

## Late Turolian Amphibians and Reptiles from Brisighella (Northern Italy): preliminary report

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ABSTRACT — A preliminary study of the fossil herpetofauna collected in the site of Brisighella (Romagna, N Italy), of Late Miocene age (MN 13), indicates the presence of the following species: *Rana* sp., *Trionyx* sp., *Emydidae* gen. et sp. indet., (?) *Testudinidae* gen. et sp. indet., *Gekkonidae* gen. et sp. indet., *Lacerta* (s.l.) sp., *Anguis* sp., *Ophisaurus* cfr. *O. pannonicus* Kormos, *Varanidae* gen. et sp. indet., cfr. *Eryx* sp., *Colubrinae* gen. et sp. indet., *Natricinae* gen. et sp. indet. The predominance of *Ophisaurus* testifies a generally arid environment.

RIASSUNTO — [Anfibi e rettili del Turoliano superiore di Brisighella (Italia settentrionale): rapporto preliminare] — Uno studio preliminare dell'erpetofauna fossile raccolta nel giacimento di Brisighella (Romagna, Italia settentrionale), di età miocenica terminale (MN 13), ha permesso di individuare le seguenti specie: *Rana* sp., *Trionyx* sp., *Emydidae* gen. et sp. indet., (?) *Testudinidae* gen. et sp. indet., *Gekkonidae* gen. et sp. indet., *Lacerta* (s.l.) sp., *Anguis* sp., *Ophisaurus* cfr. *O. pannonicus* Kormos, *Varanidae* gen. et sp. indet., cfr. *Eryx* sp., *Colubrinae* gen. et sp. indet., *Natricinae* gen. et sp. indet. La preponderanza di *Ophisaurus* indica un ambiente generalmente arido.

### INTRODUCTION

A great quantity of fossil vertebrates has been recently discovered in karst fissure-fillings near Brisighella (Romagna, N Italy) (Costa *et al.*, 1986). The micromammals and especially the murids are the dominant component of the association, but some large mammals and lower vertebrates have been also collected. The mammals discovered in the different fissures indicate that all the sites are of the same age, i.e. Late Turolian (MN 13). The present paper is a preliminary report on the amphibians and reptiles of Brisighella. The fossil remains belonging to these classes are extremely fragmentary, nevertheless eleven or twelve taxa have been recognized. Only one of these belongs to amphibians (anurans) while two or three are assigned to turtles, five to saurians and three to snakes.

### SYSTEMATICS

#### Family RANIDAE

One vertebra and one left humerus are the only remains belonging to amphibians. The former specimen is very damaged but the latter, with the condyle centrally placed and the fossa cubitalis not very deep but well marked, makes possible an attribution to the genus *Rana* (see Rage, 1974 for the morphology of recent European genera and Spinar, 1972 for the

palaeobatrachids). Members of the family Ranidae are relatively common among the Neogene amphibians of Europe. In Italy remains of anurans are reported from oligohaline Messinian deposits of Piedmont (*Rana* sp., Morisi & Tropeano, 1983) and of Marche ("*Ranavus*" *scarabellii* Portis, "*Bufavus*" *meneghinii* Portis, Portis, 1885a). The presence of these fossils in brackish environment is due to transport. The species erected by Portis (1885a) need a systematic revision. Ranids are known also from the Ruscinian site of Mandriola (Sardinia) (Pecorini *et al.*, 1973).

#### Family TRIONYCHIDAE

A single fragment of small dimensions of a heavy sculptured carapace of turtle belongs to the family Trionychidae. Trionychids are relatively common in European Miocene deposits and become more rare with the beginning of Pliocene. Nevertheless in Southern Europe their real decline starts with the Late Pliocene. In Italy Turolian members of this family are known in Tuscany (*Trionyx bambolii* Ristori) and Sardinia (*Trionyx sardus* Portis), while in the Ruscinian deposits of Tuscany remains of *Trionyx pliopedemontanus* Sacco or *T. cfr. pliopedemontanus* were collected. The last species is also known in the Ruscinian deposits of Southern France. Near Parma (Emilia) was discovered a skull of a trionychid, (?) *Trionyx cortesii* (Portis), but both the systematic and stratigraphic (Late

Miocene or Early Pliocene) position of this species are uncertain (Portis, 1885b, 1901; Sacco, 1889; Ristori, 1895; Fucini, 1912; Broin, 1977; Kotsakis, 1985).

