# 2013-2017 Published on the occasion of the 17th International Congress of Speleology WHAT IS NEW SINCE 2013?













# 2013-2017 **CA**

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From the editor

It is with great pleasure that we present this special volume entitled "Polish Caving 2013-2017", published on the occasion of the 17th International Congress of Speleology. The aim of the publication is to communicate the main achievements of Polish cavers over the last four years.

Spectacular results were achieved by Krzysztof Starnawski in 2016 in the Czech Republic, where Hranicka Propast became the deepest underwater cave in the world with a depth of 404 m. K. Starnawski also broke the world record in cave diving on a closed circuit rebreather (CCR) in Viroit Cave (-278 m), Albania.

In the Alps, a team of Polish cavers has been exploring Interesting Cave in the Hagengebirge massif since 2006. Today, the cave is 19 032 m long and has a depth of 639 m. The expeditions to nearby Hoher Göll were focused on connecting Gruberhornhöhle Cave with Hochschartehöhlensystem and exploration of Gamssteighöhle Cave, where our cavers discovered more than 1.9 km of new passages and deepened the cave to -444.5 m. In the Leoganger Steinberge massif, the main findings took place in the CL-3 Cave System and Drachenhöhle Cave. Exploration was also carried on in Jack Daniel's Cave in the Tennengebirge mountains.

More and more expeditions have been systematically visiting karst massifs in the Balkans. In the Prokletije Mts ca. 7 500 m of new passages were surveyed (Górnicza Cave, now 585 m deep). In the Maganik massif, important discoveries occurred in M35 and Zoran Jama Cave, now respectively 110 m and 550 m deep. Shpella Sportive (-264.3 m deep), a cave explored by Polish cavers in the Albanian Alps, became the fifth deepest cave in Albania. Furthermore, many small teams of divers went to Albania, Bosnia and Herzegovina, Montenegro and Serbia. Other exploration undertakings run by Polish cavers were also continued in the Picos de Europa (Spain) and Kanin (Slovenia).

Outside Europe, the most spectacular Polish project is currently going on in China. During five expeditions in recent years, approx. 44 km of new cave passages were surveyed and mapped. One of the explored caves begins with an enormous, 320 m deep pit, one of the largest in the world. Its estimated volume is 3 million m3. Closer to Poland, in Krubera-Voronya Cave, Michał Macioszczyk checked a small "window" going up into the unknown 20 m below the water level (ie. at -2160 m), becoming the first Pole to dive in the deepest part of the cave. Meanwhile, cavers from Speleoklub Bobry Żagań still continue to "collect" the deepest pits of the world.

In addition, Polish cavers participated in international expeditions and took part in expeditions organized by speleological federations of other countries to Mexico, the United States, Turkey, China, Iran, Abkhazia, Germany, Montenegro, Bosnia and Herzegovina, Romania and other countries.

Besides the articles on Polish achievements abroad, this issue also includes information on caves and caving organizations in Poland. We also included several short notes about Polish caving and speleological activities, and celebration of the 50th Jubilee of the Speleological Symposium.

Ditta Kicińska

# Caves in Poland

#### Michał Gradziński and Ditta Kicińska

There are more than 5200 known caves in Poland. They are of karst and non-karst (pseudokarst) origin. The former are developed in karstic rocks, mainly limestones and dolomites, rarely in gypsum and marbles and exceptionally in rock salt. Although the karstified rocks are widely distributed, the outcrops are rather small and occupy only about 2.5% of the country area (i.e., about 8000 km²). Most of the country is covered with loose Cainozoic deposits. The non-karstic caves are developed mainly in sandstones. The eight main regions of cave occurrence in Poland are characterized below.

# Tatra Mountains (Tatry)

The Tatra Mountains are the only alpine mountains in Poland. They occupy an area of  $785~\rm km^2$  (only  $175~\rm km^2$  in Poland). The karstic rocks (limestones and dolomites of Triassic, Jurassic and Cretaceous age) build mainly the western part of the Tatra range. They occur over the area of  $50~\rm km^2$ . This area is practically the only region in Poland with large and deep caves. Because of that fact, everyday activity of Polish cavers, both exploration and training is concentrated in this area. Long life anchors were installed in the most popular caves of this region.

More than 868 caves are now known in the Tatra Mountains: 837 in the Western Tatra Mts. and 31 caves in the High Tatra Mts. Most caves of the High Tatra Mts occur in granitoids. The total length of the Tatra caves exceeds 133.5 km. The highest outcrops of karstic rocks lie at altitudes above 2000 m and the main karst springs are situated at the level of about 1000 m. Most caves are located in the following areas: slopes of the Bobrowiec, Kominiarski Wierch, Kościeliska Valley, Czerwone Wierchy, Giewont, Kalacka Turnia and Kopa Magury-Zawrat Kasprowy massif. The longest and deepest caves are situated mainly in the Czerwone Wierchy massif. The Wielka Śnieżna Cave system is the largest in the Western Tatra Mts (with vertical extent of 824 m and length more than 23 km).

All the Tatra caves are situated in the Tatra National Park and caving activities are strictly limited by the Park authorities. Only six caves are open for tourists. For visiting other caves special permit is needed. 25 caves are available for caving (this constitutes 50% of the length of all the corridors). For each visit in a cave the cavers are obligated to obtain electronic permission from the Tatra National Park (TPN). One cave can be visited by maximum 15 people a day.

# Pieniny Klippen Belt (Pieniński pas skałkowy)

In this area resistant Mesozoic limestones build up isolated klippen surrounded by non-karstic rocks. There are more than 90 caves in this area. Although all these caves are in limestones, most of them are of non-karstic (pseudokarst) origin. The longest cave is Jaskinia w Ociemnem, which is 196 m long and 47.5 m deep.

#### Beskidy Mts (Beskidy)

The Beskidy Mts are built of Cretaceous-Paleogene flysch – sandstones and shales. More than 1448 caves are known there, all of non-karstic (pseudokarst) origin with sandstones as the host rocks. They originated from gravitational movements of rocks along cracks. The longest cave is Wiślańska Cave (2 275 m long, 41 m vertical extent) and the deepest is Ostra-Rolling-Stones Cave System (–60 m deep, 855 m long) in the Beskid Śląski Mts. Wiślańska Cave was discovered in 2003, it reached the length of more than 300 m long after the first year of exploration. The explor-

ers came back in 2007. The resumed exploration soon brought the length of 2275 m. Probably it is now the longest non-karstic cave in Central Europe. The exploration has not been finished yet. New discoveries in Salmopolska Cave extended its length from 175 m to 1009.5 m. Some chambers are quite spacious as for caves of this origin.

#### Kraków – Wieluń Upland (Wyżyna Krakowsko-Wieluńska)

This area occupies about 2500 km2. Nowadays there are more than 2261 known caves. Almost all of them are developed in Upper Jurassic limestones. Only a few occur in Lower Carboniferous limestones and Middle Triassic limestones and dolomites. Wierna Cave, which was explored in 1990 is the longest cave in the Kraków-Wieluń Upland. It is 1027 m long. The caves of this area are mainly horizontal, the deepest is Jaskinia Studnisko (-77.5 m). Some caves are situated within protected areas (i.e., the Ojców National Park and the Jurassic Landscape Parks). Accessing these caves requires a special permit. Five caves are open for tourists and four of them are lit by electricity. Niedźwiedzia Górna Cave is the greatest cave discovered in the recent years in the Kraków-Częstochowa Upland. It is 540 m long and 31 m vertical extent. The cave entrance has been closed with a gate shortly after its discovery, because of the speleothem richness.



Distribution of caves in Poland; the caves mentioned in text: 1. Jaskinia w Ociemnem, 2. Jaskinia Wiślańska, 3. Ostra-Rolling Stones, 4. Kryształowe Groty in Wieliczka salt mine, 5. Jaskinia w Diablej Górze, 6. Jaskinia Wierna, 7. Jaskinia Studnisko, 8. Jaskinia Skorocicka, 9. Chelosiowa Jama, 10. Jaskinia Raj, 11. Jaskinia Niedźwiedzia, 12. Szczelina Wojcieszowska, 13. caves near Inowrocław, 14. caves near Gdańsk

<sup>\*</sup> The names of Polish caves were not translated to avoid confusion. The frequent word "jaskinia" means cave.



Czarna Cave. Photo Jakub Nowak

### Poland's deepest caves

Cave	Location	Vertical extent
Jaskinia Wielka Śnieżna	Tatra Mts, Małołączniak	824 m (-808; +16)
Śnieżna Studnia	Tatra Mts, Małołączniak	763 m (-726; +37)
Bańdzioch Kominiarski	Tatra Mts, Kominiarski Wierch	562 m (-546; +16)
Jaskinia Mała w Mułowej	Tatra Mts, Ciemniak	-555 m
Jaskinia Wysoka — Za Siedmioma Progami	Tatra Mts, Ciemniak	435 m (-288; +147)
Jaskinia Kozia	Tatra Mts, Kozi Grzbiet	389 m (-376; +13)
Ptasia Studnia	Tatra Mts, Kozi Grzbiet	-352 m
Jaskinia Miętusia	Tatra Mts, Dolina Miętusia	305 m (-283; +22)
Jaskinia Czarna	Tatra Mts, Dolina Kościeliska	303.5 m (-241.5; +62)
Siwy Kocioł	Tatra Mts, Dolina Małej Łąki	-295 m
Studnia w Kazalnicy	Tatra Mts., Dolina Miętusia	244 m (-199; +45)
Jaskinia Zimna	Tatra Mts., Dolina Kościeliska	176 m (-16; +160)
Jaskinia Pod Wantą	Tatra Mts., Małołączniak	172 m (-158; +14)
Jaskinia Małołącka	Tatra Mts., Małołączniak	-166 m
Jaskinia Zośka-Zagonna	Tatra Mts., Małołączniak	163 m (-154; +9)
Jaskinia Marmurowa	Tatra Mts., Ciemniak	150.5 m (-126; +25.5)
Jaskinia Miętusia Wyżnia	Tatra Mts., Dolina Miętusia	145 m (-108; +37)
Jaskinia Harda	Tatra Mts., Dolina Miętusia	-126.3 m
Jaskinia Niedźwiedzia w Kletnie	Sudety Mts, Masyw Śnieżnika	118 m (-83; +32)

# Poland's longest caves

Cave	Location	Length
Jaskinia Wielka Śnieżna	Tatra Mts., Małołączniak	23 753 m
Śnieżna Studnia	Tatra Mts., Małołączniak	12 900 m
Jaskinia Wysoka — Za Siedmioma Progami	Tatra Mts., Ciemniak	11 700 m
Jaskinia Miętusia	Tatra Mts., Dolina Miętusia	10 780 m
Bańdzioch Kominiarski	Tatra Mts., Kominiarski Wierch	9 550 m
Jaskinia Czarna	Tatra Mts., Dolina Kościeliska	7 247 m
Ptasia Studnia	Tatra Mts., Kozi Grzbiet	6 283 m
Jaskinia Zimna	Tatra Mts,Dolina Kościeliska	5 335 m
Jaskinia Niedźwiedzia w Kletnie	Sudety Mts., Masyw Śnieżnika	4 100 m
Jaskinia Mała w Mułowej	Tatra Mts., Ciemniak	3 863 m
Chelosiowa Jama-Jaworznicka	Świętokrzyskie Mts., Góra Kopaczowa	3 670 m
Jaskinia Kozia	Tatra Mts., Kozi Grzbiet	3 470 m
Jaskinia Kasprowa Niżna	Tatra Mts., Dolina Kasprowa	3 100 m
System Pawlikowskiego (Jaskinia Mylna — Obłazkowa — Raptawicka)	Tatra Mts, Dolina Kościeliska	2 404 m
Szczelina Chochołowska	Tatra Mts., Dolina Chochołowska	2 320 m
Jaskinia Wiślańska	Beskid Śląski Mts., Dolina Malinka	2 275 m
Jaskinia Miecharska	Beskid Śląski Mts., Dolina Malinka	1 838 m
Jaskinia Bystrej	Tatra Mts., Dolina Bystrej	1 480 m
Siwy Kocioł	Tatra Mts., Dolina Małej Łąki	1 318 m
Jaskinia Magurska	Tatra Mts., Dolina Jaworzynki	1 285 m
Jaskinia Naciekowa	Tatra Mts., Dolina Kościeliska	1 210 m
Jaskinia w Trzech Kopcach	Beskid Śląski Mts., Trzy Kopce	1 250 m
Jaskinia Pajęcza	Świętokrzyskie Mts., Góra Kopaczowa	1 183 m

#### Silesian Upland (Wyżyna Śląska)

This area of more than 3900 km² is built mainly of Middle Triassic carbonates. More than 66 caves are known there. They are rather small, only one of them exceeds 100 m in length (Jaskinia w Diablej Górze, 107 m long). Most of the caves were opened during quarrying. Some of them were afterwards destroyed by exploitation. A few caves were discovered during zinc-lead ores mining in the Olkusz area to the north-west of Kraków. These caves are developed in Middle Triassic ore-bearing dolomites. One small cave is developed in Holocene tufa.

#### Świętokrzyskie Mts (Góry Świętokrzyskie)

Chelosiowa Jama is developed in Devonian limestone; it is 3670 m long. Another long cave, Jaskinia Pajęcza, with the length of about 1000 m, is located very close to the first one. Although, Chelosiowa occupies the eleventh place on the list of the longest Polish caves, the other 135 caves occurring in this area are rather small. The caves in the Świętokrzyskie Mts developed mainly in Devonian limestones, only subordinately in Jurassic limestone. The best known one is Raj (Paradise), famous for its speleothems. This cave is open for tourists and illuminated.

#### Nida river basin (Niecka Nidziańska)

This is the only area of non-carbonate karst in Poland. Almost all of 117 caves situated in this region are developed in Miocene deposits, mainly in gypsum and only subor-

dinately in kalkarenites, many near the groundwater level. The longest is Jaskinia Skorocicka (350 m).

# The Sudetes (Sudety)

Most of karst caves in the Sudetes are developed in Precambrian and Palaeozoic marbles. Apart from them some karst caves are situated in Permian limestones. Other caves, these of non-karstic origin, occur in granites and sandstones. More than 180 caves are known from the Sudetes. The famous one is Niedźwiedzia Cave. New galleries and shafts were discovered by cavers in 2012. The total length of new series reaches 1797 m. Niedźwiedzia Cave is the longest (4100 m) and the deepest (vertical extent 118 m) in the Sudetes. Its upper part is open for tourists. Some of the caves in the Sudetes are situated in a big, still active quarry in Wojcieszów. The access to these caves is strongly prohibited. Some caves have been destructed by quarrying (due to quarry works more than 14 m of passages have been destroyed), whereas entrances to others have been blocked with rubble.

#### Other caves in Poland

Some caves in Poland are situated outside the above characterized regions. Some of them are developed in locally lithified Pleistocene sands in northern Poland. Jaskinia w Mechowie (Cave in Mechowo) near Gdańsk, is the longest one (61 m). Other small caves, which are probably exhumed fossil karstic forms, are known from Jurassic limestone quarries near Inowrocław in central Poland. A few caves were discovered during mining of rock salt. The most famous of them are small caves in the Wieliczka salt mine (south-

east of Kraków), named Kryształowe Groty (Crystal Caverns) after the giant halite crystals lining their walls. Other similar caves developed in Permian rock-salt occurred near Inowrocław. Unfortunately they were flooded after the end of rock-salt mining. A few small caves were also surveyed in Miocene limestones of the Roztocze Upland.

#### References

The morphometric data on caves mentioned in above were derived from many sources. Some of them have already been published in the 32 volumes of the inventory of Polish caves published by Polskie Towarzystwo Przyjaciół Nauk o Ziemi (Polish Society of Earth Science Fellows) and edited mainly by J. Grodzicki. This data are also available on the Polish Geological Instutute website: http://geoportal.pgi.gov.pl/portal/page/portal/jaskinie\_polski and http://www.jaskinie.m3.net.pl/.

The inventory covers the caves situated in most of the above mentioned regions. The following publications were also used: A. Amirowicz, J. Baryła, K. Dziubek & M. Gradziński (1995) on caves in the Pieniny National Park, M. Gradziński & M. Szelerewicz (2004), several volumes of inventory of caves in the Ojców National Park in the Kraków-Wieluń Upland. Many current data has been published in quarterly journal "Jaskinie" as well as on Epimenides Cave Page - www.sktj.pl/ epimenides/index\_d.html and on Krakowski Klub Taternictwa Jaskiniowego page – www. kktj.pl. The geological data on distribution of karst features in Poland is based on the articles by J. Głazek, T. Dabrowski & R. Gradziński (1972), as well as by J. Głazek, R. Gradziński & M. Pulina (1982). □



Raptawicka Cave. Photo Jakub Nowak

# Caving in Poland

#### Ditta Kicińska

In Poland there are 28 caving clubs, associated in the Polish Mountaineering Association (PMA, Polski Związek Alpinizmu). According to a decades-long tradition, Polish caving is connected with alpinism, therefore PMA brings together climbers, mountaineers (including Himalayan explorers), cavers, rock climbers, ski mountaineers and canyoning enthusiasts.

The Polish Mountaineering Association is a founding member of Union Internationale des Associations d'Alpinisme (UIAA) and member of Union Internationale de Speleologie (UIS), the International Federation of Sport Climbing (IFSC), the International Ski Mountaineering Federation (ISMF) and the European Speleological Federation (FSE).

