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KARST TERMINOLOGY IN APULIA (SOUTHERN ITALY)

LJUDSKA KRAŠKA TERMINOLOGIJA IZ APULIJE (JUŽNA ITALIJA)

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Abstract

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Mario Parise & Antonio Federico & Marco Delle Rose & Mariangela Sammarco: Folk karst terminology from Apulia (Southern Italy)

Apulia region, in southern Italy, is one of the classical karst areas of the Italian peninsula, being underlain for most of its extension by intensely karstified carbonate rocks. The landscape presents essentially landforms of karstic origin, which have been the object of specific studies for a long time. The three main geographical sub-regions into which Apulia is generally divided (from north to south, the Gargano Promontory, the Murge plateau, and the Salento peninsula) have been characterized in the past centuries by complex and different social and historical events. These resulted in the development, from a linguistical point of view, of very distinct dialects in different parts of Apulia. The terms used to describe the karst landforms, both at the surface and underground, had subsequently been, and still are, extremely variable throughout the region.

This paper illustrates some terms used in Apulia to designate and describe the main geomorphological manifestations of the karst landscape. An attempt is made to analyze the terms on the basis of: i) geographical distribution; ii) etymology, with reference to the local dialects; iii) morphological features and genesis of described landforms. Some cases of misuse of terms in the Apulian karst, even in recent times, are also pointed out.

Key words: karst, terminology, *lama*, *gravina*, etymology, Apulia.

Izveleček

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Mario Parise & Antonio Federico & Marco Delle Rose & Mariangela Sammarco: Ljudska kraška terminologija iz Apulije (južna Italija)

Apulija v južni Italiji je eno izmed »klasičnih« kraških ozemelj italijanskega polotoka, saj je pretežno na močno zakraselih karbonatnih kamninah. Površinske oblike so predvsem kraškega nastanka in že dolgo časa predmet posebnih raziskav. Tri glavne podregije, na katere je običajno razdeljena Apulija (od severa proti jugu: polotok Gargano, planota Murge in polotok Salento), so bile v preteklosti podvržene kompleksnim in močno različnim družbenim in zgodovinskim dogajanjem. Zaradi tega so nastala v raznih delih Apulije, z jezikoslovnega gledišča zelo različna, narečja. Zaradi tega so izrazi, ki jih ljudje v Apuliji uporabljajo za označevanje kraških oblik, tako površinskih kot podzemeljskih, izredno različni. Te izraze so uporabljali nekdanj, a jih tudi še danes. V prispevku so predstavljeni nekateri teh izrazov, uporabljanih za označevanje najpomembnejših kraških oblik. Te izraze skuša avtor analizirati na podlagi geografske razprostranjenosti, etimologije z oziroma na krajevna narečja in oblike ter nastanka opisanih pojavov. Opozorjeno je tudi na današnje primere napačne rabe takih izrazov na krasu v Apuliji.

Ključne besede: kras, terminologija, »lama«, »gravina«, etimologija, Apulija, Italija.

INTRODUCTION

The use of an internationally accepted terminology is crucial for the correct diffusion of scientific information and data in any field of research. The most complete understanding between scientists and researchers and the sharing of experiences carried out in different countries are possible only if mutual comprehension is fully accomplished.

As regards karst terminology, in spite of the several attempts aimed at its standardization, the use of different terms to describe the same features, or the misuse of some terms, has still to be registered both at a national and international level. This is a frequent source of likely confusion and misunderstandings in karst and speleological publications. The situation is further complicated in the Mediterranean basin, where for historical reasons the present language inherited terms from the many idioms and dialects spoken in the past during different dominations. As a consequence, a great number of terms, differing from area to area also within a single region, exists, and handling them is not always an easy task.