#### Family EMYDIDAE

A fragment of plastron belongs to the family Emydidae. Some more fragments of the carapace and plastron possibly belong to the same taxon. A generic attribution is not possible. Many species of turtles of this family have been described from European deposits of Turolian and Ruscinian age (Broin, 1977; Schleich, 1981). Some of these come from Tuscany and Piedmont but need a systematic revision (Ristori, 1895; Kotsakis, 1980; Kotsakis & Mori, 1981). Fragmentary remains belonging to the same family were collected also in the Ruscinian site of Mandriola (Sardinia) (Esu & Kotsakis, 1983).

#### Family TESTUDINIDAE

A very damaged peripheral bone possibly belongs to a member of the family Testudinidae but the classification is very uncertain. Testudinids were collected in Turolian deposits of Tuscany and Piedmont (Pantaneli, 1892; Kotsakis & Mori, 1981).

#### Family GEKKONIDAE

A fragment of a dentary, very thin and fragile, is referred to the family Gekkonidae. A generic attribution is not possible. Miocene gekkonid remains from France are ascribed by Hoffstetter (1946) to the fossil genus *Gerandogekko* (*G. arambourgi* Hoffstetter from the Agenian of St.-Gérand-le-Puy (Allier); *G. gaillardi* Hoffstetter from the Astaracian of La Grive-St. Alban (Isère)) but as this author notes may belong to an extant genus. Schleich (1987) described *Palaeogekko risgoviensis* Schleich on abundant material from S. Germany. Remains of a gekkonid ascribed by Estes (1969) to cfr. *Phyllodactylus* sp., an extant genus, are reported from Devinska Nova Ves (= Neudorf a.d. March) in Czechoslovakia (see also comments in Estes, 1983). Pecorini *et al.* (1973) signaled the presence of gekkonids in the Ruscinian deposit of Mandriola (Sardinia).

#### Family LACERTIDAE

Several fragmentary dentaries and maxillaries and two vertebrae belong to a lacertid of medium-small dimensions. I classify them as *Lacerta* (*s.l.*) sp. following Estes (1983) who includes the members of the genera *Podarcis*, *Gallotia* etc. to *Lacerta*. Some frag-

ments belonging also to the same family are somewhat larger than the majority of the lacertids collected in this site, but I prefer for the moment to assigne all the lacertids of Brisighella to the same taxon. Many species of *Lacerta* have been erected for European Neogene remains (*L. bifidentata* Lartet, *L. sansaniensis* Lartet, *L. crassidens* Gervais etc.). These taxa are considered as *nomina dubia* by Estes (1983). Modern Authors prefer to classify the remains of this genus as *Lacerta* sp. (cfr. Mlynarski, 1956, 1962, 1977). A revision of the whole fossil European material of the genus is necessary. The presence of the genus *Lacerta* is well documented in many Neogene deposits of Europe (France, Austria, Hungary, Poland, etc.) (Estes, 1983). In Italy lacertids of Ruscinian age are reported from Mandriola (Sardinia) (Pecorini *et al.*, 1973).

#### Family ANGUIDAE

Remains belonging to the family Anguidae are, by far, the most abundant lower vertebrates of Brisighella. Two taxa of this family are present. Two thin, rounded osteoscutes belong to the genus *Anguis*. The genus is known from a limited number of European Neogene sites. Two species were erected for Miocene remains (*Anguis robustus* Klembara from the Agenian of Dolnice, Czechoslovakia; *?Anguis acutidentatus* Lartet from the Astaracian of Sansan, France — *nomen dubium* after Estes, 1983), while the Late Pliocene remains from Poland were ascribed tentatively to the living *Anguis fragilis* Linnaeus (Mlynarski, 1956, 1962, 1964, 1977). All the fossil remains belonging to the anguids, with the exception of the two osteoscutes above mentioned, are assigned to the genus *Ophisaurus* (a genus perhaps not monophyletic, Klembara, 1979). Fragments of dentaries and maxillaries, a premaxillary and very numerous osteoscutes, have been collected in Brisighella. Many species of this genus were described for the Neogene remains of Europe. After Estes (1983) some of them (*O. fejfari* Klembara, *O. spinari* Klembara, *?O. bibronianus* (Lartet), *?O. laurillardi* (Lartet)) are *nomina dubia*. But three species are well established: *O. moguntinus* Boettger (= *O. fraasi* (Hilgendorf)), *O. pannonicus* Kormos and *O. acuminatus* Jorg. The last form is characterized by strongly acuminate teeth. This character is not present in the specimens of Brisighella. The specific separation between *O. moguntinus* and *O. pannonicus* is not very clear but generally the specimens of Middle Miocene are ascribed to the former species while those of Latest Miocene and Pliocene to the latter (Mlynarski, 1956, 1960, 1962, 1977, 1984; Bachmayer & Mlynarski, 1977; Estes, 1983). The type of *O. pannonicus* is described from the Hungarian site of Polgárdy (MN 13) (Kormos, 1911). The specimens of Brisighella are identical with the Hungarian