PMA is represented by a management board, elected every three years by the representatives of all the clubs. The role of PMA is mostly the one of representation. It decides on general rules of any sport activities in the Polish mountains, supervises training courses and takes care of safety regulations. PMA has some financial means and sometimes does support projects, such as expeditions, trainings and editorial activities.

There are more than 6758 members of this organization and among them 1187 people cave. Caving community is represented in the PMA by the Caving Committee (Komisja Taternictwa Jaskiniowego). The main goals of the committee are: representing Polish cavers in national institutions/organization (e.g. UIS, FSE, Ministry of Sport and Tourism, national parks authorities), overseeing basic cave training, carrying qualifications for becoming a caving instructor, organizing countrylevel trainings in rescuing and surveying, supporting Polish exploration expeditions abroad and promoting the cave protection. In 2014 non-profit Cave Rescue Group (Grupa Ratownictwa Jaskiniowego, GRJ) was set up, as a part of the Caving Committee of PZA.

The vast majority of cavers associated in PMA completed basic cave training (which ends with an examination), after which obtained a caving license (*Karta Taternika Jaskiniowego*). This course includes an extensive SRT training (with emphasis on re-belays),

rigging in presence of permanent anchors (knots, Y-rigs, deviations, traverses, climbs), visiting at least eight caves, including four vertical caves in mountainous areas (typically at least one with the depth of 250 m ascended using SRT), basics of self-rescue and elementary first aid, basics of cave protection, elements of geology and karst science as well as elements of winter/avalanche specific behavior. Detailed information can be found on the Caving Committee website: http://pza.org. pl/jaskinie, available also in English. Due to safety reasons, KTJ encourages our foreign partners issuing caving permits to ask their applicants coming from Poland for scans of their "Karta Taternika Jaskiniowego" or to verify that their name is on the official list of certified PMA caving instructors. This naturally concerns technically difficult caves.

Most caves in Poland are situated in either national parks or protected landscape areas, so cave exploration and visiting are possible only with permits from respective authorities (the Tatra National Park, nature reserves in the Cracow – Częstochowa Upland). Outside the protected areas, caves in Poland can be visited without any permits. Few caves are the private properties, in such cases, the visit requires consent of the owner.

In the Tatra National Park scientists conducting research under the auspices of scientific institutions can apply for relevant permits. Permits concerning research are seasonal and limited to particular caves or cave areas. For caving, non-commercial trips to one of the available 25 caves in the Tatra Mts can be legally organized through one of the clubs associated in PMA. Every cave trip

has to be registered in the National Park in advance, via their web site. In order to register foreigners, the club has to provide a caving instructor to take care of the group and confirm that he takes the responsibility for the visitors' actions. To visit the caves for other purposes or in other protected areas, an individual permit from the Park authorities is required.

In the last four years, Polish clubs have been organizing over dozen exploration expeditions (Austria, Spain, Slovenia, Montenegro, Albania, Turkey, Abkhazia, China). We also participate in exploration conducted conducted by national expeditions of other countries and international groups (Mexico, China, Austria, Romania). Most of them are organized under the auspices of PMA and are partially subsidized from PMA funds.

Every year the national competition in caving techniques is organized in Wojcieszów. There is also a post-expedition meeting of the majority of active Polish cavers where the exploration achievements of the year are presented (Speleokonfrontacje in Podlesice). In 2017, the 1st Nationwide Forum of Speleo (I Ogólnopolskie Forum Speleo) was organized. During three days of the Forum, over 130 cavers engaged in meetings, workshops, lectures about exploration, cave rescue, caving techniques, cartography, cave and karst geology and other topics.

The Caving Committee of PMA in cooperation with the Tatra National Park conducted a detailed natural inventory of selected caves in the Tatra Mts, both available and unavailable for caving. Independently, for many years the Caving Commission of PMA and the caving clubs regularly cleaned the Tatra caves.

Besides the PMA, which is oriented more on caving rather than cave science, a Speleological Section exists under the auspices of Polish Naturalists Society (Sekcja Speleologiczna Polskiego Towarzystwa Przyrodników). Its members are not only scientists researching karst and speleological problems, but also all people interested in this subject.



→ Excursion to Chelosiowa Jama Cave. Photo Marcin Słowik ↓ Participants of the 1st Nationwide Forum of Speleo. Photo Marcin Słowik



# Addresses of the Polish caving organizations

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# Cave rescue in Poland - GRJ

#### Ewelina Raczyńska

For years, cave rescue operations in Poland have been carried out by two non-profit organizations: Tatra Volunteer Search and Rescue (in the Tatra Mts) and Mountain Volunteer Search and Rescue (in other parts of Poland).

In October 2014, there emerged a third group, also a non-profit organization, namely the Cave Rescue Group (Polish: Grupa Ratownictwa Jaskiniowego, GRJ), established by the Polish Caving Committee of the Polish Mountaineering Association. Members of the GRJ recruit from the most experienced Polish

cavers, and among more than 45 of them there are e.g. cave divers, paramedics, and physicians. Although many of them have already proved their skills in real rescue actions, each GRJ member improves their skills by attending frequently held trainings, as well as standardization meetings, both in Poland and abroad. Prevention of cave accidents is an important part of the GRJ's mission, therefore the Group organizes workshops on proper and safe caving practices. More information can be found on the GRJ FB site: FB: https://pl-pl.facebook.com/gruparatownictwajaskiniowego. □



↑ Mock rescue action in cave. Photo GRJ archive







# Foundation and activeness

# of the Speleological Section of the Polish Copernicus Society of Naturalists and Speleological Symposia

Janusz Baryła

Speleological Section of the Polish Copernicus Society of Naturalists was founded in Cracow on 6 May 1964. That event was the culmination of initiatives and organizational activities conducted for about two years. But the idea of setting up a speleology organization in Poland (understood literally: speleion - cave, logos - knowledge, science) came up as early as December 1950. At that time Kazimierz Kowalski published in the 3rd journal of "Zeszyt Grotołaza" the article: "Speleology and cave tourism in Poland". The ideological foundations of cave activity were formulated for the first time. The author separated speleology - cave science connected with karst processes from cave tourism, recently known as alpine caving. For each of those branches of cave activity Kowalski proposed creation of separated formal organizational structures (It should be added that there was no formal cave organization in Poland at that time. The only one, informal and then illegal, was "Klub Grotołazów"). In the case of tourism and alpine caving that could have been, for example, the cave section of the Polish Tatra Society; and relating to speleology, the commission of the Polish Society of Naturalists, the Polish Geographical Society or any other scientific organization.

The first of those proposals was realized in 1953 when at the Tatra Climbing Committee of the Polish Tourist Association Board (the Polish Tatra Society ceased to exist at the end of 1950) the Sub-Commission of Tatra Caving was formed. The second one was realized after more than 10 years.

Efforts of focusing people connected with speleology in one organization were taken by Bronisław Wołoszyn from Kielce. Supported by Zbigniew Rubinowski, he managed to interest the then president of the Kielce Scientific Society. The society sent out a questionnaire to several dozen potentially interested people and having received several positive responses organized on 29.05-01.06.1963 in Saint Katherine and in Kielce a meeting called "Speleological Seminar of the First Polish Congress of Karst Scientists".

18 people participated in the meeting (listed in the order shown in the photo, from left to right): Stefan Zwoliński, Bronisław Goch, Zbigniew Rubinowski, Kazimierz Kowalski, Hanna Majchert-Wójcik, Monika Błaszak, Andrzej Walczowski, Tadeusz Dąbrowski, Edmund Massalski (president of the Kielce Scientific Society), Józef Bażyński, Anna Marchlewska-Koj, Zbigniew Mossoczy, Ryszard Gradziński, Janusz Rabek, Bernard



Participants of "Speleological Seminar of the First Polish Congress of Karst Scientists".

Photo Bronisław W. Wołoszyn

Koisar, Bronisław W. Wołoszyn, Jan Rudnicki, Andrzej Skalski and (absent in the photo) Zbigniew Wójcik, who probably made the photo.

During the meeting 14 papers were delivered, participants visited karst areas and caves near Łagów, Kadzielnia and Skorocice. At the final meeting in Kielce the agreement was reached on the need of taking activities leading to form a Polish speleological organization. In order to implement this proposal, a special organizational committee was formed, composed of: K. Kowalski, R. Gradziński, Z. Mossoczy, Z. Rubinowski, B.W. Wołoszyn and S. Zwoliński.

After recognizing the organizational possibilities and necessary arrangements, the committee convened on 06.05.1964 in Cracow an organizational meeting of all interested people. At that meeting the Speleological Section of the Polish Copernicus Society of Naturalists was established.

Participants and founding members of the Speleological Section were (in order of the attendance list): Kazimierz Maślankiewicz (Cracow, president of the Polish Copernicus Society of Naturalists Board), Kazimierz Kowalski, Janusz Kozłowski (Cracow), Stefan Zwoliński (Zakopane), Włodzimierz Starzecki (Cracow), Hanna Majchert-Wójcik (Warsaw), Wiesław Maczek (Cracow), Ryszard Gradziński (Cracow), Maria Drzał (Cracow), Krystyna Oleksynowa (Cracow), Jerzy Pokorny (Cracow), Kazimierz Klimek (Cracow), Stanisław Wójcik (Zakopane), Maciej Lewandowski (Cracow), Ewa Lewandowska (Cracow), Janusz Rabek (Wrocław), Bronisław W. Wołoszyn (Wroclaw), Wacław Szymczakowski (Cracow), Marian Pulina (Wroclaw),

Wincenty Harmata (Cracow), Janusz Wojtusiak (Cracow), Wojciech Staręga (Warsaw), Cezary Dziadosz (Warsaw), Janusz Baryła (Cracow) and Jan Rudnicki i Zbigniew Wójcik (both from Warsaw), who submitted written submissions.

At the meeting a temporary management board of the Polish Copernicus Society of Naturalists was appointed and composed of: K. Kowalski - chairman, R. Gradziński - secretary, J. Pokorny, J. Rudnicki, B.W. Wołoszyn, Z. Wójcik i S. Zwoliński - members. It was also established that the main form of activity of the Section will be organization of annual speleological symposia including lectures and field trips. Since the 29th Speleological Symposium (1995) paper materials have been published. Earlier the materials had appeared sporadically. Also several other publications have appeared as a result of the Section activity. Another aspect of the Section have been the animation of work of the Award and Maria Markowicz's Medal Committee.

#### Speleological Symposia

The first symposium in 1963 was organized and realized by the Kielce Scientific Society. The next symposia have been organized by the Speleological Section of the Polish Copernicus Society of Naturalists, usually in cooperation with people representing many scientific institutes, national and landscape parks, and caving clubs as well. In several cases the Slovak institutions and once – the Czech ones have participated in organization. □

The text was published in Polish in Proceedings of the 50th Speleological Symposium in Checiny (2016).

# Exploration in Poland 2012–2016

Jakub Nowak

Kraków-Częstochowa Upland region (called "Jura") in central Poland is our biggest karst area. There are as many 2261 caves, most of which are small. Recently the following new caves and passages were found in this area:

#### 2012

- Gravitational cave named Rysia (length of 510 m; depth of 49.5 m)
- Spełnionych Marzeń Cave (length of 200 m)

#### 2013

 Dziura w Dąbrowie Cave (length of 165 m) was discovered in a small sinkhole

#### 2014

- a gravitational cave, Między Sosnami (length of 140 m), was surveyed
- W Mącznej Skale Duża Cave (length of 120 m ) was explored

#### 2015

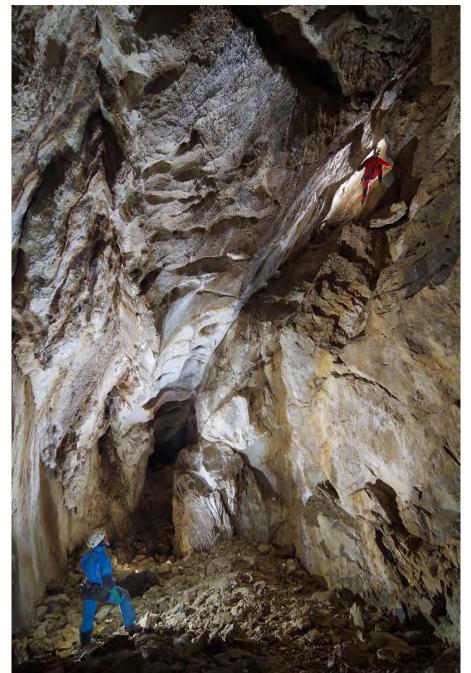
exploration in Twardowskiego Cave, one
of the longest cave in the area, was resumed making it over 600 meters in
length

#### 2016

Bezsenna Cave (length of 130 m) was discovered

Recently, the biggest increases in discovered cave length have occurred in another large Polish karst area, the Tatra Mountains where there are 868 known caves. The total length of these caves exceeds 133.5 km. There are at least 19 caves deeper than 100 m and at least 67 longer that 100 m. The deepest and the longest cave is the Wielka Śnieżna Cave System with a vertical extent of 824 m and a length of about 23.7 km.

- Czarna Cave: one of the most popular caves in the Tatra Mts. In 2012-2015 exploration and survey of side passages was completed. This exploration brought the cave to 7.25 km in length.
- Siwy Kocioł Cave: thanks to very systematic work within this new cave, its present length is 1.3 km.
- Śnieżna Studnia Cave: a hard, climbing work was was done in there and now this cave has 13.2 km of surveyed passages.





Czarna Cave. Photo Jakub Nowak







Śnieżna Studnia Cave boasts the highest chimney in Poland, 132 m high.

- **Kasprowa Niżnia Cave:** in spite of the a very difficult sump series, regular exploration in the last sump (2013-2016) has made this cave 3.1 km long.
- Mylna, Obłazkowa and Raptawicka caves were connected in 2015. They are long known tourist caves. The new 2.4 km long system with seven entrances was named the Pawlikowski Cave system
- **Jedrusiowe Dziury caves:** two small caves connected together formed a 419 m system.
- Mysia and Pod Raptawica caves were connected together as to form a 240 m long system with seven entrances.

There are several more, a little bit smaller areas besides the ones mentioned above. Among the most interesting discoveries in these regions there is a newly discovered cave called W Wiśniówkach Cave (342 m) in the Niecka Nidziańska area and Salmopolska Cave in the Carpathian area (Karpaty Fliszowe), with the length exceeding 1 km after recent exploration.  $\square$ 

# Hranicka Propast

### - step beyond 400 metres 1997-2016

Ilona Łęcka and Krzysztof Starnawski

Germany Poland

Czech Republic

Slovakia

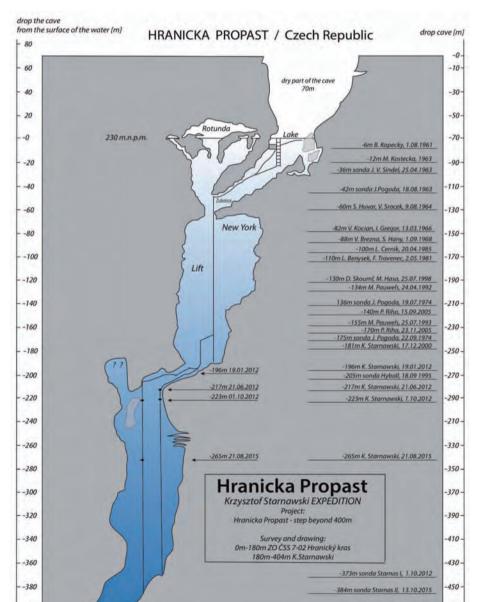
Hranicka Propast is a limestone underwater cave, with high content of carbon dioxide in water. Exploration was initiated by Czech speleologist B. Kopecky in 1961, who performed first documented diving. Up to 1997, Czech speleologists were increasing its depth by diving and lowering probes, having measured first 200 m. Additionally, they discovered a small side corridor, crowned with dry chamber called Rotunda.

The cave is situated in the suburbs of Hranice city, Morawy District, eastern Czech Repub-

lic, inside Hurka u Hranic National Park. Its dry part is a steep limestone crater, 69 m long. The submerged part commences with a small lake. Carbonaceous acid is dissolved in water with unusually high concentration. Carbon dioxide is bubbling at the surface. The crater remains a tourist attraction and it is surrounded by fence to prevent accidental falls. For safety reasons, an official permission to perform diving is required and enforced by fine.

First expedition led by Krzysztof Starnawski took place in 1997. Starnawski dived to 88

m, reaching the first restriction, but then he retreated due to lack of equipment. The same season, he dived to 131 m. Then, he returned two years later, passing the restriction and reaching a vast chamber, called New York. The name probably stands in connotation with the city of New York, called "A Big Apple". Starnawski finally reached –181 m, which was officially considered a record in Polish cave diving. He also lowered probes, reaching –200 m. According to geological analysis, the cave might be 1 kilometer or more deep, but





Hranicka Propast – preparations. Photo Krzysztof Starnawski



Krzysztof Starnawski in the cave. Photo Krzysztof Starnawski

-400

404m 27.09.2016

404m ROV GralMarine, 27.09.2016

-470-



there was a narrow restriction at 196 m, therefore the probes could not reach any deeper. The diving was performed using open circuit breathing apparatus, therefore many breathing mixture tanks were to be deposited and used whilst diving. The bottom time had to be strictly limited. Starnawski was not satisfied with the results of his project, so he decided to develop his skills in using closed – circuit rebreather. In 2011 he engineered self – invented dual rebreather and he performed test dives in Blue Abyss, Red Sea, descending

Dry part of Hranicka Propast. Photo Krzysztof Starnawski

to –283 m. This accomplishment still remains world record in closed – circuit diving.

