	c
Oppia sp. n.	c
O. translamellata (WILLMANN)	c
Quadroppia quadricarinata (MICHAEL)	c, n
Suctobelbidae	
Suctobelba trigona (MICHAEL)	c
Cymbaeremaeidae	
Cymbaeremaeus cymba (NICOLET)	c
Scutoverticidae	
Scutovertex minutus (C. L. KOCH)	c
Oribatulidae	
Zygoribatula exilis (NICOLET)	c
Chamobatidae	
Chamobates alpinus SCHWEIZER	c
Ch. cuspidatus (MICHAEL)	c
Ch. schultzi (OUDEMANS)	c
Ceratozetidae	
Ceratozetes piritus GRANDJEAN	c
Ceratozetes sp.	c
Sphaerozetes piriformis (NICOLET)	c
Pelopidae	
Eupelops torulosus C. L. KOCH	c
Oribatellidae	
Oribatella calcarata (C. L. KOCH)	c
O. meridionalis BERLESE	c
Archipteriidae	
Archipteria punctata (NICOLET)	c
Galumnidae	
Galumna tenuiclavus (BERLESE)	c
Parasitidae indet.	c, n
Poecilochiridae indet.	c
Ixodidae (TOVORNIK, D. det.)	
Ixodes vespertilionis C. L. KOCH	c
I. hexagonus LEACH	c
Spinturnicidae	
Spinturnix sp.	c

TARDIGRADA not sampled

CHILOPODA (MATIC, Z. & A. STENTZER det.; lit.)			
Lithobiidae			
Eupolybothrus (*E.*) *grossipes* (C. L. KOCH)			c
Lithobius (*L.*) *agilis* C. L. KOCH			c
L. (*L.*) *p. punctatus* (C. L. KOCH)			c
Scolioplanidae			
Strigamia cf. *acuminata* (LEACH)			c
DIPLOPODA (STRASSER, K. & N. MRŠIĆ det.; lit.)			
Glomeridae			
Glomeris (*Eurypleuromeris*) *conspersa* C. L. KOCH			c
G. (*Stenopleuromeris*) cf. *norica* LATZEL			c
G. (*S.*) *pustulata* LATREILLE			c
Haploglomeris multistriata (C. L. KOCH)			c
Glomeridellidae			
Glomeridella minima LATZEL			c
Trachysphaeridae			
Trachysphaera costata WAGA			c
T. cf. *noduligera* (VERHOEFF)			c
Polydesmidae			
Brachydesmus (*B.*) *carniolensis* VERHOEFF	T	E	c
B. (*B.*) *dorsolucidus* STRASSER	T	E	c
B. (*B.*) *h. herzegowinensis* VERHOEFF	T		c, n
B. (*B.*) *h. septentrionalis* STRASSER	T	E	c
B. (*B.*) *subterraneus* HELLER	T		c
B. (*B.*) *troglobius* DADAY	T		c
Polydesmus (*P.*) *complanatus illyricus* VERHOEFF			c, n
P. (*Spanobranchium*) *c. collaris* C. L. KOCH			c
Polydesmus monticolus LATZEL			c
P. (*Acanthotarsus*) *e. edentulus* (C. L. KOCH)			c
P. (*A.*) *e. bidentatus* VERHOEFF			c
P. (*A.*) *e. plitvicensis* VERHOEFF			c
Strongylosomatidae			
Strongylosoma stigmatosum EICHENWALD			
Haaseidae			
Haasea (*O.*) *fonticulorum* VERHOEFF			c
H. (*Bracybainosoma*) *pretneri* (STRASSER)		E	c
Anthroleucosomatidae			
Haasia largescutata parallela (STRASSER)		E	c
Heteroporatidae			
Heteroporatia mutabilis LATZEL			n
Attemsiidae			
Coelogonium cavernarum STRASSER		E	c
Iulialpium alabardatum STRASSER		E	c
Mecogonopodium b. bohiniense STRASSER		E	c
M. b. parvulum STRASSER		E	c
M. zirianus MRŠIĆ		E	c
Polyphematia moniliformis (LATZEL)			c
Stiphrogonium a. attemsi STRASSER		E	c