This paper examines some terms in the karst of Apulia, in southern Italy, in an attempt to highlight the relationships between local language and history of this region of the Mediterranean area, and to clarify some common misusages of karst terminology. Apulia can be geographically described as formed by three distinct sectors (Fig. 1): the Gargano Promontory to the north, the Murge plateau in the central part, and the Salento Peninsula to the south. It is one of the classical karst areas of Italy, being characterized for much of its extension by carbonate rocks of the Apulian carbonate platform, which acted as the foreland during the building up of the Apenninic Chain in Miocene time. Development of karst processes produced a dense network of cavities and conduits which characterize large portions of Apulia. The landscape is typically low-relief karst, very rich in natural cavities. As many of these cavities have been occupied by man at different times, their conservation is a very important aspect in the preservation of the historical heritage of this sector of southern Italy.

HISTORICAL BACKGROUND

Differently from other regions in the southern part of the Italian peninsula, the Greek settlements in Apulia were limited to Taranto, the colony of Sparta facing the Ionian Sea, and the surrounding areas. The great part of Apulia was not directly affected by the phase of Greek colonization (*Magna Graecia*) that concerned southern Italy and Sicily starting from the half of VIII century B.C. By that period, the cultural and ethnic setting of Apulia looks fully unitary, characterized by the presence of the *Iapyges*, the indigenous population which was in this area since XI century B.C., and particularly spread in the region during the early Iron Age (IX-VIII centuries B.C.).

As for the origins of the Iapygian people, two different literary traditions are reported: the first assigns them Hellenic origins, telling about a mythical coming of Aegean people from Crete (Herodotus; Strabo); the second one, the most supported indeed, considers them Illyrians coming from the opposite side of the Adriatic Sea (De Juliis, 1988, and references therein). As a matter of fact, the archaeological evidence documents a decisive cultural contribution from Illyria (along the Dalmatian coast) in the second half of the XII century B.C., during the last phase of the Bronze Age. After an incubation period, during which endogenous and external elements join, the new, original Iapygian culture, arises.

The land occupied by the *Iapyges* was the *Iapygia* or *Iapudia*, a denomination later on transformed by the Sanniti in *Apudia*, and eventually in *Apulia*, the name most common from the IV century B.C. and made official in the Augustan period (De Juliis, 1988).

From the VIII century B.C., within the even cultural situation, characterized by the so-called "Iapygian Protogeometric", a diversifying process starts, which will bring three sub-regional cultures and, consequently, the creation of three principal ethnical groups which differentiate one from the others also for the territorial distribution (Fig. 2): the *Dauni* lived in the northern part of the region, that is the Gargano Promontory and the area of transition toward the southern Apennines of Italy, the so-called Subappennino Dauno. In central Apulia, the *Peuceti* were in the area which can be geographically described as the Murge plateau; more toward the south, the area around Brindisi and the Salento Peninsula were occupied by the *Messapi*, the name given by the Greeks, which, according to one of the proposed interpretations, indicates the population "set between two seas" (Adriatic and Ionian).

Within this articulated historical and cultural framework, it is also possible to identify in Apulia significant differences in terms of linguistics and epigraphy. Still today, the dialects that are typical of the Subappennino Dauno and, more in general, of the Foggia province, have many elements in common with those of the inner Apennines of southern Italy. The language in the Bari area is very different, and the changes are still stronger in Salento, where the language is related to the branch known as Calabrian-Apulian-Sicilian dialect (Parlangčli, 1953). Regarding this matter, it is worth remembering that the Salento Peninsula, which Greeks and Romans identified as *Messapěa*, represented in the past a wide and linguistically homogeneous area well defined at least since the VI century B.C. The Messapian language is still today confirmed by the discovery of almost 400 inscriptions and derives partly from the Laconic alphabet used in the territory of Taranto.

Even now, the linguistic situation is characterized by the presence of linguistic islands, where peculiar languages have been preserved. The most significant is the so-called *Grecěa Salentina*, where a dialect strictly related to the Greek language (*griko*) is spoken still today. As shown in Fig. 3, originally this dialect was widespread in wide areas of central Salento, and during the XIV-XV centuries it almost extended from the Ionian to the Adriatic coast, along a line connecting Gallipoli and Otranto. Today, it is much less limited, being restricted to an area which includes about ten villages. The origin of this ancient linguistic tradition remains uncertain, and someone reputes it an heritage of the Byzantine control. It seems, indeed, more likely that it concerns a phenomenon of progressive isolation which involved the most ancient greek-speaking populations of *Magna Graecia*.