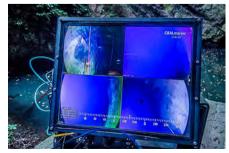
In 2012, fourth expedition led by Starnawski took place. Starnawski passed a narrow restriction at –196 m, called Maciejka, reached –223 m and lowered probes that measured 373 m of depth. It was only 19 m less than the depth of Pozzo Del Merro, an Italian cave back then considered the deepest underwater cave in the world. Therefore, the decision was made to continue the exploration. The project 'Hranicka Propast – step beyond 400 metres'

met enthusiastic approach and a scientific grant from National Geographic. Starnawski asked Bartłomiej Grynda from GralMarine company to engineer a ROV (remotely operated vehicle). The robot was to be lowered to -300 m to examine and measure the second chamber. In 2014, Starnawski's team launched the robot, but the attempt failed due to multiple technical issues of the machine. One year later, Starnawski arranged another expedition, dived to 265 m and discovered that there had been a collapse in the cave, which closed the restriction at -196 m. At the same time, another passage had opened, which turned out to be larger than the previous one and more likely for ROV to pass through it. Yet, the machine reached -180 m and had to be retreated due to engine malfunction.

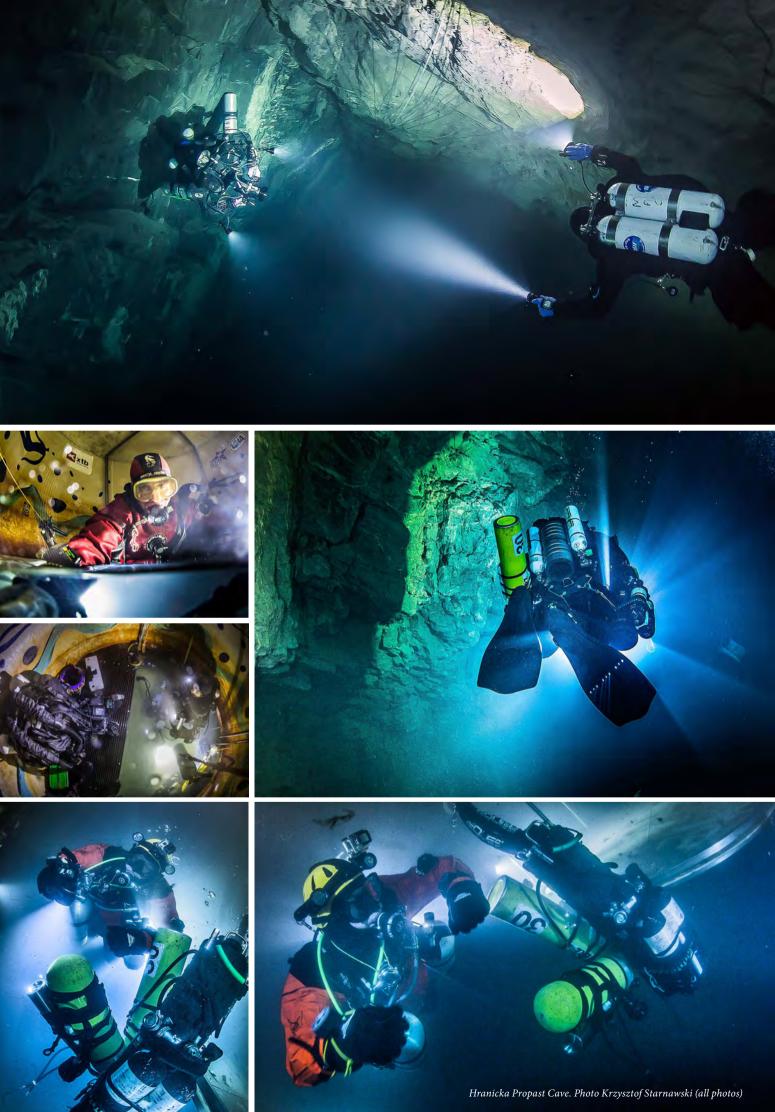
The expedition scheduled for 27th September 2016 was meant to be training event. Starnawski dived to 200 m and fixed ropes, so the machine could be easily navigated and led through the restriction. Then, he

performed decompression, ROV was launched when Starnawski returned to the surface, so he could navigate the machine and advise its operator, Bartek Grynda. ROV passed the restriction and reached -404 m. The view from the cameras showed clearly, that there was a steep corridor below 404 m, filled with loose rocks, mud and trunks. The machine was unable to continue descent, as the optical fiber was too short. Should ROV have got cluttered in trunks, there would have been no chance releasing it. Therefore, Starnawski decided to turn the machine back. After all, it got tangled in the fiber in Maciejka area (at 196 m) and still remains there to be released in near future. Nevertheless, the 'Hranicka Propast step beyond 400 meters' project has been successful in proving that that Hranicka Propast is the deepest underwater cave in the world with its documented depth of -404 metres.

Krzysztof Starnawski performed dozens of diving actions in Hranicka Propast, descending to −200 m or beyond 14 times. More than a hundred people have been involved in exploration throughout the years; those were: Czech and Polish divers, Tatra Mountain Rescue Service members, equipment manufacturers and engineers. □



Video from the ROV. Photo Krzysztof Starnawski



# Viroit Cave

#### Krzysztof Starnawski and Ditta Kicińska



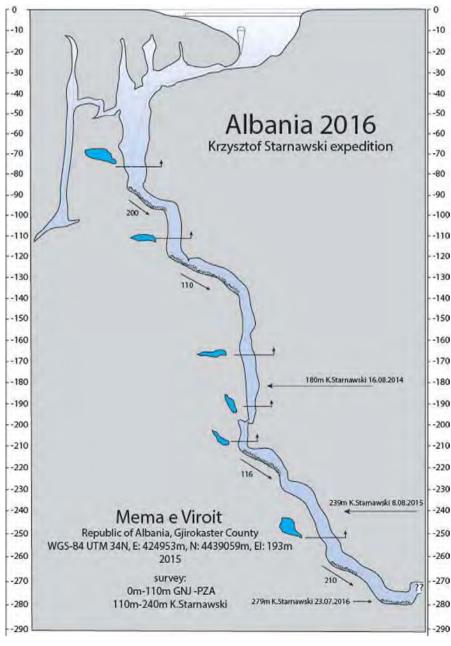
Viroit Cave is the deepest submerged cave in Albania. The cave is situated in the neighbourhood of Gjirokaster city, in the southern part of Albania. In the 90's, it was a water source for agricultural purposes. Nowadays, changes in infrastructure development have taken place. There is a recreational park for local people.

Since 1997 exploration of this area have been conducted by cavers from Great Britain, France, Italy and Greece. First Polish expeditions were organized in 2009 and continued in 2010 and 2013. In 2014 Cave Divers Group (in Polish: Grupa Nurków Jaskiniowych, GNJ) led by Dariusz Lermer have dived in Viroit, Petranik, Skotini cave and others. During that expedition Krzysztof Starnawski dived to 184 m in Viroit Cave. In 2015 Adam Pawlik and Krzysztof Starnawski dived in the cave and reached the depth of 201 m and 239.2 m, respectively. The most spectacular discovery was made by Krzysztof Starnawski in 2016 who dived to 278 m and broke the world record in cave diving with a closed circuit (CCR). The water temperature in Viroit Cave was only 9 degrees and visibility was 50 m. Diving in the cave is possible for two months in a year because of the strong current. The record dive took Krzysztof Starnawski 7 hours. He used selfinvented dual rebreather, underwater scooter, specialized lighting and decompress habitat because of the cold water.  $\square$ 



Krzysztof Starnawski in Viroit Cave. Photo Krzysztof Starnawski





# Hagengebirge, Austria

### - Interessante Höhle

Marek Wierzbowski

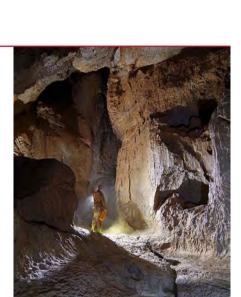
Hagengebirge is a mountain range of the Berchtesgaden Alps. It is located mainly in the Austrian Land Salzburg, and the western part of the Bavarian county called Berchtesgadener Land.

Hagengebirge has distinctive rectangular karst plateau located on the Salzburger side, covering an area roughly 24 of square kilometres. The national border between Germany and Austria runs from north to south through the mountain range. The steep west side of the Hagengebirge falls around 1700 m to the post-glacial lake Königssee. In the east, the Salzach Valley forms a deep dividing line to neighboring Tennengebirge massif. In the north and south, it is bounded by valleys and mountain ranges, Göll and Hochkönig respectively. Around 25 square kilometers of the Hagengebirge lies over 2000 meters. The highest peak reaches 2363 m a.s.l., and the valleys go as low as 500 m.

The Hagengebirge massif is built mostly from Triassic limestone called Dachsteinkalk which rests directly on underlying dolomite formation. There are over 500 known caves, most important ones being the 34 km long Tantalhöhle and 28 km long and over 1000 meter deep Jagerbrunntroghöhle. Both of them are located over the Blühnbach Valley, on the southern end of the mountain range. For caves of Alpine character they have vast passages and large horizontal extents. Both caves are examples of ancient horizontal flows from the time when the valley floor was much higher than it is today.

The initial exploration in Hagengebirge was done by cavers form a local club, Landesverein für Höhlenkunde in Salzburg; Polish cavers first visited Hagengebirge in 1977. The exploration lasted into the eighties and focused on the southern part of the range, mainly Jagerbrunntroghöhle Cave.

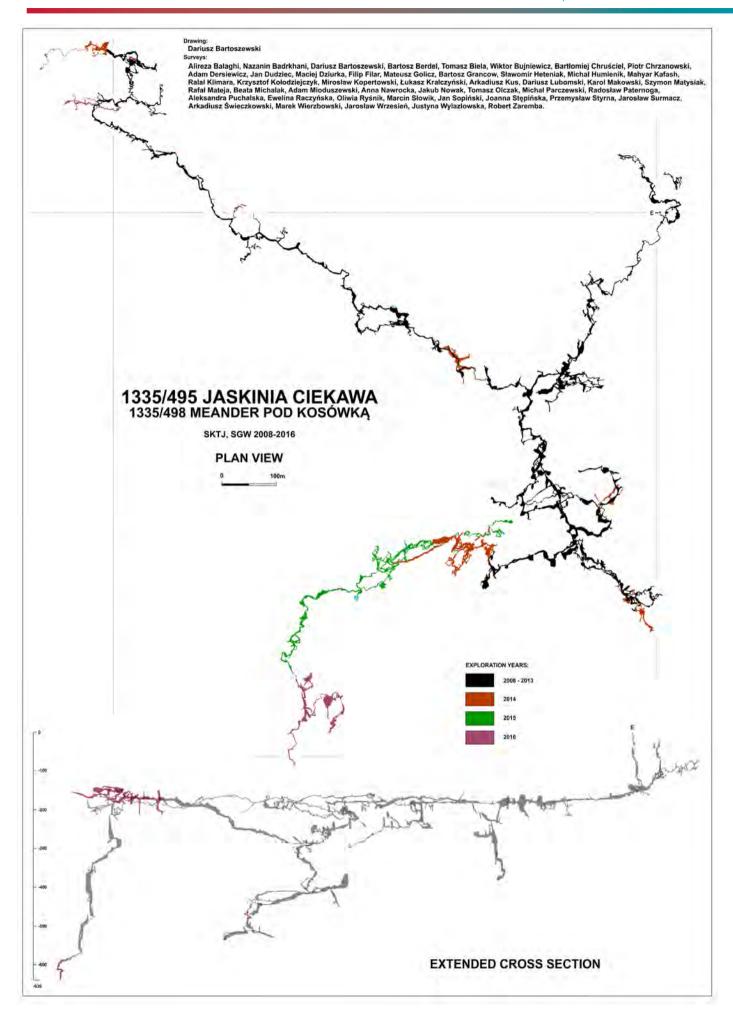
Our expedition arrived in the massif for the first time in 2002. From the start it was organized by caving clubs from two cities: Wrocław (Sekcja Grotołazów Wrocław) and Sopot (Sopocki Klub Taternictwa Jaskiniowego). Over the years we discovered many caves in the depth range of 100–250 m, but the first major discovery came in 2005 and



↑ Interessante Höhle – Sala z Wodospadem (Chamber with waterfall). Photo Jakub Nowak

↓ Interessante Höhle – Malina Meander. Photo Jakub Nowak





was named Höhle in Roten Steinen, after the red rocks surrounding the entrance. The cave reached a depth of 855 m and is a geologically young canyon with strong water flow.

In 2006 we discovered Interessante Höhle (Interesting Cave, in Polish: Jaskinia Ciekawa). The GPS waypoint was named "interesting", because the entrance shaft looked more like a clean washed canyon than a tectonic pit typical for the area. At the bottom we found a breakdown with some airflow which, after some work, lead us to a meander and a series of pits. The breakthrough came two years after discovery: after 170 m of descent we found ourselves in a vast horizontal passage, mostly very dry and old, probably formed around 5 million years ago.

The horizontal level is crossed in number of places by shafts with active streams. During first years the exploration went quickly, but as the size of the cave progressed, it naturally slowed down. In the western part of the cave, after a series of deep pits, connected by muddy and uncomfortable meanders, we reached the lowest point of the cave. The cave still has got serious potential in there, but both the time and effort required to reach the last pit places further exploration on the brink of reasonability and human endurance. For a number years we searched for another entrance, but the surface of the area in which such an entrance would be useful for us is severely destroyed by glaciers and erosion.

Due to the large horizontal extent of the cave, we also continue our work in its south-eastern part. The cave continues there, and as it goes towards the surface, we hope that another entrance might be



Interessante Höhle – Meander Zachodni (Western Meander).

Photo Jakuh Nowak

found in the future. There is also a number of shafts crossing the horizontal passages which still need to be checked. We already explored a number of them, finding sumps, most often not very deep. As for today, the cave is 19 032 m long and has a depth of 639 m.

We are thankful for all the help and support we received from our friends from Landesverein für Höhlenkunde in Salzburg over the years. □



Interessante Höhle – Splątany Meander (Tangled Meander). Photo Jakub Nowak



Interessante Höhle – Meander na -200 m (Meander at -200 m). Photo Jakub Nowak

# Hoher Göll

#### Mateusz Golicz



On hiking maps of the surroundings of Salzburg, Hoher Göll – the highest summit of an eponymous massif – seems an unimportant mountain, simply one of many Alpine peaks along the state border between Austria and Germany. Indeed, compared to the nearby Hagengebirge and Tennengebirge ranges, the Göll massif is very unassuming, at least on the surface of it. It consists essentially just of a single, 11-km long, steep ridge running from East to West. There are only a few marked hiking trails and the main tourist attraction on the mountain is probably the infamous Eagle's Nest, or Obersalzberg, the former mountain residence of Adolf Hitler.

However, the underground of Göll is much more impressive. Its geology is rather typical of the Northern Calcareous Alps, with Dachstein limestone of the Upper Triassic on top of Dachstein dolomite, as well as Wetterstein limestone, Ramsau dolomite series and Ramsau/Reifling limestone (Klappacher and Knapczyk, 1985). The already mentioned highest peak reaches 2522 m a.s.l. while the main resurgence, Schwarzbachfall, lies almost 2000 metres lower. All these facts imply favourable circumstances for development of vast cave systems beneath the surface. Encouraged by discoveries made by their Austrian colleagues, Polish cavers first visited the area in 1969 and since 1989 Göll has been thoroughly explored by at least one Polish expedition every summer.

The deepest cave we found so far - Unvollendeterschacht (1336/302; "The Unending Pit") - is 1264 m deep, 7 km long and connects to three other caves, forming the so-called Hochschartehöhlensystem. Reaching the terminal sump (which occurred in 2011) was our most important news in the previous issue of "Polish Caving" (2009-2013). Although we had left a few difficult leads in Unvollendenterschacht, since then we moved our expedition camp eastwards, intending to look again at a couple of questionmarks left by our Austrian colleagues in caves already known for many years. The location and surroundings of the latest camp are typical of the whole Göll's main ridge: very steep and difficult to access. Over 500 m of safety ropes are installed on the surface trail leading from the valley up to the camp.

Between 2013 and 2015 we directed much resources towards an unsuccessful attempt of connecting Gruberhornhöhle Cave (1336/29) with Hochschartehöhlensystem. According to surveys, these caves are 100 m apart from each other. Finding the connection would symbolically underline a link Austrian cavers that discovered and explored most of Gruberhornhöhle back in the sixties with Polish



Our current camp in Hoher Göll (under overhang, in the central part of the photograph).

Photo Mateusz Golicz

cavers that have discovered and explored Hochschartehöhlensystem more recently. Alas, despite re-rigging most of the cave and many underground trips to climb previously abandoned leads, our search yielded no results.