S. a. celeae MRŠIĆ		E	c
Symphyosphys s. serkoi STRASSER			c, n
Tylogonium nivifidele STRASSER		E	c
Glomogonium k. karawankarum STRASSER		E	c
G. k. intermedium MRŠIĆ		E	c
G. k. saviniense MRŠIĆ		E	c
Craspedosomatidae			
Asandalum sp.			c
Iulidae			
Cylindroiulus (*C.*) *luridus* (C. L. KOCH)			c
C. (*Bracheioiulus*) *boleti* C. L. KOCH			c
C. (*Cannioiulus*) *dicentrus* LATZEL			c
C. (*Ypsiloniulus*) *groedensis* (ATTEMS)			c
Leptoiulus (*L.*) *vagabundus* (LATZEL)			c
Ommatoiulus sabulosus (LINNAEUS)			c
cf. *Pachyiulus* sp.			c
Styrioiulus cf. *pelidnus* (LATZEL)			n
Unciger foetidus (C. L. KOCH)			c
Blaniulidae			
Nopoiulus venustus (MEINERT)			n
PAUROPODA indet.			
SYMPHYLLA indet.			
COLLEMBOLA (ČERVEK, S. det.)			
Poduridae indet.			c, n
Hypogastruridae			
Hypogastrura purpurascens (LUBBOCK)			c
Onychiuridae			
Onychiurus gracilis (Jul. MÜLLER)	T		c, n
Onychiurus spp.	T		c, n
Terodontophora bielanensis (WAGA)			c
Isotomidae			
Isotomurus palustris (O. F. MÜLLER)			c
I. subterraneus STACH			c
Isotoma notabilis SCHÄFFER			c
Isotomiella minor (SCHÄFFER)			c
Oncopodidae			
Oncopodura cavernarum STACH		E	c
O. crassicornis SHOEBOTAN			c, n
Tomoceridae			
Tomocerus minor (LUBBOCK)			c, n
T. flavescens (TULLBERG)			c, n
T. unidentatus (BÖRNER)			c, n
Entomobryidae			
Heteromurus nitidus (TEMLETON)			c
Lepidocyrtus curvicollis BOURLET			c, n
L. cyaneus (TULLBERG)			c

Orchesella cf. *hungarica* STACH			c, n
Pseudosinella subvirei BONET	T		c
Sminthuridae			
Arrhopalites pygmaeus WANKEL			c
Arrhopalites sp.			c
DIPLURA indet.			
Campodeidae			
Plusiocampa sp.	T		c
PROTURA (NOSEK, F. det.)			
Acerentomonidae			
Acerentomon kustorae NOSEK		E	c
THYSANURA indet.			
Machilidae			
EPHEMEROPTERA indet.			
PLECOPTERA indet.			
SALTATORIA (US, P. & T. NOVAK det.)			
Rhaphidophoridae			
Troglophilus cavicola (KOLLAR)			c, n
T. neglectus KRAUSS			c, n
Tettigoniidae			
Tettigonia sp.			c
DERMAPTERA indet.			
Forficulidae			
BLATTARIA indet.			
Blattellidae			
Ectobius sp.			c
PSOCOPTERA indet.			c, n
THYSANOPTERA indet.			c
MECOPTERA (DEVETAK, D. det.)			
Boreidae			
Boreus hyemalis (LINNAEUS)			c
B. westwoodi HAGEN			c
NEUROPTERA (DEVETAK, D. det.)			
Myrmeleontidae			
Myrmeleon formicarius LINNAEUS			c, n
Euroleon nostras GEOFFROY in FOURCROY			c, n