The persistence of the *griko* dialect is well evidenced by several names of localities in the area. Among these, it is worth remembering here the locality *Poesia*, which also gave name to the karst system of *Grotte della Poesia* (Pagliara, 1987), two caves located along the Adriatic coast of Salento (see Fig. 3 for location). According to the more qualified interpretation, the name *poesia* derives from the *griko* word *posěa*, with its deriving terms *poisěa*, and *puesěa*. These terms are slightly modified transliterations of the greek *δύοή* (beverage, drink), deriving from the verb, *δβίũ* which means to drink. In the dialect of Calimera (one of the villages of *Grecěa Salentina*), *posěa* means drinkable water, and should therefore imply the presence of a spring of fresh water within the cave system. Today, no spring is visible in the caves, but this could result from changes in the local hydrogeological setting (Delle Rose and Parise, 2003).

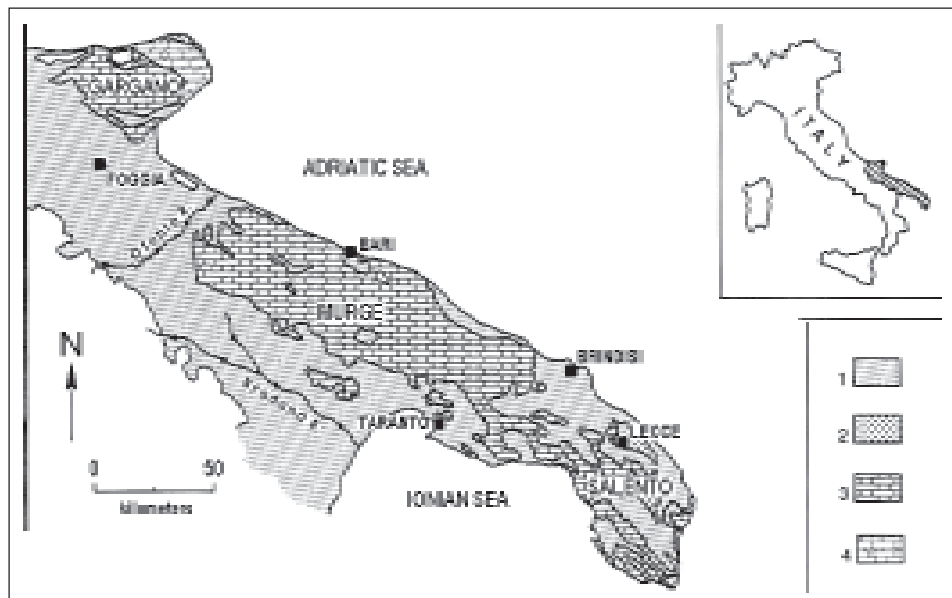


Fig. 1: Geological sketch of Apulia, showing the main geographical localities cited in the text. Explanation: 1) recent clastic cover (Pliocene – Pleistocene); 2) bioclastic carbonate rocks (Paleogene) and calcarenites (Miocene); 3) carbonate platform rocks (Upper Jurassic – Cretaceous); 4) scarp and basin chert-carbonate rocks (Upper Jurassic – Cretaceous).



Fig. 2: Distribution of Apulian populations in the VI century B.C. (modified after Baldacci, 1962).

TERMINOLOGY OF THE APULIAN KARST

Previous studies

Among the studies which have been dedicated in the past to terminology of karst phenomena in Italy, it is worth mentioning the work by Anelli (1959), who listed and provided explanation for a number of terms used to describe surface and underground features related to karst processes. Even though Professor Anelli was at that time Director of the Castellana Grotte, and lived in Apulia since several years, in his work only a few Apulian terms were included and briefly described; the national coverage of the work, in practice, did not allow a specific and thorough analysis of Apulian terms.

At a regional level, the most complete study so far available regarding Apulia is that by Elba (1969): this is a simple list of many terms, for which a very short explanation is provided, with, in some cases, indications on the geographical area of use of the term itself.