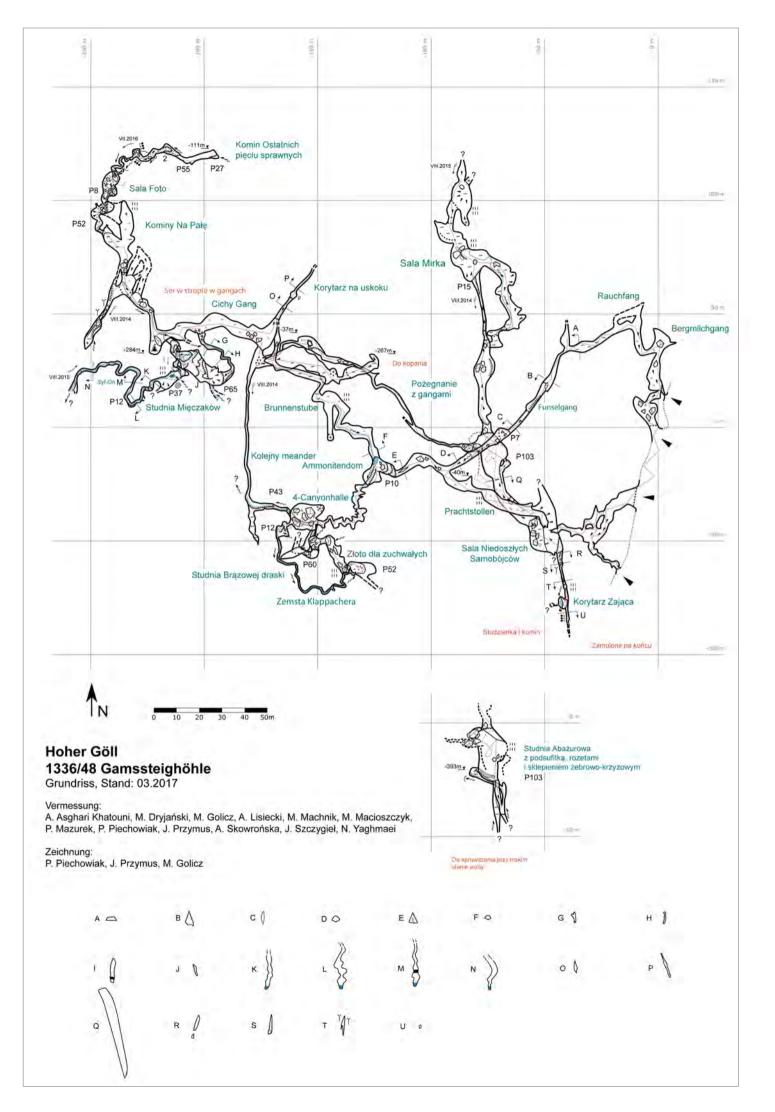
Recently, at the beginning of every expedition we supply the camp using a helicopter. Photo Mateusz Golicz



Camp life. Photo Mateusz Golicz

Currently the expeditions have been focusing on Gamssteighöhle Cave (1336/48), another one initially explored in 1960's by Austrian cavers. Our colleagues, even though seemingly more determined that we are now, did not have all the technical means available for cavers today, such as lightweight bolting kits or modern LED lamps. Gamssteighöhle is a good example that modern equipment allows cavers push the limits further. As left by the Austrian cavers in 1965, the cave was 756 m long and 110 m deep. Over the course of the latest four Polish expeditions (2013–2016), more than 1.9 km of new passages have been added. Also, the cave now boasts a depth of -444,5 m. There are still a couple of interesting leads that we will be targeting during the 2017 expedition.

The main obstacle in exploring the cave further is a series of tight meanders, the worst being the Klappacher's Rache (The Revenge of Klappacher), that we named after a prominent caver from Salzburg and one of Göll's original explorers. Walter Klappacher friendly advised us which question marks on the old cave maps we should check in the first place, probably (but not certainly!) unaware that one of them would lead us quickly to a 80 m long meander that takes 40 minutes to cross, even though no rope is necessary. This squeeze prompted us to set up an in-cave camp at -284 m in order to limit these tedious movements. Thanks to a telephone line, during the 2016 expedition we were able to keep the in-cave camp running for ten days non-stop, with



fresh teams bringing new supplies replacing tired cavers at the camp in a highly coordinated manner.

Right now most of our attention is devoted to bolt climbing a series of promising chimneys located close to the in-cave camp. Since 2015 we have managed to climb more than 120 meters and at least another 30 meters of climbing is required to reach the next ledge, which will let us see if we can find a horizontal continuation. Also, the lead in the deepest currently known point of the cave is simple to push, requiring merely rappelling down past subsequent cascades. However, these parts of cave are sensitive to weather conditions and we try to avoid exploration during heavy rainfalls, which are unfortunately a common occurrence during the Alpine summer.

→ The promising chimney in Gamssteighöhle.
Photo Mateusz Golicz
→ Our in-cave camp in Gamssteighöhle.
Photo Mateusz Golicz
↓ Top of P103, discovered in 2014
in Gamssteighöhle. Photo Mateusz Golicz





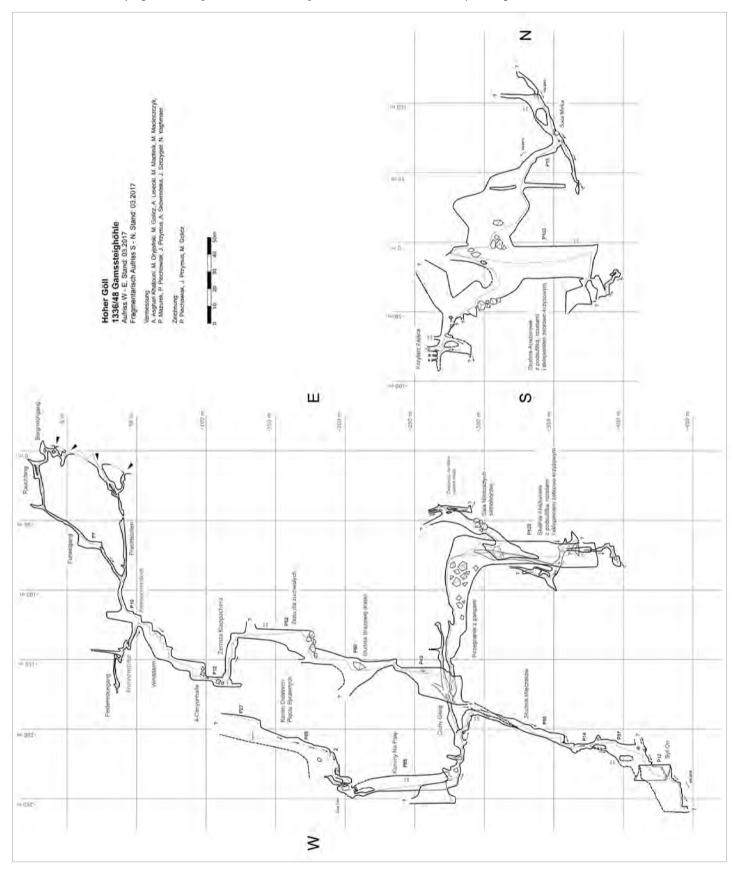




The Hoher Göll expedition is currently one of the least attended of all long term Polish cave exploration projects. This is partially due to the limited camp capacity, but also because of the difficult alpine terrain that excludes any form of "family" caving holidays. Non-cavers simply do not have much to do while staying at the camp, since

it is rather difficult to do any hiking in the vicinity without carrying a rope and/or an SRT kit.

Nevertheless, twenty three caves from seven different Polish caving associations participated (of course, some of them took part in all the expeditions) between 2013 and 2016. Our plans for near future are clearly defined: we intend to continue exploring Gamssteighöhle, while at the same time revisiting old "open problems" in other caves of the area. At the end, we would like to express our gratitude for all the formal and merit help we have received from our friends from Landesverein für Höhlenkunde in Salzburg. □





## Polish exploration in the

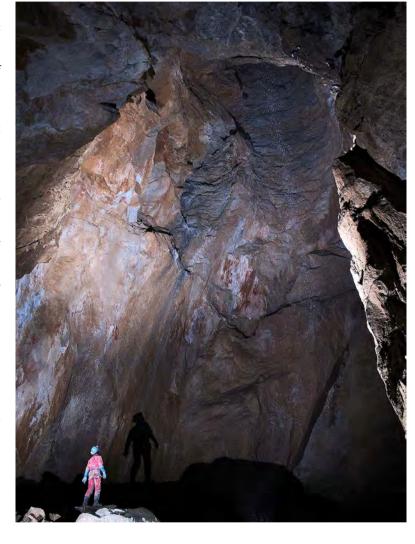
# Leoganger Steinberge massif

Andrzej Ciszewski and Michał Ciszewski

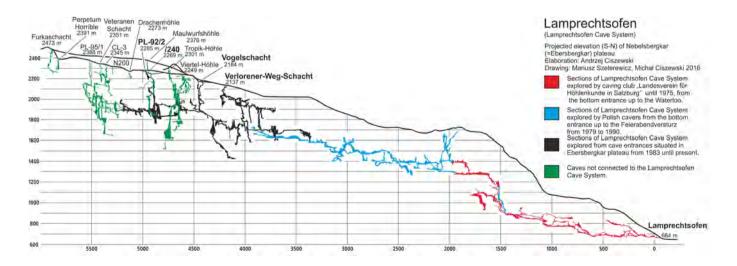
Exploration in the Leoganger Steinberge massif, located in the Salzburg Alps, Austria has been carried out by Polish teams for 44 years. As a result of the methodical exploration, the Lamprechtsofen Cave System became the deepest cave in the world in 1998. Vertical extent of the system reached 1632 m and its length exceeded 50 km after connection of PL-2 Cave. The title of the deepest cave in the world was taken by Krubera-Voronya Cave in 2001, but the Lamprechtsofen system still remains the largest cave traverse in the world, with seven entrances in total. Exploration of the system and searching for connection with other caves has not been finished.

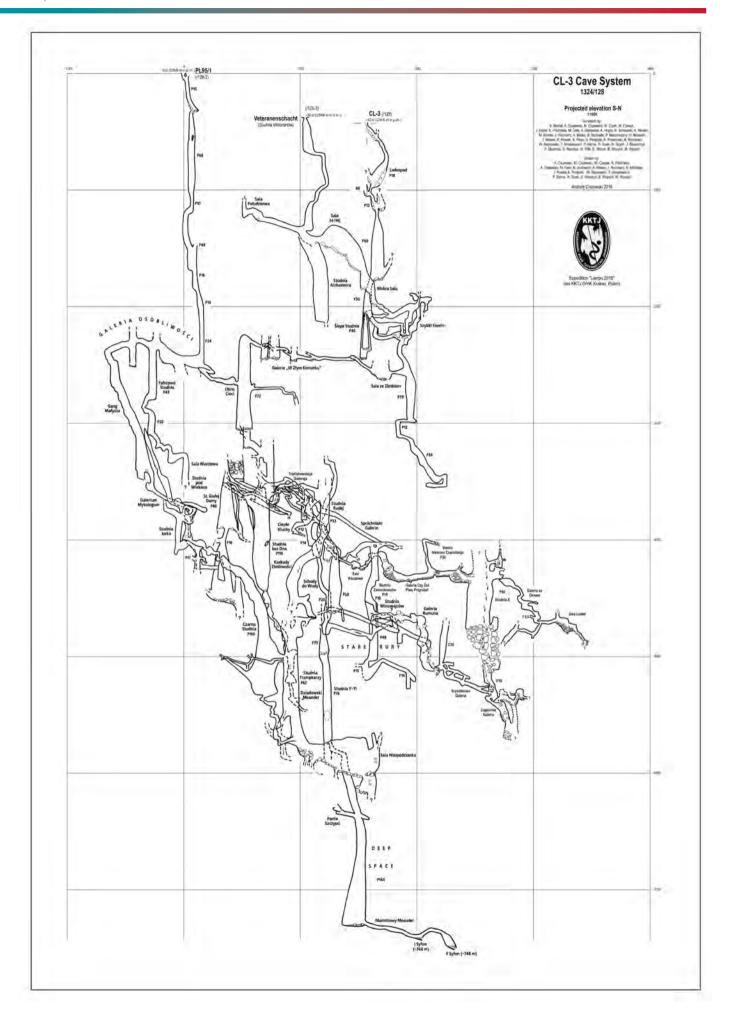
In the last few years, the expeditions have been focusing on caves located in the vicinity of PL-2 Cave, higher up in the deeply incised Nebelsbergkar Cirque. The highest entrance of the Lamprechtsofen Cave System is located at 2285 m a.s.l., on an extensive lapiez surrounded by a ridge culminating 200 m above and leading further to the highest peak in the massif, called Birnhorn (2634 m a.s.l.). Analysis of geologic setting suggests a possibility of increasing denivelation of the Lamprechtsofen Cave System by approximately 200 m. However, multiple intersecting faults that induced formation of many depressions complicate exploration above PL-2 Cave.

The most interesting cave is the CL-3 Cave System with the highest of its three entrances located 103 m above the highest entrance of the Lamprechtsofen System. Intensive exploration of the cave led to discovery of a multilevel system of passages with total length of 7816 m and depth of 748 m. In the northernmost parts of the cave, we managed to approach southern passages of Lamprechtsofen Cave System, where distance between these two caves is approximately 50 m, according to the survey data.



X Pit in the CL-3 Cave System. Photo Michał Ciszewski







The CL-3 Cave System – passage leading to the X Pit. Photo Michał Ciszewski



The CL-3 Cave System – entrance to the Zaginiona Galeria passage (Lost Gallery).

Photo Michał Ciszewski



Ice crystals in Drachenhöhle (Dragon's Cave).
Photo Michał Ciszewski

Exploration of the CL-3 Cave was very difficult due to large collapse zones and tectonic faults, leading to blockage or narrowing of passages found in the area. Nevertheless, there are many leads to explore during our next expeditions. The most important ones are located at the depth of 450 m and require very stable weather because of many streams and waterfalls present in the area.

Furkaschacht is the highest situated cave in the massif that could potentially connect with the Lamprechtsofen System. Its entrance is located at 2473 m a.s.l. on steep slopes of Birnhorn. Unfortunately, exploration of the 230 m deep cave with an open vertical lead has not been possible during the last few years because of ice plug that had formed at the depth of 50 m.

Caves located near the expedition camp, at 2300 m a.s.l. are mostly well explored. One of the caves, discovered in 2015 was connected with the Lamprechtsofen System as the seventh entrance but overall denivelation did not change.

In 2013, we started exploration of Drachenhöhle (Dragon's Cave), developed above southern verge of the Lamprechtsofen System and northern leads in the CL-3 Cave. Drachenhöhle Cave has developed on a structure of intersecting tectonic faults, therefore due to numerous collapse zones, exploration speed has been relatively slow. Yet, the cave can be regarded as interesting in context of connection with the Lamprechtsofen System and possibly with the CL-3 Cave as well.

To summarize achievements of the Polish exploration in the Leoganger Steinberge massif: 40 large expeditions and shorter trips have been organized, during which we have located over 600 entrances and surveyed 300 of them. Total length of the explored cave passages has reached 67 km.  $\square$ 

# Speleoklub Bobry in caves of Tennengebirge 2012–2016

Rajmund Kondratowicz

The annual expedition to Tennengebirge, Austria, is one of the flagship Polish exploration projects abroad, dating back to 1979. Every August between 2012 and 2016 a Polish team from Speleoklub Bobry from Żagań spent around three weeks rigging and surveying the underground of this alpine massif.

Our activities during the last five expeditions were focused mainly on investigating leads in Jack Daniel's Cave that we initially discovered in 2003. In 2012 we had a particularly successful summer. In northern parts of the cave, we managed to survey more than 1 km of new passages, including a 630 m long loop leading through Thresholds and WX series. Also, a climb in Alleluja chimney led us to a beautifully decorated gallery that we named Gallery Popodeszli.

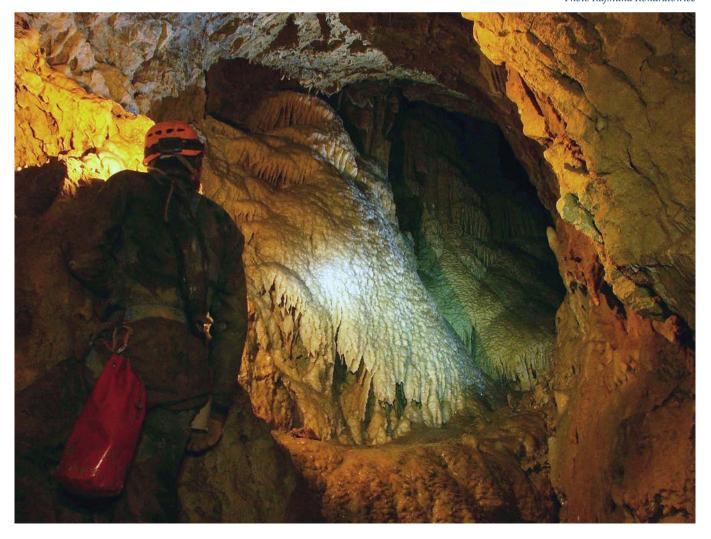
The next expeditions were not that fruitful, however every year we still managed to push the exploration further. In 2013 our team was very small, consisting of only 11 cavers, nevertheless we added another 700 m to the total cave length. After finishing surveying the northernmost part of the cave, we moved our underground camp somewhat closer to the cave entrance and carried on exploring Gallery Popodeszli and also some leads going off to the west from Capricorn Gallery. We also started a backbreaking effort to climb all the numerous chimneys that we so far question-marked on our cave map.