HOMOPTERA, CICCADINA indet.			c, n
Aphididae indet.			c
HETEROPTERA indet.			c, n
COLEOPTERA (PRETNER, E., B. DROVENIK, S. POLAK & P.ZWICK det.; lit.)			
Carabidae			
Abax carinatus DUFTSCHMIDT			c
Abax sp.			c, n
Agonum (*Platynus*) *scrobiculatum* FABRICIUS			c
Anophthalmus a. ajdovskanus GANGLBAUER	T	E	c
A. a. concubinus J. MÜLLER	T	E	c
A. a. kaplai DAFFNER	T	E	c
A. a. naraglavi MLEJNEK & MORAVEC	T	E	c
A. a. pretneri J. MÜLLER	T	E	c
A. alphonsi alphonsi MÜLLER	T	E	c
A. a. lubnicensis MÜLLER	T	E	c
A. a. skofjeloscensis DAFFNER	T	E	c
A. bernhaueri GANGLBAUER	T	E	c
A. b. besnicensis PRETNER	T	E	c
A. b. frater DAFFNER	T	E	c
A. egonis J. MÜLLER	T	E	c
A. erebus erebus KRAUSS	T	E	c
A. e. bozoi MLEJNEK & MORAVEC	T	E	c
A. e. kraussi WINKLER	T	E	c
A. f. fallaciosus J. MÜLLER	T	E	c
A. gobanzi weberi GANGLBAUER	T	E	c
A. hitleri SCHEIBEL	T	E	c
A. kahleni DAFFNER	T	E	c
A. kofleri DAFFNER	T	E	c
A. m. manhartensis MESCHNIGG	T	E	c
A. m. fuartensis COLLA	T	E	c
A. m. mariae SCHATZMAYR	T		c
A. micklitzi GANGLBAUER ssp.	T	E	c
A. nivalis G. MÜLLER	T	E	c
A. p. pretneri MÜLLER	T	E	c
A. p. ceji VREZEC	T	E	c
A. p. savinjscensis DAFFNER	T	E	c
A. sch. schaumi SCHAUM	T	E	c
A. sch. knirschi WINKLER	T	E	c
A. sch. macromelas JEANNEL	T	E	c
A. sch. silvicola JEANNEL	T	E	c
A. scopolii episcopalis G. J. MÜLLER	T	E	c
A. sch. schmidti gspani REITTER	T	E	c
A. tolminensis (MÜLLER)	T	E	c
Aphaenopidius kamnikensis DROVENIK	T	E	c
A. t. treulandi J. MÜLLER	T	E	c
A. t. cephalotes KNIRSCH	T	E	c

Bembidion sp.			c
Carabus (*Megadontus*) *germari* STURM			c
C. (*Porcrustes*) *coriaceus* LINNAEUS			c
Cychrus attenuatus FABRICIUS			c
C. *rostratus hoppei* GANGLBAUER			n
Duvalius e. *exaratus* SCHAUM			c
Antisphodrus schreibersi KÜSTER			c, n
Leistus sp.			c
Nebria germari HEER			c
Orotrechus g. *globulipennis* (SCHAUM)	T	E	c, n
O. *koflerianus* DAFFNER	T	E	c
O. *lucensis* SCHEIBL	T	E	c
O. *slapniki* DROVENIK, MLEJNEK & MORAVEC	T	E	c
O. *subpannonicus* DAFFNER	T	E	c
O. *novaki* MLEJNEK, MORAVEC & UDRŽAL	T	E	c
Pterostichus fasciatopunctatus CREUTZER			c
P. metallicus (FABRICIUS)			c
Trechus croaticus DEJEAN			c
T. r. rotundipennis DUFTSCHMIDT			c
T. r. cordicollis MÜLLER			c
Ptiliidae indet.			c
Cholevidae			
Bathysciinae			
Batyscia m. *montana* SCHIÖDTE			c
B. *m*. *forticornis* JOSEPH		E	c
Batysciola silvestris (MOTSCHOULSKY)			c
Aphaobiella b.-*l*. *budnar-lipoglavseki* PRETNER	T	E	c
A. *b*.-*l*. *mozirjensis* PRETNER	T	E	c
A. *tisnicensis* PRETNER	T	E	c, n
Aphaobius (*A*.) *h*. *heydeni* REITTER	T	E	c
A. (*A*.) *h*. *robustus* J. MÜLLER	T	E	c
A. (*A*.) *m*. *milleri* SCHMIDT	T	E	c
A. (*A*.) *m*. *alphonsi* J. MÜLLER	T	E	c
A. (*A*.) *m*. *fortesculptus* J. MÜLLER	T	E	c
A. (*A*.) *m*. *grabowskii* J. MÜLLER	T	E	c
A. (*A*.) *m*. *knirschi* J. MÜLLER	T	E	c
A. (*A*.) *m*. *kraussi* J. MÜLLER	T	E	c
A. (*A*.) *m*. *lubnicensis* J. MÜLLER	T	E	c
A. (*A*.) *m*. *pretneri* J. MÜLLER	T	E	c
A. (*A*.) *m*. *winkleri* MANDL	T	E	c
A. (*A*.) *muellerianus* PRETNER	T	E	c
Ceuthmonocharis (*C*.) *freyeri* (L. MÜLLER)	T	E	c
C. (*C*.) *netolitzkyi kodrici* (G. MÜLLER)	T	E	c
C. (*C*.) *pusillus* JEANNEL	T	E	c
C. (*C*.) *r. robici* (GANGLBAUER)	T	E	c
C. (*C*.) *r. staudacheri* J. MÜLLER	T	E	c
Sphaerobathyscia hoffmanni (MOTSCHOULSKY)			c
Pretneria droveniki ETONTI	T	E	c
P. m. *metkae* BOGNOLO	T	E	c