To examine karst terminology in Apulia, a multi-disciplinary approach is presented here, even though limited to the analysis of a few terms. This approach is, in our opinion, extremely useful to gain insight about the genesis of the processes that have worked to produce the karst features, and to understand better the evolution of the karst landscape in recent times. At this aim, each term is examined, considering the etymology, the morphological features it describes, and their genesis as well, and, if available, the historical documentation from different sources. In addition, a particular focus is given to the territorial distribution of the terms, which, as outlined above, appears to be strictly related to the linguistic evolution of Apulia.

Lama and gravina

Karst valleys are among the most widespread and typical landforms of Apulia. They are generally described with terms such as *lama*, *gravina*, *canale*, the latter being restricted to the southernmost part of Salento, at the very tip of the region. As an example of the relationships existing between morphology and etymology of the terms, *lama* and *gravina* are examined here.

Lama, and the variations *laima* and *lême* in the provinces of Brindisi and Taranto, respectively (Rohlf, 1976), indicate slightly incised valleys where the waters flow during and after heavy rainstorms. They are not very deep, and present a flat bottom, with a gradual connection with the adjoining slopes (Fig. 4). The term derives from the rare latin *lama* which, although used by Horace (Cortellazzo and Zolli, 1983), has an obscure root. It means pond, swamp, and is therefore related to the presence of water at the ground surface.

Within the *lame*, terre rosse and other residual deposits fill the valley bottom; in the past, *lame* represented the only place where it was possible to cultivate land (Colamonico, 1917c), in contrast with the surrounding bare karst and rocky slopes. *Lame* were thus a sort of oasis where to perform agricultural practice, resulting in a territory characterized by narrow strips or circular plots of cultivated land.

In the last decades, however, the original karst landscape of Apulia is strongly changing because of the introduction of new agricultural practices such as stone clearing, which is performed today through intense use of machinery, and not as in the past by hand, when the resulting detritus was used to build dry walls or collected in piles, locally known as *specchie*. The result is that *lame* are progressively being removed from the landscape (Parise and Pascale, 2003), and intense phases of erosion on the occasion of concentrated rainfall events may occur.

Gravina, on the other hand, is a landform much deeper than *lama*. It is a deep and narrow canyon incised in carbonate rocks (Fig. 5), with the bottom usually flat, which appears to be dry except when a river flows, after heavy rainstorms. The word, with the variations *cravina* in the Taranto area (Rohlf, 1976) and *gramina* in Calabria (Battisti and Alessio, 1975), derives from the pre-Latin term *grava*, which means pit or hole, as well as from the messapian term *graba*, meaning erosion of a river bank (Rohlf, 1976). Note the relation of both roots with the German and English terms *graben* and *grave*, meaning dig.

The majority of *gravine* is concentrated along the Ionian arc near Taranto, to connect the present coastal plain to the Murge plateau. Due to the vertical walls at the flanks of *gravine*, these are often affected by slope instabilities, most of which occur as rock falls and topples (Fig. 6). Many of these phenomena damage or threaten the remains of the "rupestrian civilization" that developed in Apulia and Lucania in medieval time (Fonseca, 1980).

Genesis of *lame* and *gravine* is still today an object of discussion among geologists and karst scientists: the oldest ideas considered both the landforms as related to erosional activity, with the term *lama* used to describe the valleys on the Adriatic side of Apulia, while *gravina* characterized those of the Ionian side (De Giorgi, 1884; Segre, 1947). This concept has been recently re-adopted by other authors (e.g. Mastronuzzi and Sansò, 2002).

On the other hand, Colamonico (1953) and Palagiano (1965) were among the first to point out the different morphology of *lame* and *gravine*, ascribing the latter to development of vertical erosional processes in the less resistant Plio-Pleistocene deposits, in contrast with the hard Cretaceous limestone, where vertical deepening resulted much more difficult, and the valley tended to enlarge laterally, creating the typical *lama*.