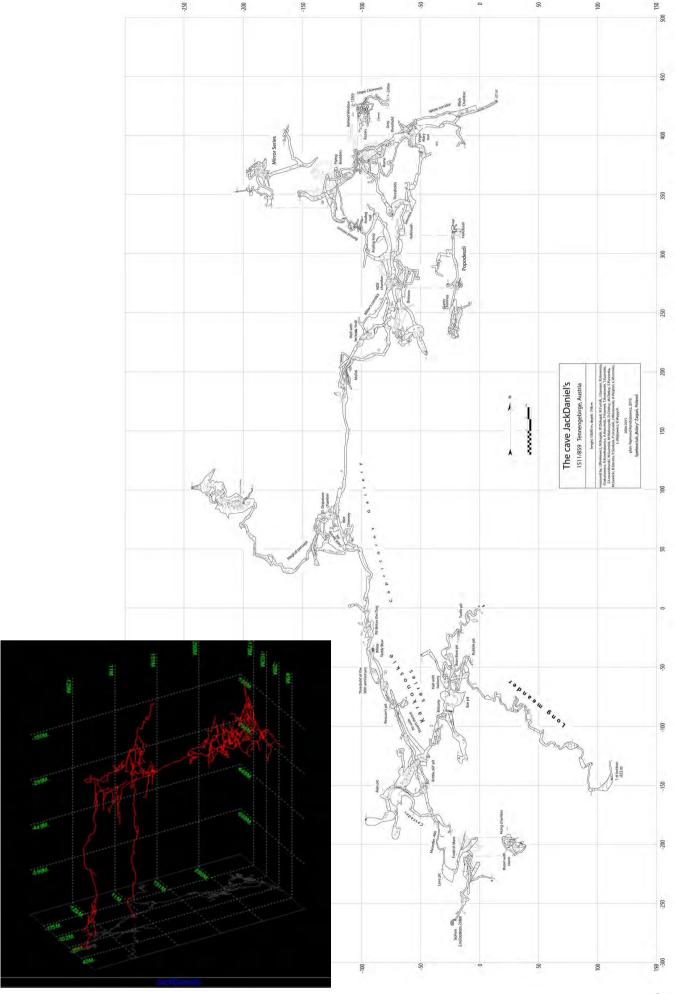
During the 2014 expedition we found the so far largest room of the cave. However, we only surveyed 200 m, as our exploration was suddenly interrupted by an accident. One of





↑ WX series in Jack Daniel's Cave. Photo Rajmund Kondratowicz ↓ Capricorns Gallery in Jack Daniel's Cave. Photo Rajmund Kondratowicz





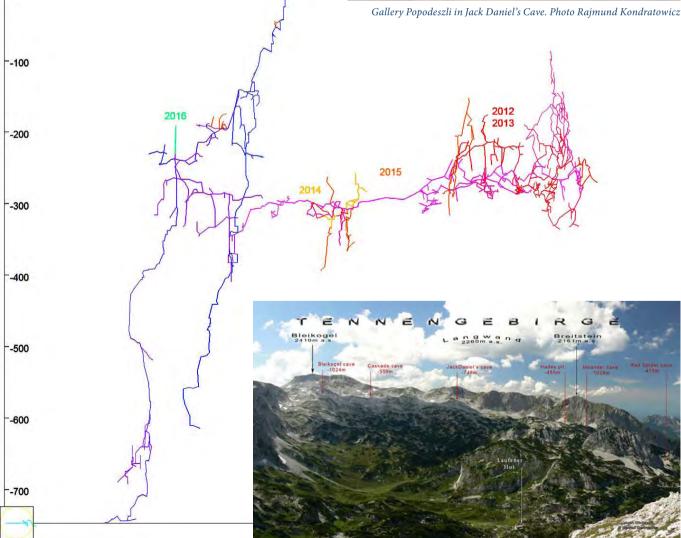
the team members fell from a six meter step located 280 m below the entrance. A complex cave rescue operation was initiated by other team members staying in the cave at the time, and then continued by Austrian and German cave rescue services, from federal states of Salzburg and Bavaria respectively. After 48 hours our colleague was successfully rescued and was treated for pelvis and rib fractures in a hospital in Salzburg.

Despite this unfortunate circumstance, a large number of cavers participated in the two most recent expeditions, in 2015 and 2016. These extended Jack Daniel's Cave by another 900 m, setting its length slightly above 10 km. The newest discoveries were made mainly in series to the west of Dripstone Chamber and while climbing Giant Chimney (in Polish: Komin Gigantów) and Rain Pit (in Polish: Studnia Deszczu). The latter is so far the largest pit in the whole cave, being now more than 150 m high.

Many other smaller caves were also explored throughout the mentioned expeditions. Particularly in 2016 we found sixteen new caves, totally measuring 633 m in length. One of them is very promising and will definitely be one of our main objectives for 2017. Also, during the 2015 expedition two large previously explored caves were visited: Red Spider (in Polish: Jaskinia Czerwony Pajak) and Under Snowy Caps (in Polish: Jaskinia Pod Śnieżnymi Korkami). We previously thought we finished exploring both of them, but it turned out that new discoveries could still be made.

In total, 44 cavers from 7 caving clubs participated in the project between 2012 and 2016, when the most recent 34th expedition took place. The recent efforts were led by Marcin Furtak (2012), Rajmund Kondratowicz (2013–2014) and Piotr Szukała (2015–2016). □





# Cave exploration in the

# Prokletije Mountains (Montenegro)



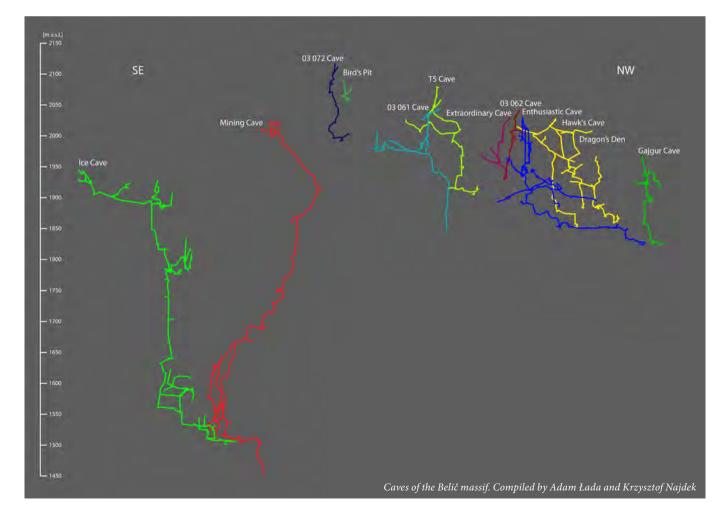
Krzysztof Najdek and Ditta Kicińska



The Prokletije Mountains (Northern Albanian Alps) are the highest mountain range of the Dinaric Alps. Since 2006 Polish expeditions have explored carbonate massifs, such as Karanfili-Vesirova Brada, Zastan Grbajski, Volušnica, Belič nad Kolata. In 2013–2017 activities of the project have been focused on the Belič nad Kolata massifs, which are located on

the border between Montenegro and Albania, Maja Kolata (2534 m a.s.l.) being the highest peak of Montenegro. The caves of these massifs are developed in Mesozoic limestones and dolomites which belong to the High Karst unit (Djokič at al., 1976). The cave systems are developed along tectonic discontinuities (NW-SE and NE-SW) or bedding planes.

In 2013–2017 four summer expeditions were organized by Wielkopolski Caving Club (Wielkopolski Klub Taternictwa Jaskiniowego, Poznań) in co-operation with a caving club from Kielce (Speleoklub Świętokrzyski), Akademski Speleosko-Alpinisticki Klub (Belgrad, Serbia) and Ponir Banja Luka caving club (Bosnia and Herzegovina). Participating





↑ Black Path Cave. Photo Adam Łada

cavers came from different clubs, both Polish and Balkan (Serbia, Bosnia and Herzegovina, Croatia and Bulgaria).

In the last four years exploration continued in caves known earlier (Mining Cave/Jaskinia Górnicza, Ice Cave/Ledena Pečina/Jaskinia Lodowa) and newly-discovered caves such as the 03 061-T5 Cave System, the Enthusiastic Cave System, Gajgur Cave, Black Path Cave/Jaskinia Czarny Szlak, 03 072 Cave and several smaller objects.

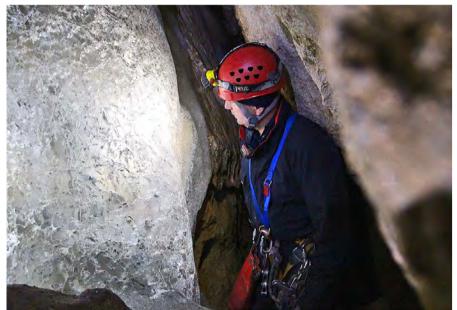
Mining Cave is the deepest cave of the Prokletije Mts in Montenegro (depth of –585 m, length of 2083 m). In the deepest part of the cave there are three bottoms, which are filled with sands and clays. In 2016 near the last explored bottom ("third bottom") a new passage was found, leading to an even deeper part of the cave. It is a vertical cave with only a few short parts which are horizontal. Mining Cave was found in 2010 and has been explored each year since then.

The Enthusiastic Cave System is the longest cave in the Prokletije Mts in Montenegro (depth of –225 m, length of 3098 m). The system consists of 4 caves: Enthusiastic/Entuzjastyczna, Extraordinary/Nadzwyczajna, Dragon's Den, 03 062 which were connected during the expeditions.

Black Path Cave was found in 2015 at the end of our stay in Montenegro. After exploration in 2016 the cave has a length of ca. 600 m and a depth of ca. 60 m. The entrance series is developed horizontally. The cave contains one of the biggest rooms discovered during all the expeditions. The chamber is 40 m wide and 80 m long, at the same time being over a dozen meters high.

03 061 and T5 caves were found in 2014 and connected in 2015. Both entrances are partly filled with snow. The system has a depth of 242 m and a length of 1131 m.

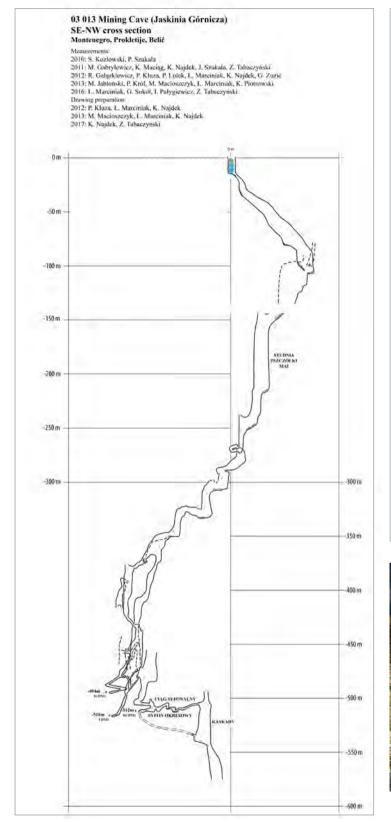
The cave expeditions in 2013–2017 surveyed ca. 7500 m of new passages. Exploration

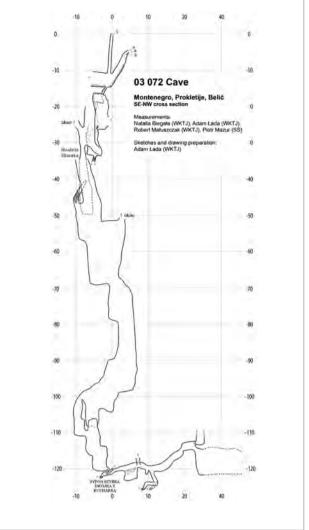


Ice in 03 061 Cave. Photo Marietta Milewska-Moult



Entrance of Enthusiastic Cave. Photo Marietta Milewska-Moult







During the search of new caves. Photo Adam Łada Kolata and Belič massif. Photo Adam Łada



is going to be continued in 2017. The deepest and the longest caves are listed in the table below.

The deepest and the longest caves of the Prokletije Mountains in Montenegro

Cave	Vertical extent	Length
Mining Cave/Górnicza Cave	585 m	2083 m
lce Cave/ Ledena Pečina/Jaskinia Lodowa	451 m	2057 m
Giant Cave/Jaskinia Gigant	306 m	1871 m
03 016-T5 Cave system	242 m	1131 m
Nibyczarna-Babina Sisa Cave system	236 m	1611 m
Kolektor-Łezka Cave system	235 m	776 m
Enthusiastic Cave system	225 m	3098 m
W Trzech Kopcach Cave	141 m	725 m
Ziemia Obiecana Cave	134 m	236 m
Wrota Budvy Cave	130 m	491 m

During the expeditions several dozen entrances were checked. A majority of them are terminated by blocks, snowy plugs or constrictions. A majority caves explored are simple systems of vertical shafts with short meanders connecting subsequent shafts. In some of them there are short subhorizontal conduits. The caves studied are relatively poor in speleothems.

In the Prokletije Mountains ice caves are present. Snow, firn and ice deposits were documented in Ice Cave/Ledena Pečina/Jaskinia Lodowa, Mining Cave/Jaskinia Górnicza, the 03 061–T5 (03 067) Cave System, Ice Giant Cave/Lodowy Gigant and other (www.prokletije.pl).

The exploration and scientific activities have been conducted in cooperation with the National Park of Prokletije and the Public Enterprise for National Parks of Montenegro.  $\Box$ 

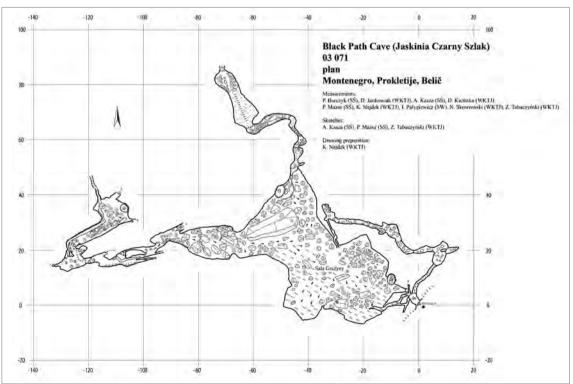




"Third bottom" in Mining Cave. Photo Zbigniew Tabaczyński



Entrance of 03 061 Cave. Photo Marietta Milewska-Moult



# Exploration in Maganik, Montenegro 2012–2016

Irek Królewicz

In July of 2012, a few members of Student's Caving Club in Cracow (AKG Kraków) visited Montenegro once again. Excursions in Maganik karst massif have been held by our Club regularly from 2007 (results of previous activity were published in Polish Caving 2005-2009).

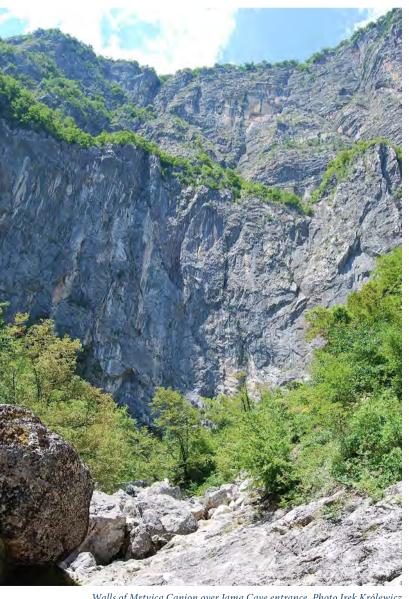
Our first point of interest was located in Mrtvica Canyon, the second largest canyon in Europe, 8 km long and sometimes up to 1100 m deep. We started with Jama Cave, whose entrance is usually one of the springs supplying Mrtvica River, but thanks to that year's drought, the water level had decreased enough to go deeper into the massif. Jama Cave has a horizontal structure and its spacious passages most probably form the last part of Maganik drainage system. Because of this there is a high risk of flash flooding, cutting off escape routes. We managed to explore the first 600 m of the cave. We were stopped by unfavourable weather



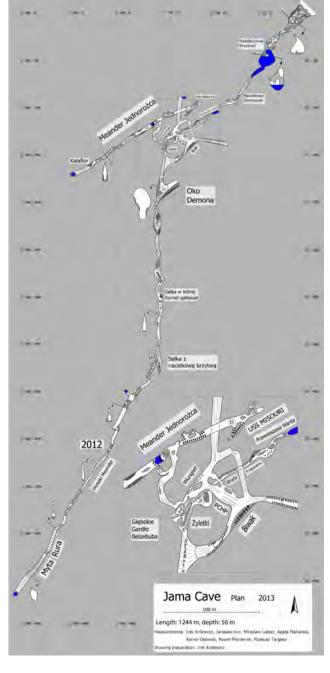
↑ Crew and Zoran Bulatovic with family. Photo Andrzej Dajek

↓ Crew and Branko Bulatovic with family. Photo Andrzej Dajek

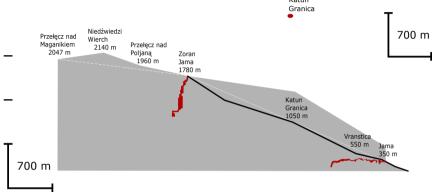


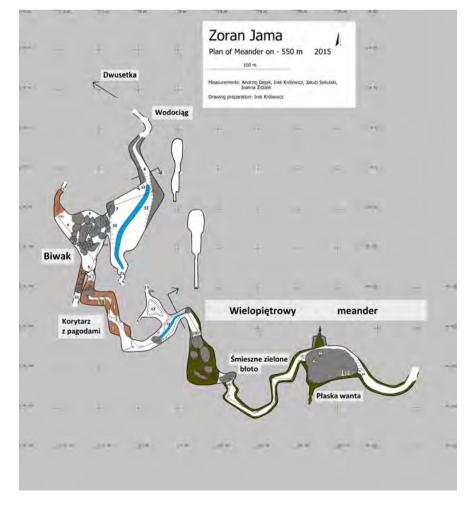


Walls of Mrtvica Canion over Jama Cave entrance. Photo Irek Królewicz









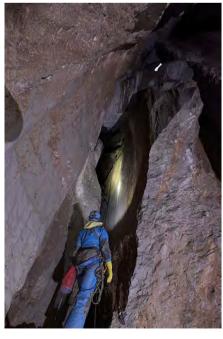
forecasts, but we are optimistic – the cave seems to be continuing with no end in sight.