P. metkae mirae BOGNOLO & KOFLER	T	E	c
P. saulii G. MÜLLER	T	E	c
P. triglavensis PRETNER	T	E	c
Oryotus m. micklitzi REITTER	T	E	c
O. m. indentatus PRETNER	T	E	c
O. raduhensis DROVENIK, MLEJNEK & MORAVEC	T	E	c
Cholevinae (ZWICK, P. det.)			
Apocatops nigrita (ERICHSON)			c
Catops fuliginosus (ERICHSON)			c, n
C. longulus KELLNER			c
C. neglectus KRATZ			c
C. cf. *nigricans* SPENCE			c
C. picipes FABRICIUS			c, n
C. subfuscus KELLNER			c, n
C. tristis (PANZER)			c, n
Choleva angustata (FABRICIUS)			c
Ch. cisteloides (FRÖLICH)			c
Ch. glauca BRITTEN			c
Ch. sturmi (BRISOUT)			c, n
Fissocatops westi (KROGERUS)			c
Nargus wilkini (SPENCE)			n
Sciopdrepoides watsoni (SPENCE)			c
Lionidae indet.			c
Leptinidae			
Leptinus illyricus BESSUCHET	T		c
Nitidulidae indet.			c
Silphidae			
Necrophilus subterraneus DAHL			c
Necrophorus humator FABRICIUS			c
N. vespillo LINNAEUS			c
N. vespilloides HERBST			c
Scydmaenidae indet.			c
Staphylinidae (DROVENIK, B., E. PRETNER & P. ZWICK det.)			
Atheta spp.			c
Lathrobium (*Glyptomerus*) *cavicola* J. MÜLLER	T	E	c
Lathrimaeum sp.			c
Omalium sp.			c
Philontus sp.			c
Phyllodrepa sp.			c
Proteinus sp.			c, n
Quedius mesomelinus MARSHAM			c
Pselaphidae (KARAMAN, Z. det.; lit.)			
Bryaxis argus KRATZ			c
B. erichsoni ursus (REITTER)			c
Bythoxenus subterraneus MOTSCHOULSKY	T		c
Machaerites subterraneus L. MÜLLER	T	E	c
Lampyridae			
Lampyris noctiluca LINNAEUS			c
Cryptophagidae			

Cryptophagus sp.		c
Endomychidae (PRETNER, E. det.)		
Endomychus coccineus LINNAEUS		c
Micetina cruciata (SCHALLER)		c
Ptinidae (ZWICK, P. det.)		
Ptinus sp.		c
Curculionidae		
Otiorrhynchus elegantulus (GERMAR)		c
Troglorrhynchus anophthalmus F. SCHMIDT	T	c
Scarabeidae		
Geotrupes stercorarius (LINNAEUS)		c, n
Dermestidae indet.		n
Elateridae indet.		c
Scolytidae indet.		c
Ptiliidae indet.		c
Cantharidae		
Cantharis sp.		c
Chrisomelidae		
Chrisochloa sp.		c
HYMENOPTERA (BOURNE, J. D., M. MEDEN & T. NOVAK det.)		
Ichneumonidae (BOURNE, J. D. det.)		
Amblyteles armatorius (FORSTER)		c
A. quadripunctorius MÜLLER		c, n
Exephanes hilaris (GRAUENHORST)		c
Cynipoidea		c, n
Formicidae (MEDEN, M. det.)		
Camponotus sp.		c
Chthonolasius sp.		c
Proctotrypidae (NOVAK, T. det.)		
Exallonyx longicornis NEES		c
TRICHOPTERA (lit.)		
Limnephilidae		
Micropterna sp.		c
Stenophylax permistus Mc LACHLAN		c, n
LEPIDOPTERA (CARNELUTTI, J. det.)		
Nymphalidae		
Inachis io (LINNAEUS)		c
Notodontidae		
Lophopteryx camelina LINNAEUS		c
Noctuidae		
Apamea monoglypha HUFNAGEL		c
Conistra vaccinii LINNAEUS		c
Diarsia brunnea SCHIFFERMÜLLER		c
Hypaena proboscidalis LINNAEUS		c
H. rostralis LINNAEUS		c
Noctua pronuba LINNAEUS		c