Actually, many *gravine* are incised in both the Plio-Pleistocene calcarenites and the Cretaceous limestone: this is the main element which relates their origin to superimposition (*sensu* Bates and Jackson, 1987), in consequence of the recent uplift of the area. Different rates of uplifting occurred between the Ionian and the Adriatic side of Apulia, and have to be related to the location of these zones within the Apulian foreland during the phases of building up of the Apenninic Chain, and to the different tilting (Doglioni et al., 1994). This had as consequence the greater development of *gravine* along the Ionian coastline, where higher rates of uplift, ranging from 0.21-0.27 mm/yr, have been calculated based on facies analysis of deposits located along the coast north of Mar Piccolo of Taranto (Belluomini et al., 2002). However, small-size *gravine*, up to 20 m deep, and which often terminate as *lame* in their final part, are also locally present at sites of the Adriatic coast.

In addition to the above recalled differences in depth and width of the two types of karst valleys, further geological elements are worth mentioning: in the *gravine*-type valleys, some evidence is present which directly derives from the action of fluvial processes. Namely, this is the meandering pattern of many *gravine*, and the presence of remains of terraced alluvial deposits at various heights along their flanks (one of the most typical situations can be observed at Gravina Triglio, some 10 km north of Taranto).

All these morphological and geological elements are indicative of a quite different origin of *lame* and *gravine*: the first type of valley developed mainly as erosional valley into the hard Cretaceous limestone, where lateral enlargement of the valley could be favoured opposite to vertical deepening. *Gravine*, on the other hand, initially developed through vertical incision into the weak Plio-Pleistocene calcarenites, and then kept deepening, once in the Cretaceous limestone, by

superimposition. Both types of valleys were probably controlled in their development by the main structural discontinuities in the rock mass, although their successive evolution significantly differed, leading eventually to two distinct landforms.

As regards *gravine*, there has also to be taken into account the possibility of the rapid deepening of an initial valley, due to local humid microclimate which may greatly enhance the solution of carbonate rocks (Badino, 1995).

Based upon the above elements, we do not consider other processes, namely sapping (Baker, 1990; Dunne, 1990), as the “leading role process in the genesis of these valleys” as recently proposed by Mastronuzzi and Sansñ (2002). If active in the development of *gravine*, sapping could have played a minor and local role in the terminal portion of the valley, toward the sea (as shown in the model of coastal karst caves speleogenesis by Delle Rose and Parise, 2003), while the leading one had to be played by overland flow and fluvial incision, as evidenced by the aforementioned alluvial deposits and fluvial landforms.

In conclusion, many differences exist between *lama* and *gravina*, from a morphological, geological, and structural point of view. These differences are well highlighted by the etymology of the terms, with *lama* which is related to surficial presence and/or flowing of water, and *gravina* that, on the other hand, is clearly associated to the idea of depth. Describing these very distinct landforms simply as karst valleys is therefore, in our opinion, a possible source of misunderstanding and confusion, especially for readers unfamiliar with the Apulian karst.

Grave and related terms

Strictly related to *gravina*, are other terms used in the Apulian karst, such as *grava*, *grave*, *gravinelle*, *graviglione*. They derive from the same root of *gravina* and refer, again, to deep landforms of the ground surface: *grave* is used in Apulia to indicate a vertical shaft or abyss, generally produced by rock falls from the vault of an original karst cave.

In other Italian regions, the same term has different meaning: for example, in Veneto (north-eastern Italy) *grava* is used to describe gravelly soil, beach, from the vulgar Latin *grava* – of Celtic origin – meaning sand, gravel, gravelly beach (Battaglia, 1961-2003; cf. also with the French *grève* which means shingle, pebbly river-bed, and with the English term *gravel*, along with its corresponding Spanish *grava*).

With the meaning diffuse in Apulia, on the other hand, *grave* is an abyss more deep than wide, which usually presents a pile of fallen blocks at its base. Many Apulian caves, generally characterized by depth greater than 30-40 meters, or single and deep caverns, are named *grave*. The most famous example is the Grave di Castellana, the about 60 m deep entrance to the complex karst system of Castellana Grotte, which is the longest cave in Apulia with its 3125 meters of length, a part of which is exploited as show cave (Anelli, 1954). Another famous *grave* in Apulia is the *Grave di Campolato* in the Gargano Promontory, the deepest cave in the region with its depth of over 300 meters (Orofino, 1969). While the term *grave* is widespread for caves and caverns, it is not used for surface landforms. To our knowledge, it is always related to the presence of karst caves.