#### 2013

This was the year we started working under a new name: Speleoclub Kras. A big surprise was awaiting us at the entrance to Jama Cave. Pieces of last year's ropes were lying on the rocks all around the place. Moreover, bolt hangers and carabiners had cut into each other by the continuous movement of ropes. Water really had to work hard on them during the spring ice melt. Happily, ropes on the most difficult parts survived, so we could easily get to the Demon's Eye passage (Oko Demona). But instead of main passage, we chose a narrower but still wide, side corridor. A good decision. We found the Meander of the Unicorn - high and spacious, with tremendous speleothems, formed parallel to the main corridor. I still remember those fragile, calcite rice fields as most beautiful I have ever seen. Unfortunately, it ends in sump pool (a wide one - nice for divers). History repeats itself in main passage.

#### 2014

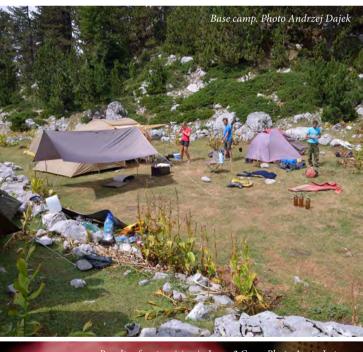
This year's target was M35 Cave, placed close to the edge of Mrtvica Canyon, positively verified two years ago. High expectations were placed on this hole. The entrance to M35 is located in a long crack, along with several others holes. Thanks to a frail window, it is possible to move from the entrance shaft to a neighbouring, parallel shaft with classic shape, several meters wide, almost 100 meters deep, ending in a passage with side continuations. Unfortunately, even the thinnest of ladies were unable to pass any of them. The disappointment was even bigger because of the perceptible draught blowing through this place. Paradoxically, the unresolved M35 Cave prob-



Anna under second well in Zoran Jama Cave. Photo Andrzej Dajek









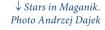
lem only increased the curiosity about this part of the massif. The cold air that could be noticed in these cracks indicates a large system of underground cavities.

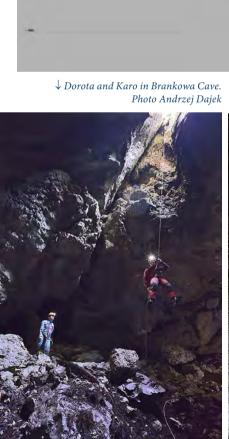
#### 2015

This year, we were set to explore Zoran Jama Cave below -500 m. We re-rigged the rope descent in Dwusetka shaft, so it would be far from any suddenly emerging waterfall. In a meander at -550 m, no more than 50 m further than the last-known point we found the very first place in this cave capable of hosting a camp - we had a place to hang hammocks. Walking in the meander is a continuous wandering between middle, often collapsed and wide but muddy, upper level. We managed to move on about 150 m, climbing three rock barriers on the way. The rope ran out, but the cave did just the opposite.

#### 2016

It was very pleasant for us to notice that our local friends were awaiting us. We installed new ropes in Dwusetka shaft and prepared for the underground bivouac at -550 m. Several metres before the place where we finished last year, I noticed a measurement tape lost during last year's tough surveying. When I climbed down for it I heard the sound of water falling deep under my feet. A waterfall? Quick drilling, a knot or two and... madness! I was descending large cascades below our meander at -550 m. The width and volume of this passage, along with a visibly stronger waterflow suggested that we had found a continuation of the upper, main canal. A cool reward for the earlier mud festival. For almost 20 metres steps led us to another meander. Moreover, we checked that the new parts were heading directly for the canyon and that is what it was all about.  $\Box$ 







↓ Anna under entrance shaft in Zoran Jama Cave. Photo Andrzej Dajek







## the Albanian Alps

in the years 2006-2014

Magdalena Słupińska and Mariusz Polok



Shpella Sportive entrance. Photo Mariusz Polok 2011

-20.00

In this period we organized 12 expeditions all led by Mariusz Polok from Speleoklub Aven Sosnowiec. Over 30 cavers from several Polish clubs (Speleoclubs: Aven Sosnowiec, Dabrowa Górnicza, Częstochowski, Łódzki and KW Warszawa) and Renato Serodio from Portugal participated in these expeditions. We concentrated our activity mainly in two massifs:

- hanging valley located between the peaks of Maja Cet-Harushës (2422 m a.s.l.), Maja Ismet Sali Brucaj (2527 m a.s.l.) and Maja Malgashit (2319 m a.s.l.),
- Maja Isuf Demes (2243 m a.s.l.) and Maja Gjarprit Ceremit (2142 m a.s.l.),
- reconnaissance on north part of Maja Rosit (2522 m a.s.l.) and hanging valley Gropa e Rupes.

We found 141 new caves. Most of them have a length of less than 50 m and are mainly vertical. The deepest - Shpella Spor-



Shpella Sportive - Uszy Królika Pit. Photo Damian Sprycha 2011

tive located in Maja Malgashit massif, is 264.3 m deep and 746.7 m long. We discovered it and explored to -107 m in 2010. During the next expeditions we continued exploration, discovering new parts. A detailed plan of the cave was drawn up by D. Piętak and M. Polok. At the moment it is the fifth deepest cave of Albania.

For us, the most promising and interesting is AVLC 19 Cave (Maja Gjarprit massif). It is a pit over 100 m deep meters deep, almost perfectly round in shape, with a diameter of 10 m, with a firn/ice cone at the bottom. We were there in June 2010 when there was a lot of snow in the cave and on the surface. We want to visit this cave in September in more favourable snow conditions.

Plenty of ice caves are found in the Albanian Alps. We found snow, firn and ice in 17 caves, all of them having an entrance above 2000 m a.s.l.

In the Maja Gjarprit massif we found snow and ice also in caves AVLC 03, AVLC 06, AVLC 07, AVLC 08, AVLC 09. These are about -20 m deep pits with snow plugs. It is difficult to say how thick the layers of snow are because the entire bottom is covered.

The south part of Maja Rosit is where we found AVL 43 Cave with a main gallery covered by firn sloping steeply down with an inclination of 60 degrees. Exploration was terminated at a depth of -60 m.

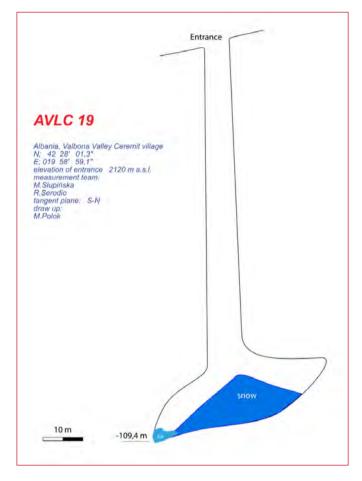
The exploration around the valley suspended between Maja Cet-Harushes and Maja Malgashit - where we found Shpella Sportive





pomiary: D. Piętak, M. Polok, M. Słupińska, D. Sprycha, Z. Wiśniewski, J. Zygmunt opracowanie: D. Piętak, M. Polok stan na 08 2011

– was particularly productive. In caves AVL 24A, AVL 24B, AVL 29, AVL 30 and AVL 31 at a depth of about –15 m we found snow plugs 10–11 m thick. On the slopes of Maja Ismet Sali Brucaj we discovered the cave AVL 106, where we found an ice lake with ice stalactites in





AVLC 19 entrance. Photo Mariusz Polok 2010

a chamber close to the entrance. Located nearby, caves AVL 102, AVL 103 I AVL 104 are filled with snow plugs too.

In 2008 and 2007, we focused on the exploration of the Maja Brykare te Hapta massif and the glacial cirque under Maja Ismet Sali Brucaj. In this area we also found ice caves. The biggest of them are AVL 9 Cave, with a large entrance (12 to 8 m) and snow plug with a thickness of approximately 8 m located just below moraine and AVL 19 Cave on the side the cirque. Measurements show that the snow and firn there has a thickness of at least 25 m. Snow plugs were present also in AVL 3 and AVL 5 caves.

During our stay in early May 2009, and again in August, we carried out some hydrological observations. Most of the springs studied in May are periodic. However, the most interesting for us were the measurements of Selim resurgence, which had not changed its temperature or discharge in relation to measurements in May. This can suggest a stable and relatively abundant supply. Observations of the sources were sporadically continued during later expeditions to validate our assumptions concerning the direction of water circulation in massifs surrounding the Valbona Valley.  $\square$ 



View of the Valbona – on the right Cet Harushes, in front Maja Jezerce. Photo Mariusz Polok 2010.

### Picos de Europa

### - Western Massif (El Cornion)

Marek Jedrzejczak

Polish cavers have been active in the Western Massif of Picos de Europa (Spain) since 1978. A brief history of the project and general information on the area was presented in the previous issue of Polish Caving (see http:// pza.org.pl/jaskinie/english). In turn, this article provides a summary of our achievements between 2008 and 2012 and gives a detailed description of our activities during the last four expeditions, 2013-2016.

### 2008-2012

Retrospectively, it was an important period and what happened back then seriously influenced our later exploration. Our most significant accomplishment was finishing our work in the Sistema Cemba Vieya Cave. Passage trends from this 6.2 km long cave system as well as dye tracing that we conducted in 2012 are now important cues in investigating the neighboring karst. The system itself has a denivelation of 890 m, a horizontal extent of 1.4 km and consists of four caves: Sima Parodia (SCP111), Sima Cemba Vieya (CEM), Pozu del Aguja de Enol (CEV181) i Pozu de los Barrastrosas (G-13). The highest entrance is located at 2232 m a.s.l.

It is worth noting that exploration of this system took place over a span of almost 40 years. The pioneers who initiated the efforts in Pozu del Aguja de Enol (CEV181) Cave and Pozu de los Barrastrosas (G-13) Cave never suspected these caves could be parts of such a large system. Connecting the caves was only possible due to cooperation between Poles and Spaniards and de facto merging the surface zones originally assigned to Speleoclub Wrocław (SCW) and Sección de Exploraciones Subterráneas de Centro Excursionista de Valencia (CEV).

Another important achievement in the 2018-2012 period was the discovery and exploration of Pozu de la Torre Santa Maria (PE001) Cave, with its entrance located even higher than Sistema Cemba Vieya (SCP111/ CEM/CEV181/G-13), at 2297 m a.s.l. Although we initially conjectured that it could possibly be an another entrance of the system, in the end we could not confirm the connection and had to reject this hypothesis.

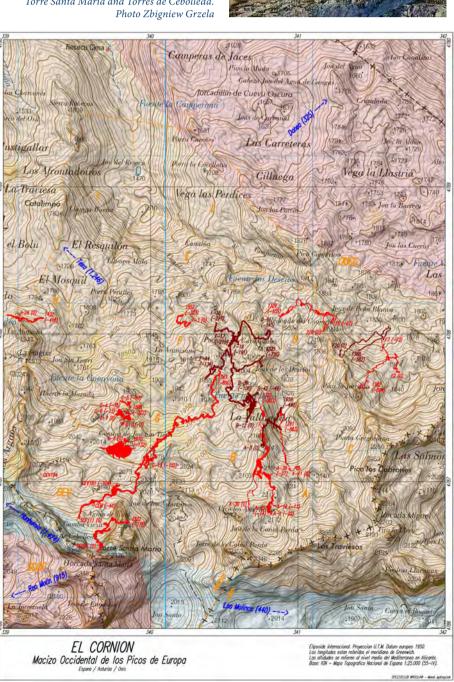
The same period saw finishing of a project aiming to prepare a 3D hydrogeological model of the complex geological setting found in the Picos de Europa using the KARSYS system. This model was verified by comparing it against results obtained through various dye tracing experiments conducted in the Picos

Map of the area. Compiled by Marek Jędrzejczak

de Europa over the years by many different teams. By sharing our results we initiated a fruitful cooperation with Daniel Ballesteros - an Asturian caver, geologist and researcher working at the University of Oviedo. We conducted several dye tracing attempts together, with Daniel and his team taking care of preparing the experiment and the sampling and our team responsible for the in-cave tasks.









Torre Santa Maria peak and its surroundings. Photo Marcin Krajewski



Entrance of Pozu de la Torre Santa Maria (PE001) Cave in 2013. Photo Tomasz Utkowski



Entrance of Pozu de la Torre Santa Maria (PE001) Cave in 2016. Photo Zbigniew Grzela

#### 2013

The large amount of snow that fell on the Picos de Europa in the winter of 2012/2013 did not disappear during the relatively cold spring and early summer. When we arrived in the mountains, we discovered that the snow cover is about to melt exactly during our expedition, thus making our life in the caves much wetter.

We focused on exploration of Pozu de la Torre Santa Maria (PE001) Cave, quickly gaining depth. A series of relatively spacious pits and meanders led us to a rather squeezy, horizontal crack at -775 m. Initially we managed to find a bypass, but after pushing the lead somewhat horizontally in our desired direction, we found ourselves in the very same crack, stopping at a definite squeeze.

In parallel, we extensively investigated the entrance zone, looking for the highest point of the cave. After trying everything else, we traversed the formation along which the underlying spacious pits developed. Advancing to the south-east, we arrived underneath the Torre Santa Maria peak. Then, by means of bolt climbing, we traversed a large pit and identified a continuation of the formation, leading up to a choked crack. In the end we reached merely +3 m above the entrance level, moving horizontally by 60 metres.

The new passages are located at the feet of Corredor del Marques, a massive diagonal ledge on the north-west face of Torre Santa Maria. In hope to find an upper entrance of Pozu de la Torre Santa Maria (PE001) Cave we repeatedly descended the north-west face between Corredeor del Marques and Corredor Pili Cristina. The search was in vain. Although we found a couple of entrances, none of them turned out to be promising.

During the expedition we also conducted dye tracing in PE001 Cave, in cooperation with the Daniel Ballesteros' team. Intending to make use of the opportunity that we had people and equipment so deep in the cave, we resolved to perform the dyeing at the deepest place we reached, even though it was suboptimal. According to our predictions but contrary to our hopes, the whole experiment proved inconclusive.

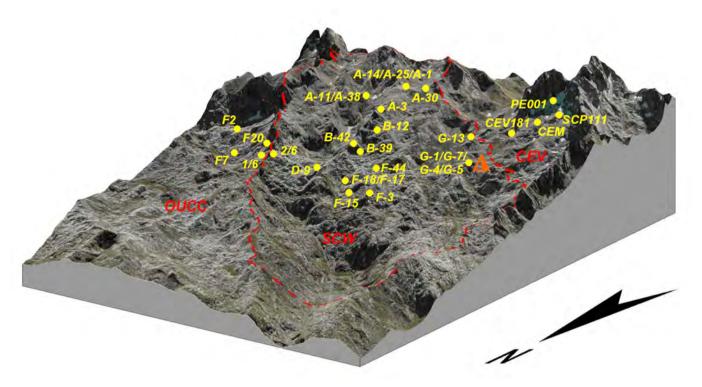
#### 2014

The August of 2014 was unusually rainy, even for the Picos de Europa standards. This effectively prevented us from exploring deeper caves of the massif. An attempt to resume work in the lower parts of Pozu de la Torre Santa Maria (PE001) resulted in 10 cavers cut off in the cave and having to wait until the rain stopped at a very improvised in-cave camp.

Weather conditions forced us to focus on searching for new entrances on the surface. We examined zone B, however to no avail.

#### 2015

In 2015 we managed to return to the bottom parts of Pozu de la Torre Santa Mar-



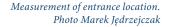
Block diagram of the area.

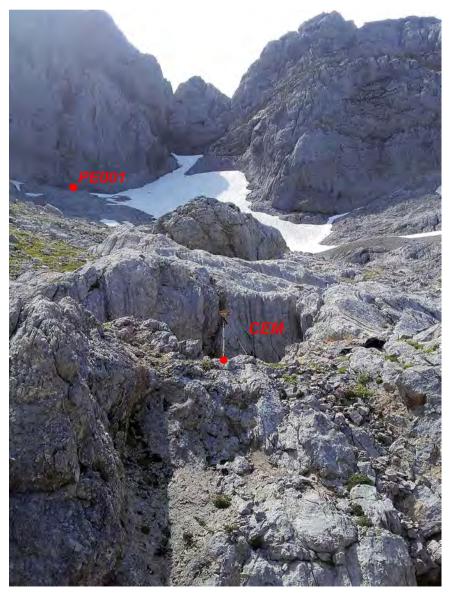
ia (PE001) Cave. We struggled to make the cave deeper, operating from a camp at –640 m. Although the cave definitely continues, squeezes that need to be passed in the company of streams collecting water from the whole cave above persuaded us to abandon this endeavor. After disbanding the camp, we looked at a certain number of leads we left at –350 m. Unfortunately every one of them connected to the main cave that we had already explored.

In the meantime we re-explored Sima Parodia (SCP111) Cave and surveyed it up to -330 m, where it connects with Sima Cemba Vieya. This cave, being the highest entrance of Sistema Cemba Vieya (SCP111/CEM/CEV181/G-13), was originally explored in 1984 and 1985. Unfortunately no cave maps from these days survived up to date. Re-mapping SCP111 concluded documenting the whole system, since all the other caves making it up, namely Sima Cemba Vieya (CEM.), Pozo de la Aguja de Enol (CEV181) and Pozu las Barrastrosas (G-13), have already been re-explored and surveyed.