Scoliopteryx libatrix LINNAEUS	c, n
Zunclognatha tarsipennalis TREITSCHKE	c
Geometridae	
Geometra papilionaria LINNAEUS	c
Triphosa dubitata LINNAEUS	c, n
T. sabaudiata DUPONCHEL	c
Melanthia procellata DENIS & SCHIFFERMÜLLER	c
Tineidae indet.	c
Acrolepiidae (NOVAK, T. det.)	
Digitivalva (*Acrolepia*) *pulicariae* KLIMETSCH	c
Pterophoridae	
Pterophorus sp.	c
Psychidae	
Agithia sp.	c
DIPTERA (SIVEC, N., J. D. BOURNE, E. CHRISTIAN & R. WAGNER det.)	
Trichoceridae	
Diazosoma hirtipenne SIEBKE	c
Trichocera maculipennis MEIGEN	c, n
T. regelationis LINNAEUS	c
Tipulidae	
Tipula sp.	c
Limoniidae CHRISTIAN, E. & N. SIVEC det.)	
Limonia nubeculosa MEIGEN	c, n
Chionea alpina BEZZI	c
Niphadobata austriaca CHRISTIAN	c, n
Psychodidae (WAGNER, R. det.)	
Psychoda albipennis ZETERSTEDT	n
P. erminea EATON	c
P. gemina EATON	n
P. parthenogenetica (TONNOIR)	c, n
P. phalaenoides LINNAEUS	n
P. aff. *minuta* BANKS	c
Threticus sp.	c
Culicidae	
Culex pipiens LINNAEUS	
Chironomidae indet.	c, n
Anisopodidae	
Sylvicola fenestralis (SCOPOLI)	c
Mycetophilidae	
Bolitophila cf. *cinerea* MEIGEN	c
Exechia sp.	c
Euphylidorea cf. *lineola* (MEIGEN)	c
Rhymosia cf. *fasciata* MEIGEN	c
Rh. cf. *tarnanii* DZIEDZICKI	c
Speolepta leptogaster WINNERZ	c, n
Tarnenia cf. *fenestralis* (MEIGEN)	c
Zelmira cf. *fasciata* MEIGEN	c

Sciaridae	
Psilosciara sp.	c
Scatopsidae	
Scatopse cf. *notata* (LINNAEUS)	c
Cecidomyidae indet.	c, n
Dolichopodidae indet.	c
Phoridae	c, n
Diploneurini gg. spp.	c, n
Megaselia sp.	c
Syrphidae	
Eristalomya tenax (LINNAEUS)	c
Scaeva pyrastri (LINNAEUS)	c
Helomyzidae	c, n
Amoebaleria sp.	c
Helomyza cf. *captiosa* GORODKOV	c
Thelida sp.	c
Dryomyzidae indet.	c, n
Sphaeroceridae	c, n
Leptocera sp.	c
Drosophilidae	c, n
Dorsophila cf. *simulans* STURTEVANT	c
Muscidae indet.	c, n
Nycteribiidae	
Nycteribia schmidti SCHINER	c
Calliphoridae	
Calliphora erythrocephala MEIGEN	c, n
Simuliidae indet.	n
Anthomyidae indet.	c
SIPHONAPTERA (BRELIH, S. det.)	
Vermipsyllidae	
Chaetopsylla (*Ch.*) *globiceps* (TASCHENBERG)	c
Hystricopsyllidae	
Hystricopsylla (*H.*) *t. talpae* (CURTIS)	c
H. (*H.*) *t. orientalis* SMIT	c
Rhadinopsylla (*Rectofrontia*) *i. integella* JORDAN & ROTHSCHILD	c
Ceratopyllidae	
Monopsyllus s. sciurorum (SCHRANK)	c
AMPHIBIA (NOVAK, T. det.)	
Salamandridae	
Salamandra s. salamandra LINNAEUS	c, n
Discoglossidae	
Bombina variegata LINNAEUS	c
Bufonidae	
Bufo b. bufo LINNAEUS	c
Hylidae	
Hyla arborea (LINNAEUS)	c