Directly from *grave*, the terms *gravinelle*, *graviglione* and *gravaglione* come (Colamonico, 1917a, 1919b). Again at Castellana Grotte, two narrow shafts, 40 m deep, are called *gravinelle* to distinguish them from the already known and more important *Grave* aforementioned. *Gravinelle* are located at the lowest part of town, which has been site in the past of several events of flooding,

even with casualties, as during the tragic flood of 1896; at the beginning of the last century, hydraulic engineering works were done at the site, by using also the *Gravinelle* to allow the rapid drainage of water underground on the occasion of intense rainstorms (Parise, 2003).

Gravaglione (or *ravaglione*) has a slightly different meaning, since it indicates a swallet, generally located at the deepest zone of dolines or karst valleys, where water can infiltrate underground. The presence of underground caves is not always documented, since the surface deposits transported by the water might have clogged the entrance to caves or conduits below. In any case, the term *gravaglione* also refers always to connection with the underground infiltration of water. One of the most famous *gravaglione* in the south-eastern Murge is the swallet of the largest polje in the area, which is known as Canale di Pirro (Parise, 1999).

Pulo

The term *pulo* is widespread in northwestern Murge, inland from Bari, while it is not widespread in southern Apulia. There are some variations of the term, including *pulicchio*, *puro*, *pure*, (Colamonico, 1919a). Its root is uncertain. A Germanic root – as for the old French *pol*, which means marsh, mud (cf. the English *pool* and the German *pfuhl*) – is not very likely; more probably the term is a Mediterranean relict, perhaps similar to the Greek *θύεç* which means gate, narrow entrance (Battisti and Alessio, 1975), while its plural form *θύέαι* is also used as narrow gorge. It seems therefore that *pulo* could derive from this root, to designate depressions and/or entrance to caves. Actually, at the base of some *pulo* there are swallets and cave entrances.

The term *pulo* generally describes large dolines produced by karst processes: for most of them, a clear origin through fall of the vault of an underground cave can be invoked, but in other cases the origin is less straightforward. The most famous sites with this name are *Pulo di Altamura*, a wide doline in the Murge plateau, and *Pulo di Molfetta*, few kilometers to the Adriatic coastline north of Bari.

Notwithstanding the assonance between *pulo* and the slavonic term *polje*, the latter well known in karst terminology to designate close depressions with flat bottom developed on karst rocks (Cvijić, 1893; Gams, 1978), to our knowledge none of the landscapes described as *pulo* in Apulia may be directly related to *polje* features.

Pulo, on the other hand, is also locally used to describe other karst landforms. Around Ruvo di Puglia, for example, the term indicates the steepest sectors of two karst valleys (*Pulo di Modesti* and *Pulo della Cavallerizza*), that join and form a single *lama* (Colamonico, 1919-20). Maximum depth of the valleys ranges from 20 to 40 meters.

Gurgo, vurgo, vora

Gurgo (and the related local variations: *virgo*, *virgh*, *virgl*, *gurg*, *gurgh*, *gurio*, *jurio*) derives from the Latin *gurgus*, a variation of *gurgus* which means whirlpool, and is used in the Murge plateau to indicate a karst depression or basin. From the semantic point of view, the term refers to infiltration of water underground after heavy rainfalls: the water accumulates at the base of the depression and is drained in a time ranging from minutes to hours. The site of drainage is often characterized by development of whirlpools.

Apart from the hydrologic process of formation, the resulting landscape at the ground surface consists of a doline whose base is generally flat, or filled with fallen material (Colamonico, 1917b, 1920). The walls are vertical or steeply inclined, and often present small caves, which generally



Fig. 4: A lama in the inner Murge plateau. Note the soils and terre rosse which outline the development of the karst landform.