#### 2016

During the 2016 expedition, another unsuccessful attempt was made at the bottom of Pozu de la Torre Santa Maria (PE001) Cave. Checking off question marks from the bottom to the entrance, at –250 m, we traversed the upper part of the meander along which the known main cave is developed. After progressing 230 m horizontally, we found a 115 m deep pit, which turned out to be a dead end. It is, however, possible to bolt a 25 m traverse at the top of the pit, possibly reaching a continuation of the meander.





At the same time we pushed for searching the cave's highest point. Currently this translates to a careful dismantling of a boulder choke in a particularly interesting chimney. The progress we made so far is encouraging.

We also initiated re-exploration of Torca de Los Argaos (CEV194) Cave. Back in 1989, the CEV expedition reached there a depth of merely 20 m. Snow accumulating in the entrance zone makes exploration of this cave highly dependent on the weather during the previous winter and spring. In 1990 it was possible to descent the icy P54 Pit until -85 m. In the following year no new discoveries were made and it was concluded that further progress requires overcoming a squeeze leading to a large pit, that was named Pozo Iñaki Arregui and estimated to be 200 m deep. The next undertakings by members of CEV - in 2003 and 2003 - turned out futile due to snow in P54. Efforts to keep the winter out of the cave were unsuccessful.

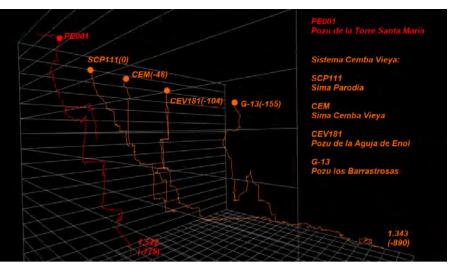
In 2016 our team managed to descend to P54 Pit, which now looks slightly different than on the original plans due to current ice deposits. Directly under the pit we found a passage that hopefully could let us bypass the squeeze leading to Pozo Iñaki Arregui. Our operations in this cave were severely hindered by melting of the ice, releasing dangerous boulders trapped within.

The entrance of Torca de Los Argaos (CEV194) Cave is located at 2096 m a.s.l. The currently known, short section of the cave develops to the north-east, along a tectonic feature clearly visible on the surface. The strike is parallel to development trends of Sistema Cemba Vieya (SCP111/CEM/CEV181/G-13). In light of this fact we think that the cave can potentially reach a depth of 750 m. In the same direction, up to 100 m above the entrance, there are a few other entrances that could potentially extend the denivelation up to 800 m. Also, if this trend is kept, the cave would get under Red de los Barrastrosas cave system (G-1/G-7/G-5/G-4) and thus we could hope to make a connection.

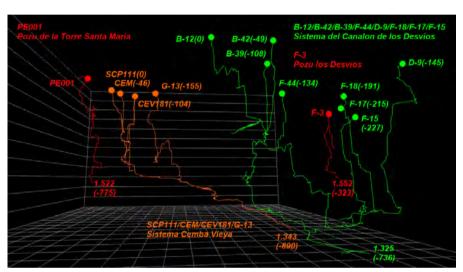
Since many of the important entrances are located at the feet of massive rock faces of Torre Santa Maria and Torres de Cebolleda, in the broadly defined Cemba Vieya area it is difficult to obtain a proper GPS fix with a handheld receiver. This specifically concerns the already mentioned caves, Pozu de la Torre Santa Maria (PE001) and Sima Parodia (SCP111), and prompted us to bring a surveying grade GPS/GLONASS unit to the 2016 expedition. This way all the larger caves were precisely located, allowing us to recompute loops in the survey data using better fixes.

### Plans for 2017

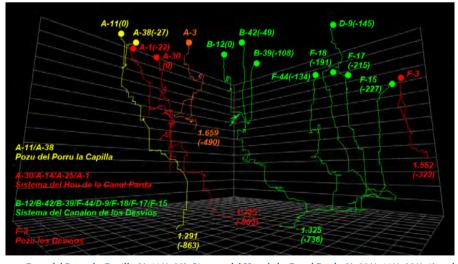
Our activity in 2017 is going to be focused on Pozu de la Torre Santa Maria (PE001) Cave, specifically on the meander at -250 m and the choked chimney with a lookout for increas-



Pozu de la Torre Santa Maria (PE001) and Sistema Cemba Vieva (SCP111/CEM/CEV181/G-13)



Sistema Cemba Vieya (SCP111/CEM/CEV181/G-13) and Sistema del Canalon de los Desvios (B-12/B-42/B-39/F-44/D-9/F-18/F-17/F-15)



Pozu del Porru la Capilla (A-11/A-38), Sistema del Hou de la Canal Parda (A-30/A-14/A-25/A-1) and Sistema del Canalon de los Desvios (B-12/B-42/B-39/F-44/D-9/F-18/F-17/F-15)

ing the cave denivelation. If only the snow and ice permits, we also intend to continue work in Torca de Los Argaos (CEV194) Cave. Traditionally, we will also continue searching the surface for new entrances.

We would like to thank to Armando Alonso Bernardo (an honorary member of Speleoclub Wrocław), Daniel Ballesteros (University of Oviedo), and Confiteria Covadonga (Cangas de Onís). □

### Deepest caves from areas of Speleoclub Wrocław (SCW) and Sección de Exploraciones Subterráneas de Centro Excursionista de Valencia (SES CEV)

	Name	Entrance symbol	Den. [m]	Length [m]	Hor. extent	Year, club, result
1	Sistema del Hou de la Canal Parda (Pozu del Picu de los Asturianos - Sima de la Torre del Alba o de los Organos)	A-30 (0) A-14 (-13) A-25 (-14) A-1 (-22)	-903	4 401 + a. 450	760	1974, SCOF, -330 in A-1 1975, SCOF, -416 in A-1 1988, SG, -100 in A-30 1989, SG, -265 in A-30 1991, SCW, -552 in A-30 1994, SCW, -726 in A-30 1995, SCW, -429 w A-1 connection with A-30 (-726) 1996, SCW, -903
2	Sistema Cemba Vieya (Sima Parodia - Sima Cemba Vieya - Pozu de la Aguja de Enol - Pozu los Barrastosas)	SCP111 (0) CEM (-46) CEV181 (-104) G-13 (-155)	-890	6 186	1390	1974, GMT, -75 in CEM 1977, SEII and GEP, -287 in CEM 1979, SEII, -319 in CEM 1981, SEII, -522 in CEM 1982, SEII and LUSS, -587 in CEM 1984, SCP, a241 in SCP111 1985, SCP, at -332 in SCP111 connection with CEM (-633) 1989, SGKWW, -429 in G-13 CEV, -30 in CEV181 1990, CEV, -209 in CEV181 2006, CEV, -290 in CEV 181 2008, SCW and CEV, -570 in CEV 181 2009, SCW and CEV, -671 in CEV 181 2009, SCW, at 548 in G-13 2010, SCW, at -475 in G-13 connection with CEV181
3	Pozu del Porru la Capilla	A-11 (0) A-38 (-27)	-863	1754	440	1984, SG, -180 1986, STJC, -400 1987, SG, -863 2003, SCW, at -123 in A-38 connection with A-11 (-863)
4	Pozu de la Torre Santa Maria	PE001	778 (-775, +3)	2 126	299	2009, SCW, 0 2011, SCW, -300 2012, SCW, -677, +3 2013, SCW, -789
5	Sistema del Canalon de los Desvios	B-12 (0) B-42 (-43) B-39 (-104) F-44 (-134) D-9 (-148) F-18 (-202) F-17 (-226) F-15 (-239)	-736	6 610 + a. 50	706	1994, SCW, -501 in F-18/F-17 1995, SCW, at -446 w F-15 connection with F-18/F-17 (-501) 1998, SCW, -542 in F-18/F-17/F-15 2001, SCW, -404 in B-12 2002, SCW, at -710 in B-12 connection with F18/F17/F15 (-736) SCW, -324 in D-9 2003, SCW, at -491 in D-9 connection with F-18/F-17 (-736) 2005, SCW, at -257 in B-39 connection with B-12 (-736) SCW, at -320 in B-42 connection with Z-12 (-736) 2006, SCW, at -582 in F-44 connect. with F18/F17/F15/09 (-736)
6	Pozu del Porru de los Garapozales	A-3	-490	1 250	298	1975 ?, SCOF ?, -60 ? 1998, SCW, -432 2003, SCW, -457 2004, SCW, -490
7	Sima de la Porra La Altiquera	J-24	-418	803	245	1972, SCOF, -73 1974, GEP, -330 1979, GEP, -418
8	Pozu los Desvios	F-3 F-3B (-3)	-323	702	97	1973, shepherd, -100 1975, SCOF, -280 1978, SW, -323 2000, SCW, at a. –60 in F-3B connection with F-3 (-323)
9	Red de los Barrastrosas	G-1 (0) G-7 (-7) G-5 (-43) G-4 (-55)	-322	?	145	1972, SCOF, -215 in G-7 1973, SCOF, -315 in G-7, SCOF, at —130 in G-4 connection with G-7 (-315) 1975, SCOF, at —140 w G-5 connection with G-4/G-7 (-315) 1998, SCW, at a. —50 in G-1 connection with G-4/G-7/G-5 (-322)
SW SG STJC SGKWW SCW	Speleoklub Warszawski Speleoklub Gliwice Sekcja Taternictwa Jaskiniowego Częst Sekcja Grotołazów Klubu Wysokogórski Speleoclub Wrocław				CEV GEP GMT LUSS SEII SCOF SCP	Sección de Exploraciones Subterráneas de Centro Excursionista de Valencia, Spain Grupo Espeleológico Polifemo, Oviedo, Spain Grupo de Montaña Torreblanca, Oviedo, Spain Lancaster University Speleological Society, Lancaster, England Sección de Espeleologia Ingenieros Industriales, Madrid, Spain Speleo Club Orsay Faculte, Orsay, France Espeleo – Club de la Universidad Politécnica de Valencia, Spain

### Caves in the Oxford University Cave Club area that neighbors the Speleoclub Wrocław sector

	Name	Entrance symbol	Den. [m]	Length [m]	Hor. extent	Year, club, result
1	Sistema Conjurtau	2/6 (0) 1/6 (-67)	-655	2 435	391	1980, OUCC, 0 in 1/6 1985, OUCC, -452 in 1/6 OUCC, -80 in 2/6 1986, OUCC, at -393 in 2/6 connection with 1/6 OUCC, -655
2	Sistema Horcada Blanca (Pozu Horcada Blanca — Pozu los Perdices)	F2 (0) F7 (-74)	-594	2511	352	1982, OUCC, -520 in F2 1983, OUCC, -594 in F2 OUCC, -92 in F7 1984, OUCC, at -437 in F7 connection with F2
3	Pozu del Redondu	F20	-582	1784	400	1984, OUCC, -125 1985, OUCC, -382 1986, OUCC, -582
						Oxford Uniwersity Cave Club. England

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## **Exploration in China**

### Andrzej Ciszewski and Michał Ciszewski



In autumn 2012, a Polish programme aimed for exploration of Chinese caves was initiated. Five small expeditions were organized every year since then in October-November, mainly to Hubei province. In addition to them, several reconnaissance trips accompanied the main effort.

The first two expeditions – in 2012 and 2013 – were focused on the vicinity of Shizilu village in the Dalou Shanmai Mountains, Lichuan county, Hubei. The area features a plateau with typical cone karst up to 1830 m a.s.l. and a complex geological setting. Caves explored in this area have a diverse morphology, including fragments of former extensive underground rivers, fossil passages with abundant speleothems or vertically developed caves containing spacious vertical pits. During these two initial expeditions, 21 caves were documented, their total length adding to 16.4 km.

The Luo Xi Tian Keng Cave System, with a total length of 3440 m and a vertical extent of 433 m, turned out to be our most important discovery near Shizilu. The cave begins with an enormous, 320 m deep pit. Its estimated volume of 3 million m³ places it among the world's most spacious pits. Exploration of the cave has not been finished, with several entrances located near the system that could be potentially connected.

The longest cave explored during the Shizilu expeditions was Da Dong-Big Cave, reaching 4094 m in length and a horizontal extent of over 1000 m. The cave is a multi-level sys-

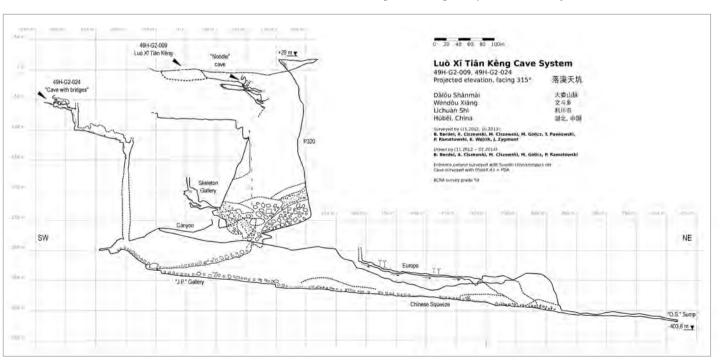
tem of mostly wet (active) passages rich in speleothems and containing numerous traces of human activities.

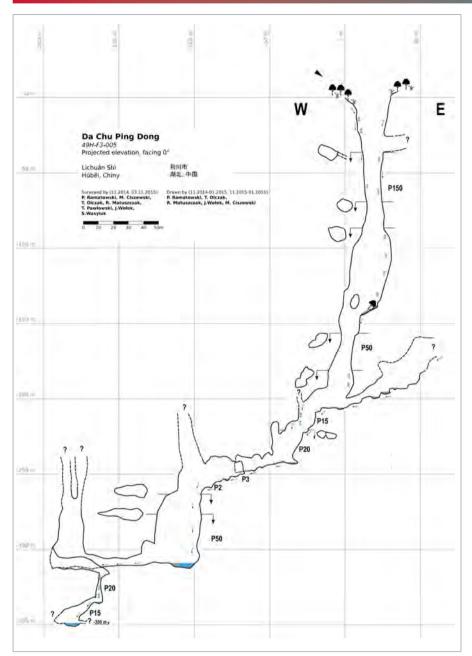
Although exploration in the Shizilu area remained unfinished, we resolved to move to another location for the following expeditions. This decision was driven by field observations made during two week reconnaissance trips between the main expeditions. These short trips also helped us optimize costs and added numerous potential entrances to our database.

We decided to focus on a massif located 30 km East of Lichuan city, also in Hubei province. A new expedition camp was set up in Niu Lan Ping Cun village, still in the Dalou



Wang Jia Cao Dong (Labirynth Cave) – colourful hall. Photo Michał Ciszewski







Wang Jia Cao Dong (Labirynth Cave) - water passage. Photo Stanisław Wasyluk



Wang Jia Cao Dong (Labirynth Cave) – water passage. Photo Sylwia Solarczyk

Shanmai Mountains, though 150 km from Shizilu. The new massif, with highest peaks reaching the elevation of 1680 m a.s.l., contains a distinct cone karst plateau limited by deeply incised valleys from south and east. Drainage occurs on several levels, with the lowest karst spring located in the Qing Jiang river at approx. 450 m a.s.l. The limestone bedrock is interbedded with thin layers of hardly soluble rocks and thus temporarily flooded zones occur in most of the caves.

Initial exploration carried out near the Niu Lan Ping village revealed that two distinct types of caves are present in the area. Near the edge of the plateau (where it abruptly drops 300 m), there are numerous pits leading to sump zones at approximately –300 m. Conversely, other caves in the massif tend to be extensive multi-level horizontal systems of passages. The deepest vertically developed caves that we explored were Da Chu Ping Dong (–350 m) and Yang Lan Ping Dong (–317 m) – featuring a 315 m deep entrance pit – and

Lu Tian Keng (-313 m). Da Tian Keng (also called Meandering Cave) is an exception to the general scheme, being developed both vertically and horizontally. A spacious entrance pit leads to an 860 m long active meander, where our exploration temporarily stopped at -230 m. Another important finding in the area, Shibanling Tian Keng, starts with a -180 m deep entrance pit that has over 100 m of diameter on the surface and leads to an underground stream ending in a muddy sump.

The most interesting cave we have been investigating near Niu Lan Ping village is Wang Jia Cao Dong Cave, presently ending with a promising lead at –350 m. The cave is currently the longest one explored during our Chinese expeditions, so far measuring 4168 m. It begins with spacious fossil horizontal galleries, quickly leading to long, wet (active) passages developed in an uniformly inclined bedrock. The second longest cave in this area is Chanzi Dong Cave (2782 m long), mostly

horizontal and featuring several levels of development. The lowest one, a spacious 1 km long gallery, ends in mud sumps.

During our expeditions we participated in several research projects coordinated by the Institute of Karst Geology from Guilin and taking place near our main exploration areas. Specifically, in 2014 we spent half of our time in China near Wulong city (Chongqing province), where we explored and surveyed caves in cooperation with the Institute and the Hong Meigui Cave Exploration Society.