Ranidae	
Rana arvalis NILSSON	c
R. dalmatina BONAPARTE	c
R. temporaria LINNAEUS	c
REPTILIA (NOVAK, T. det.)	
Colubridae	
Natrix tesselata (LAURENTI)	c
AVES (BATIČ, F. & T. NOVAK det.)	
Tytoidae	
Tyto alba (SCOPOLI)	c
Strigidae	
Strix aluco LINNAEUS	c
Cinclidae	
Cinclus cinclus (LINNAEUS)	c
Paridae	
Parus montanus BALDENSTEIN	c
Corvidae	
Pyrrhocorax graculus (LINNAEUS)	c
MAMMALIA (KRYŠTUFEK, B., B. PETROV, F. JANŽEKOVIČ & T. NOVAK det.)	
Erinaceidae	
Erinaceus concolor MARTIN	c
Soricidae	
Sorex alpinus SCHNIZ	c, n
S. araneus LINNAEUS	c
S. minutus LINNAEUS	c
Crocidura leucodon (HERMANN)	c
Rhinolophidae	
Rhinolophus ferrumequinum (SCHREBER)	c, n
Rh. hipposideros (BECHSTEIN)	c, n
Vespertilionidae	
Myotis myotis (BORKHAUSEN)	c, n
M. daubentoni (KUHL)	c
M. nattereri (KUHL)	c
M. emarginatus (GEOFFROY)	c
Pipistrellus pipistrellus (SCHREBER)	c
Eptesicus serotinus (SCHREBER)	c
Barbastella barbastellus (SCHREBER)	c, n
Plecotus auritus (LINNAEUS)	c
P. austriacus (FISCHER)	c
Miniopterus schreibersi (KUHL)	c, n
Muridae	
Clethrionomys glareolus (SCHREBER)	c, n
Chionomys nivalis (MARTINS)	c
Apodemus flavicollis (MELCHIOR)	c, n
A. sylvaticus (LINNAEUS)	c, n

Gliridae	
Glis glis (LINNAEUS)	c, n
Canidae	
Vulpes vulpes (LINNAEUS)	c
Mustelidae	
Mustela erminea LINNAEUS	c
Martes foina (ERXLEBEN)	n
Bovidae	
Rupicapra rupicapra (LINNAEUS)	c

DISCUSSION

This checklist of terrestrial fauna recorded in the cavities of northern and central Slovenia up to 2005 represents a compilation of data in accordance with present knowledge. Data from older literature were completed, some taxonomical names replaced by new valid ones, and some inaccuracies were avoided. The pseudoscorpion *Neobisium brevipes* (FRIVALDSKY), e. g., was excluded from the faunal list as it does not live in Slovenia. Nevertheless, some recent data also require prudent consideration, especially the great number of subspecies in the *Anophthalmus* species. In future genetic as well as morphometrical analyses, based on a series of individuals, the number of these taxa will undoubtedly shrink.

In the 55 cavities, beside the determined taxa, about 1500 tubes and microscopic preparations of collected acari, pseudoscorpions, springtails, diplurans, adult caddis flies, and ichneumonids were sent to certain specialists, but for various reasons not returned. Some of the acari, springtails and ichneumonids were determined, while the rest of material was not (neither have the determination lists been published, nor sent to the author). The list given in this article is thus incomplete. At least 100 more species are expected within these groups.

Ecologically, about three quarters of the cited taxa belong to the trogloxenes, which are epigean taxa that inhabit the entrance parts of cavities, and appear there occasionally in low frequencies. The troglophiles, which inhabit mostly hypogean habitats in between the entrance and the inner cavity parts, were not as numerous but most abundant in the cavities. The troglobites are subterranean taxa, mostly inhabiting fissure and crack systems adjacent to cavities. For this reason the majority of these are to be found in the inner sections of cavities, but only a few species are abundant there. In summary, there were 101 (22.2%) troglobitic species and subspecies, and 114 (22.6%) species and subspecies endemic to the territory of Slovenia. 327 (71.9%) of species have been found only in cavities within carbonate rocks, 102 (22.4%) in carbonate as well as in non-carbonate rocks, and 26 (5.7%) only within cavities in non-carbonate rocks. This result is partly caused by the fact that most cavities were investigated in carbonate rocks.