Fig. 5: View of the Gravina Madonna della Scala at Massafra, in the Taranto province. Note the vertical walls of the valley, which strongly contrast with the flat landscape of the lama shown in Fig. 4.



Fig. 6: Rock fall blocks (marked with white arrows) along the flank of a gravina. Note the high number of caves which were inhabited in medieval age, at the time of the so-called “rupestrian civilization”.



Fig. 7: The Gurgo di Andria, one of the largest collapse dolines in the Bari province.

follow the bedding in the carbonate rock. Colamonico (1919c), in his work on the *Gurgo di Andria*, one of the largest collapse dolines in the Bari province (Fig. 7), points out to the usage since medieval times of the term *gurgo* in this sector of Apulia to indicate wide pieces of land cultivated with olive trees (Morea, 1892). This testifies to the fact that the term was used to describe large basins or dolines, rich of alluvial and colluvial deposits at the bottom. Cultivation was thus possible at the site, in contrast with the surrounding areas, which at the time were characterized by woods and Mediterranean bush.

At the same root could probably be related the term *vora*, even though a second and more likely origin lets it derive from the Latin *vorago*, and the late Latin *vora*, both from *vorāre* which means to devour, to swallow. *Vora* is used in Salento to indicate a swallow-hole, an abyss (Battisti and Alessio, 1975; Duro, 1986; De Mauro, 1999), generally the vertical entrance to cave, in a way similar to the usage of *grave* in northern and central Apulia. Local variants of the term are *ňra*, *ňriu*, *vóla*, and *vňjuru* (Rohlfs, 1976).

3.6. *Áviso*

Áviso comes directly from the Greek ἄβυσσος, which means abyss. It indicates deep shafts or, more generally, the entrance to vertical caves. With this sense, it is mostly used in the Salento peninsula, especially in its central part, where the name is particularly widespread (Delle Rose et al., 2001).

It has to be said, on the other hand, that the same term is also used informally in a limited sector of southern Apulia (north-eastern Salento) to indicate morphologic depressions such as *spunnulate* (see below), partly filled by deposits, and where the calcareous bedrock rarely outcrops. These morphologies result in the presence of palustrine environments when filled by water.

Several variations of the term *áviso* (*ávisu*, *ápisu*, *áusu*), can also be found (Rohlfs, 1976). Some are diffuse in other regions of southern Italy, but the meaning can be different to that in Apulia.

On the other hand, further terms exist in Apulia with the meaning of abyss. An example is *fáu*, which indicates an abyss with a small opening, and is used in the south-eastern part of the Lecce province. *Fáu* derives from the greek ἄβυσσος = abyss (Rohlfs, 1976). A second example, widespread in the Lecce province, is *scunfunnu*, which derives from the combination of the Latin terms *sine* (without) and *fundus* (bottom).

3.7. *Spunnulate*

A dialectal term whose usage is strictly restricted to a specific area of Apulia (namely, the Salento Peninsula) is *spunnulate*, or, in other versions, *spundulate*, or *spundurate*. The terms have the same root as *spunnčriu*, i.e. they derive from the dialectal verb *spunnare* or *spundare* which means to break, to sink.

Spunnulate consist in fact of wide, not deep, sinkholes (Fig. 8) developed in carbonate rocks mainly of Quaternary age, related to the presence of underground karst cavities. At the surface, rock falls occurring below may produce sinks in the ground, in some cases reaching the surficial water table and creating small lakes or ponds. *Spunnulate* are widespread along the coastlines of Salento, and their coalescence and evolution (in a way similar to the process of formation of uvala) led in some cases to development of swamp areas. In the southern part of Apulia, the extent of these phenomena, which are strongly favoured by hyperkarst processes (enhanced solution of

carbonate rocks due to mixing of fresh groundwater with sea water), is such to justify the concept of karst subsidence (Delle Rose and Federico, 2002; Delle Rose and Parise, in press).

The Italian form of the verb to sink is *sprofondare*; from this, the term *sprofondi* derives, which is also used in Latium to designate dolines or depressions partly filled by alluvial deposits or detritus (Anelli, 1959).