In total, in the course of five expeditions organized by Andrzej Ciszewski and supported by Polish Mountaineering Association (PZA), approximately 44 km of cave passages were surveyed and mapped. We consider it a great result, taking into account that the expeditions typically lasted 3 weeks, with around ten cavers participating in each one. Our exploration clearly indicates that the massif near Niu Lan Ping Cun is a promising



Speleothems in Da Dong Cave. Photo Michał Ciszewski



area, where many interesting discoveries can still be made. Since comprehensive data on hydrologic setting of the area is not available, it is difficult to determine possible drainage directions and predict exploration potential in particular caves. We hope that this year's expedition will give us an opportunity for even more interesting discoveries of the Chinese underground world.  $\square$ 

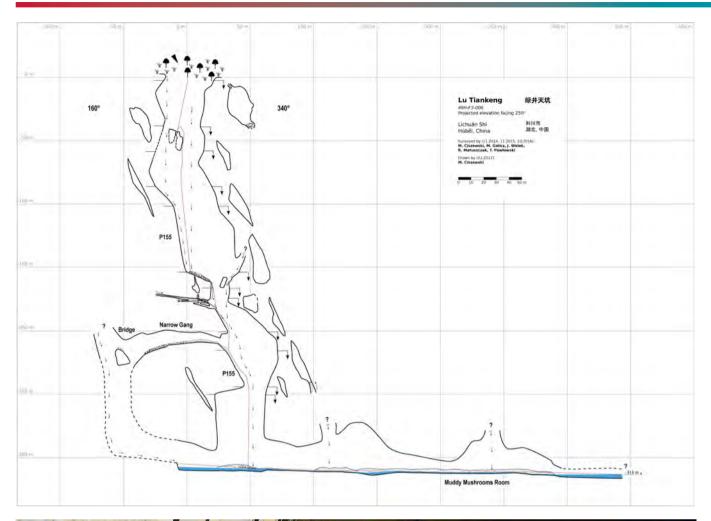


Luo Xi Tian Keng Cave System – descending from the P320 entrance pit. Photo Michal Ciszewski



↑ Shibanling Tiankeng – P180 entrance pit. Photo Tomasz Pawłowski

 $\leftarrow$  Lu Tian Keng – descent to the underground river. Photo Michał Ciszewski





 $Luo\ Xi\ Tian\ Keng-the\ JP\ Gallery.\ Photo\ Tomasz\ Pawłowski$ 

## First Polish dive into Dva Kapitana sump -Krubera-Voronya Cave

Ewelina Raczyńska and Michał Macioszczyk

The idea to go to Krubera-Voronya Cave is not a new one. Who would not want to touch the "bottom of the earth"? It was our first, most obvious goal. The second one was "crazier". Michał Macioszczyk, a very experienced caver, decided to dive the last sump. Dva Kapitana (-2140 m) and check a small "window" going up into the unknown at the -20 m depth (-2160 m).

We started preparations for the expedition in early spring 2016. Michał was training almost every day to prepare for all possibilities. Also we had to make all the arrangements with the Ukrainian Speleological Association and the head of the expedition Yuriy Kasjan, who agreed to our plan.

In the last days of July, we left Poland and flew to Georgia, to cross the Arabika massif in the Western Caucasus, where Krubera-Voronya Cave is located. In the end, our expedition counted 12 people. We split into two groups. One would go to Game Over, commonly called the "dry bottom" (-2080 m), and the second would carry all diving equipment for Michał.

The first team (Małgorzata Borowiecka, Joanna Haremza, Bogdan Guzik, Adam Łada, Piotr Sokołowski, Marek Burski, Sebastian Kołodziej) started one day before the second because of sleeping logistics at the camps. All of these team members reached the dry bottom after 4 days.

The second team had a huge number of cave packs with wet/dry suits, tanks, etc. for diving purposes. We reached the depth of -1960 m after 4 days as well, where we split one more time. Two people (Karol Przybyszewski and Ewelina Raczyńska) went to Game Over and two (Michał Amborski, Jakub Kujawski) left with Michał Macioszczyk. They dived the two first smaller but not less difficult sumps: Kwitoczka and Podnyr. After that, the tiny 150-m-long crack named Gambit turned into quite an ordeal because they were wearing dry suits. A few short rappels later they reached the edge of Dva Kapitana. The sump looks inconspicuously like a small lake. The visibility was very good, the water temperature was surprisingly high at 8° C! The unchecked "window" unfortunately turned out to be too tiny for someone wearing diving equipment. Time was getting short so Michał caught a few (among plenty) very small, transparent shrimp and put them in a special bottle for future research in a lab. According to plan, Michał came out after a 24-minute dive.

Over the next four days, all of us exited without any problems.

During this expedition each one of us accomplished a personal record, but Michal's record was the most important for him and us. He is the first Pole who dived in the deepest place in the cave (-2160 m). Also as far as we know, Michał was one of the few people who dived there at all. The first one was a very experienced diver and someone who knows this cave very well - Giene Samokhina, whom we met while coming out of the cave. There were not very many dives in this sump because of its great depth and the complicated logistics necessary to reach it with all needed equipment.

Dates of the expedition: 26.07-16.08.2016 We would like to thank the Ukrainian Speleological Association and especially Yuriy Kasjan for all the help and kindness. □

> → Closed to Dva Kapitana. Photo Michał Macioszczyk

→ Base camp. Photo Małgorzata Borowiecka

↓ Game Over. Photo Adam Łada





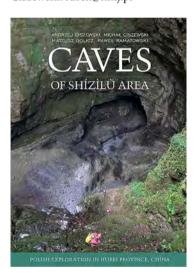






# Caves of Shízilù Area - Polish Exploration in Hubei Province, China – inventory of caves

A complete inventory of caves documented during two Polish expeditions to China was published in March 2014. The book contains comprehensive descriptions and cave maps of all caves explored near Shizilu village, Lichuan county, Hubei province by the team led by Andrzej Ciszewski in 2012 and 2013. The most important one, Luo Xi Tian Keng, starts with a 320 m deep entrance pit of an estimated volume of 3 million m3, one of the largest cave pits in the world. Paperless surveying techniques were extensively used to document the 16.4 km of caves mentioned in the inventory. The 65-page book has been published in English and is illustrated with 50 colour photographs. Authors of the book: Andrzej Ciszewski, Michał Ciszewski, Mateusz Golicz, Paweł Ramatowski. For more information please contact Michał Ciszewski: furek@kktj.pl



### Other expeditions in 2013-2017

In 2013 and 2014 cavers from club of Wałbrzych (Wałbrzyski Klub Górski i Jaskiniowy) and clubs from Turkey organized three expeditions. They explored caves in the Ala Dağlar Mountains: Yilanliyurt Mağarasi (Cave of Snake's Land), where the bottom was reached at the depth of –528 m, Tamtam Çukuru Cave to a depth of 221 m and some smaller caves. Later on, the expeditions were not continued due to complex geopolitical situation of the area.

In 2013-2016 cavers from Caving Section of Kraków Mountaineering Club continued their exploration in the Kanin massif (Slovenia). In 2016 the project discovered and surveyed 1298 m, including 1043 m in the Mala Boka-BC 4 Cave system. It was the best result of eighteen years'

exploration. The system is -1319 m deep and 9.5 km long, being the second deepest cave traverse in the world.

Since 2012 a group of cavers from Dąbrowa Górnicza, Częstochowa and Sopot has been exploring upper parts of the Kucka Krajina massif in Montenegro, on the Albanian border. During their 2015 expedition they explored and surveyed Spiral Cave to 315 m. Polish cavers from Brzeszcze explored caves in the Sureau Mts, SW Romania. They were directed to a cave of which exploration was abandoned in the 80's at the length of 70 m. In the end, Sperantei Cave ("hopeful" in Romanian) became 500 m long and -135.6 m deep.

Polish cavers have also participated in expeditions organized by speleological organizations of other countries. Mateusz Golicz and Jacek Szczygieł took part in exploring Luo Shui Kong Cave in environs of Wulong. During two expeditions the cave lengthened to 6.8 km and a depth of –381 m was achieved. Kasia Biernacka, together with American cavers explored the La Grieta section of the Huautla Cave system in Mexico, surveying 1405.5 m of its new parts. Cavers from Wrocław participated in Czech expedition to Đalovića Cave in Montenegro.

Ditta Kicińska

### Exploration in Bzyb massif, Abkhazia

Wrocław Caving Section (SGW) decided to start exploration in the West Caucasus (Abkhazia) in 2005. SGW and Belarus cavers chose one of the most promising massifs in this area - Arabika. The deepest cave in the world - Krubera-Voronya, is located there. During the first expedition, SGW discovered a new cave, PL1, which they explored for 9 years. The last expedition finished at a depth of -607 m, with a length of 2 km. Unfortunately all leads in PL1 closed down, so SGW decided to move to a massif adjacent to Arabika -Bzyb. Therein are located three caves which are on the list of the ten deepest in the world (Sarma -1830 m, llyuzia-Mezhonnogo-Snezhnaya -1753 m, Shakta Vjacheslav Pantjukhina -1508 m).

Two cavers took part in the first expedition in 2014. The purpose of this short trip was to get to know the Bzyb massif and organize all the paperwork for next year. They found out that there are plenty of abandoned leads in the caves explored in the 80s. Therefore in 2015, the main objective was to check all leads in the most promising cave – Alekjanskovo. The leads were at the bottom of the cave at –460 m. The exploration in this cave continued until 2016, unfortunately without any significant discoveries. Meanwhile, the surface search resulted in a new find, the entrance to Czarna Helena Cave. After a few

days, Polish cavers stopped at –118 m, but only because they ran out of time. The plan for 2017 is to continue exploring this cave. **Ewelina Raczyńska** 

#### **USA Caves 2015/2016**

Polish cave exploration in the USA was started years ago in different parts of America. My exploratory trip just added a small Polish contribution to American caves. The purpose of my trip was to visit as many caves as possible during my one-year stay in Seattle. I visited a lot of lava tubes in the states of Washington and Oregon with local cavers from the Cascade Grotto (Gifford Pinchot National Forest, Mt. St. Helens and Mt. Adams regions). I also did a trip to the longest and the deepest lava tube in the world – Kazumura (–1101.8 m, 65.5 km) on Hawaii's Big Island.

Thanks to the huge kindness of John Harman and Corey Hackley I was able to join them for exploration in a West Virginia cave – Kimble Pit in Germany Valley. During over two days in the cave we discovered 518 feet (~158 m) of passage, which increased Kimble Pit's length to 6.29 miles (~10 km) and depth to 429 feet (–131 m). Other cavers also took me to amazing Tennessee caves like Bo Allen Pit, Rumbling Falls and Run To The Mill. I have to say that those caves impressed me a lot.

During a few early spring days Jesse Houser and I went to Vancouver Island to help some Canadian divers with exploration. Our purpose was to haul tanks while divers went to check the lead in Reappearing Cave, which potentially would be a connection with another cave, Never Never Land. After long hours of fighting very strong water currents, it became obvious that it would be not possible to reach the lead this time. During this trip we also looked for new entrances. A new cave was found and was named Vanishing Point Cave. After a few months it grew to more than 1 km in length!

During the summer of 2016 I decided to fly to the state of Kentucky to visit the longest cave in the world - Mammoth Cave (more than 644 km long) where thanks to Dave West and the Cave Research Foundation I was able to join an exploration team in this incredible cave. Our base camp was in Hamilton Valley in Mammoth Cave National Park. My team numbered 5 people from different states in the USA; our goal was to check a few new leads in the Ehman Trail section of Colossal Cave and also to resurvey some old parts of this cave. On that day we added a few meters to Mammoth Cave and did a lot of survey work. On the next day, the situation repeated. Unfortunately this was my last cave trip during my stay in the USA.

Many thanks to Jesse Houser, John Harman, Corey Hackley, Dave West, Brad Hutchinson, Peter Norris, Peter Curtis, Adam Haydock, and Ann and Peter Bosted for all the help and kindness.

Ewelina Raczyńska

### Cave diving

In 2013 Polish cavers (Rafał Górecki and Mirek Kopertowski) took part in exploring the Huautla Cave System in Mexico, where 1774 m of dry passages and 519 m in Old Route were discovered and surveyed. Forty seven cavers from Great Britain, Canada, the United States, Mexico and Poland participated in the 7-week expedition.

In 2015 Mirek Kopertowski took part in a British expedition aimed at exploration behind sumps in the Sahara series of Hirlatzhöhle in Austria. About 200 m in two great new halls were surveyed.

In 2013–2017 cave divers from Poland (GNI) organized several trips to Balkan (Serbia, Bosnia and Herzegovina, Albania, Kosovo, Montenegro). They worked in the greatest cave of Kosovo - Gryka e Madhe. In the Big Sump they explored short horizontal galleries and the main conduit to the depth of 55 m. In Serbia the team dived in Vrelo Crnog Timoka and in Lazareva Cave, where they discovered ca. 250 of new parts with further leads open. Six cave divers from Poland attempted to reach -200 m in the resurgence Viroit in Albania. Adam Pawlik reached the depth of -201 m and noted that the cave continues downward. The diving activity in Albania was conducted conducted by Cave Divers Group from Warsaw (Speleoklub Warszawski), Wrocław (Sekcja Grotołazów Wrocław), Cracow (STJ KW Kraków) and other cities. They surveyed 730 m of news passages, mainly in Viroit, Skotini and Petranik caves.

In the Tatra Mts diving activities were performed by Polish and Slovakia cavers in

Obcasne Cave (Slovakia) and by Katarzyna Turzańska in the Koci sump of Kasprowa Niżnia Cave to –30 m.

### "The deepest cave pits of the world" project

The aim of the project is to reach bottoms of the deepest cave pits in the world.

It started in 1994 after descending the deepest (at that time) pit

– Hades, 420 m deep. The undertaking was conceived and is carried on by cavers from Bobry Żagań Speleoclub, though now also WKGiJ from Wałbrzych takes part in the project. "The deepest cave pits of the world" intends to reach all pits exceeding 400 m in depth. Until now, Bobry Żagań Speleoclub has visited the following pits:

- Hades (-420 m), Austria, 1994,
- **Provatia** (-407 m), Greece, 1995,
- Sotano del Barro (-410 m), Mexico, 1997.
- Vrtglavica (-643 m), Slovenia, 1998,
- Patkov Gust (-553 m), Croatia, 1999,
- Bayioudong (-424 m), China, 2004,
- Minye (-417 m), Papua New Guinea, 2008,
- Nyx (-429 m), Montenegro, 2011, 2013,
- Miao Keng (-491 m), China, 2009, 2012,
- Da Keng (-520m), China, 2012,
- Divka Gromovnica (–513 m), Croatia, 2013.
- **Big Boss** (-410 m), Abkhazia, 2014.

In 2000 Franciszek Kramek as first member of Bobry Żagań and WKGiJ Wałbrzych took part in the expedition to Brezna pod Velbom (–501 m) in Slovenia. In 2009 Tomasz Kuźnicki and F. Kramek participated in WKGiJ's expedition to Miao Keng. In the last five years we have organized trips to two pits from our list, namely: Divka Gromovnica in Croatia and Big Boss

in Abkhazia. Both were visited by members of Bobry Żagań and Gawra Gorzów.

When we started to think that the end of our project is near, two new objectives for us appeared on the cave map of the world: in Iran and in Spain...

...which is very fortunate, because now we have

a good pretext for further expeditions!

#### Cave pits ranking

KORONA

- 1. Vrtglavica (-643 m), Slovenia, Kanin
- 2. Ghar -e- Ghala (-562 m), Iran
- 3. Patkov Gust (-553 m), Croatia, Velebit
- 4. **Da Keng** (–520 m), China, Tianxing
- 5. **Divka Gromovnica** (–513 m), Croatia, Velebit pit in Velebita Cave
- 6. **Brezno pod Velbom** (–501 m), Slovenia, Kanin
- 7. Abisso Firn (-495 m), Italy, Kanin
- 8. **Miao Keng** (–491 m), China, Tianxing pit in Miao Keng Cave
- 9. **Gran Pozo MTDE** (-435.92), Spain, pit in Torca de Porron
- 10. **Nyx** (-429 m) Montenegro, Maganik pit in cave
- 11. Baiyudong (-424 m), China
- 12. **Hades** (–420 m), Austria, Tennengebirge
- 13. **Minye** (–417 m), Papua New Guinea, Nakanai
- 14. **Big Boss** (–410 m), Georgia, Bzyb pit in Abac Cave
- 15. **Sotano del Barro** (–410 m), Mexico, Ayutla
- 16. Provatina (-407m), Greece, Astraka

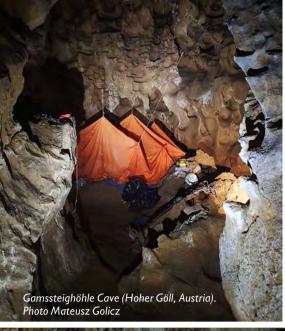
#### Marcin Furtak

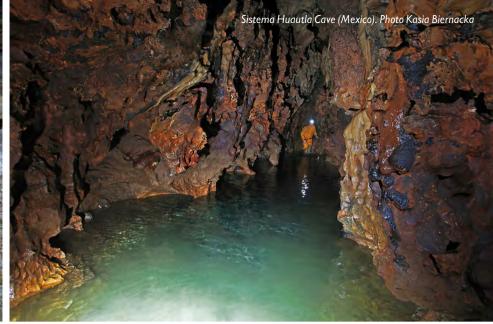


Descent to Divka Gromovnica Pit.
Photo Daniel Oleksy

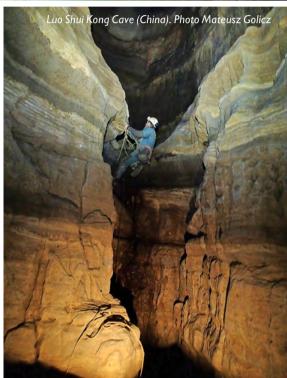


At the bottom of Big Boss Pit. Photo Jarosław Woćko













## POLISH CAVING QUARTERLY