POVZETEK

V letih 1977-2001 smo sistematsko raziskovali kopensko favno in ekološke razmere v 55 jamah in izkopanih rovih severne in osrednje Slovenije. Do leta 2005 je bilo za votline tega ozemlja na stičišču alpskega, panonskega in deloma dinarskega bioma med lastnimi raziskavami ter v literaturi registriranih 456 vrst in 100 podvrst živali iz 321 rodov, pripadajočih 183 družinam. Ta taksonomski

pregled je izhodišče pri obravnavi ekoloških ter drugih razprav o kopenski favni v podzemeljskih habitatih severne in osrednje Slovenije. Predstavitev ekološko sistematsko raziskanih votlin ter uporabljenih metod in tehnik raziskav omogoča vpogled v morfologijo teh votlin ter načine raziskovanja. Favnistični pregled je nekritičen, saj je bilo v zadnjih dveh desetletjih opisanih mnogo taksonov, zlasti podvrst rodu *Anophthalmus*, ki se bodo po temeljitih biometrijskih in/ali genetskih študijah nedvomno vsaj deloma izkazali za neupravičene. Pregled tudi ni popoln, ker nekatere taksonomske skupine iz različnih razlogov niso bile obdelane; takih je po grobi oceni še vsaj 100 vrst. Ekološko pripada največ vrst trogloksenom, ki so v podzemlju pretežno naključno, zato je njihova številčnost majhna. Najštevilčnejši so osebki troglofilnih taksonov, medtem ko je število teh vrst relativno majno. Troglobiontnih vrst je relativno veliko (101 vrsta in podvrsta; 22,2 %), a so z izjemo nekaj vrst maloševilni v votlinah severne in osrednje Slovenije. 114 (22,6 %) vrst in podvrst je endemitov Slovenije. Večina vrst (71,9 %) je bila najdena v votlinah karbonatnih predelov, deloma tudi zato, ker je tam največ raziskanih votlin.

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CORRIGENDA

Unfortunately, in Novak et al. (2004b) the presentation of Simpson`s index was mismatched with an another graph.

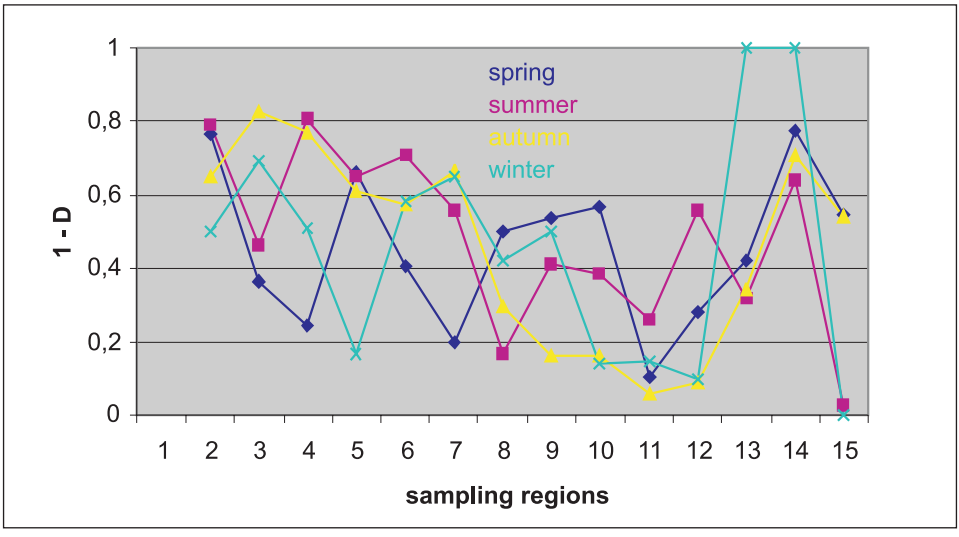

Fig. 14: Simpson`s index of dominance, D, in the Železna jama cave, 2000-2001.
Sl. 14: Simpsonov indeks dominance, D, v Železni jami, 2000-2001.