3.8. *Capovento, ientalora*

The term *capovento* has several variations, depending on the different areas of Apulia: *capuvičntu* and *capujčntu* in the Taranto area, *capijčntu* in the Lecce province, and *capajčntu* at Brindisi. All these terms indicate a site where water is drained in karst terrains, and which is characterized by breath of wind (wind = *vento*). They have probably an endoclimatic origin to indicate the air coming out from a cave, or subterranean entrance (blow hole or wind hole of Cigna and Railton, 1978).

The occurrence of breathing of wind coming from holes and fissures in the rocks is generally recognized as a clue for the presence of an underground cave, and as a good reason to perform an attempt to explore it (Badino, 1995). On the other hand, it has to be noted that, even though the origin of the term is clearly related to air circulation, not all of the existing *capovento* actually present a blowing wind.

A similar term, where again the wind is referred to, is *intalñra*, local term in the province of Lecce which indicates an abyss, a place where water is swallowed. The term is identical to *ventarñla*, which means hole or also opening in the wall of a stall (Rohlf, 1976).

3.9. *Cupa*

The term *cupa* derives probably from the Latin word *cūpa* (barrel, bowl) or from the greek *εὔδῃς* (cavity). It has two possible explanations: the first indicates a depression, a doline-like feature in the landscape. In this sense, *cupa* could describe the overall shape of a doline. This meaning is particularly widespread in Salento, where the name *cupa* is common, specially in an area south-west of Lecce (Costantini, 1997). Nearby, at the archaeological site of Cavallino, the name *cupa* indicates a slight morphological depression which has been interpreted as used during the Messapian age for the drainage of water and as water supply system (D'Andria, 1996).

On the other hand, in the Italian language the adjective *cupo* (and the female form *cupa*) means primarily deep, dark, with scarce light, which well fits the subterranean environment. Actually, some caves in Apulia are named after this term; for example, Voragine la Cupa at Castellana-Grotte, and Grave la Cupa and Grotta Cupina at Martina Franca. The word *cupa* could therefore have a double origin, indicating a morphological feature (bowl doline), or the dark environment within a karst cave.

4. CONCLUSIONS AND FUTURE PERSPECTIVES

A correct use of the terminology is mandatory for a good diffusion of information related to karst, and its evolution, even with respect to the human impact on karst territories. At the same time, terms deriving from local languages and dialects have not to be disregarded or abandoned, since they often provide useful information, even from a simple etymological analysis. The complexity of the karst environment, and the inter-relations with man and the anthropogenic

activities during the past centuries, and still more today, make particularly suitable a multi-disciplinary approach to the study of karst landforms and their evolution. In this sense, the combined and integrated work of professionals with different expertise (geologists, archaeologists, linguists, etc.) may provide interesting results, at least in areas such as the Mediterranean basin where there is a huge historical documentation going back to thousands of years from now. A sample of terms of the Apulian karst has been described in this paper. Many other terms, variable from area to area, could have been added, but a selection had to be chosen here for the sake of brevity.

One of the main results from our study is a possible subdivision of the karst landforms examined in this paper on the basis of different criteria, and namely: morphology (*gravina*, *grave*, *áviso*, *cupa*), hydrogeology (*vurgo*), hypogean climate (*capovento*, *ientalora*), genesis (*spunnulata*). Some of the terms, however, encompass two or more of these categories, since they can have more than a single origin or etymological root. The approach here presented could be better defined and extended to the many other terms of the Apulian karst, to build a more precise framework of the relationships between karst morphology, language, history and human presence in Apulia.

During this study, in addition, it was noticed that the name of many localities in Apulia is strongly related to the presence of water, and/or to peculiar karst phenomena. Since in many cases the anthropogenic activities carried out in the last centuries have strongly changed the original morphology and landforms, investigating these names represents a precious clue to identify old features, today lost, in this karst landscape. In turn, this represents an incentive toward more detailed studies on the toponymy and etymology of terms and localities in the apulian karst.



Fig. 8: A spunnulata in the Upper Pleistocene calcarenites of Salento, with evidence of the surficial water table.

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