and Polish specimens ascribed to *O. pannonicus* but the lack of cranial fragments (maxillaries excepted) suggests the classification of our material as *Ophisaurus* cfr. *O. pannonicus* Kormos. The glass lizards are very common in the Neogene European deposits (Fejérváry Lângh, 1923; Estes, 1983). In Italy *O. pannonicus* is reported also from Pleistocene deposits but an attribution to the recent species *O. apodus* Linnaeus is more probable for these remains. From the Ruscinian site of Mandriola (Sardinia) are reported remains of anguids (Pecorini *et al.*, 1973).

#### Family VARANIDAE

A single tooth belongs to the family Varanidae. Two species of *Varanus* have been described for Neogene remains of Europe, *V. hofmanni* Roger (Orleanian-Vallesian?) and *V. marathbonensis* Weithofer (Turolian-Late Pliocene) while for remains from many localities the attribution is only generic. A second genus, *Iberovaranus*, was collected in some Miocene sites of the Iberian Peninsula (Fejérváry, 1918, 1935; Hoffstetter, 1969; Rage & Sen, 1976; Estes, 1983). In Italy a varanid occurs in the Ruscinian insular fauna of Gargano and perhaps it belongs to an endemic species. The presence of *V. marathbonensis* in the Upper Pleistocene site of Arene Candide (Liguria) (Morelli, 1891) must be confirmed.

#### Family COLUBRIDAE

A fragmentary vertebra belongs to the family Colubridae. The reduction of hypapophysis to an haemal keel indicates the subfamily Colubrinae. On the contrary a second fragmentary vertebra, elongated, with a sigmoid-shaped hypapophysis, belongs to the subfamily Natricinae. A generic classification of these fossils is not possible. Many species of colubrids belonging to both living and fossil genera are described from Miocene and Pliocene deposits of Europe (Szyndlar, 1984; Rage, 1984).

#### Family BOIDAE

One very characteristic caudal vertebra belongs to the subfamily Erycinae of the family Boidae. It is similar to the erycine from the Ruscinian of Mandriola (Sardinia) signaled by Pecorini *et al.* (1973) (unpublished material of the Author of the present note) and very close to the living genus *Eryx*. Erycines belonging to the living genus *Eryx* are signaled in Ruscinian sites of France and Turkey (Hoffstetter & Rage, 1972; Rage & Sen, 1976; Rage, 1984).

#### OPHIDIA indet.

One cloacal and two caudal vertebrae and some fragmentary dentaries without teeth belong also to snakes.

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#### BRS1

Testudinata indet.

*Ophisaurus* cfr. *O. pannonicus* Kormos

#### BRS2

*Trionyx* sp.

Emydidae gen. et sp. indet.

(?) Testudinidae gen. et sp. indet.

#### BRS3

*Rana* sp.

Gekkonidae gen. et sp. indet.

*Lacerta* (s.l.) sp.

*Anguis* sp.

*Ophisaurus* cfr. *O. pannonicus* Kormos

Varanidae gen. et sp. indet.

Erycinae gen. et sp. indet.

Colubrinae gen. et sp. indet.

Natricinae gen. et sp. indet.

#### BRS5

*Rana* sp.

Testudinata indet.

*Lacerta* (s.l.) sp.

*Ophisaurus* cfr. *O. pannonicus* Kormos

#### BRS9

*Lacerta* (s.l.) sp.

*Ophisaurus* cfr. *O. pannonicus* Kormos

#### BRS20

*Lacerta* (s.l.) sp.

*Ophisaurus* cfr. *O. pannonicus* Kormos

Ophidia indet.

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Tab. 1 - Occurrence of amphibians and reptiles in the Brisighella sites.

#### REMARKS

The aquatic elements such *Rana*, *Trionyx*, an emydid and a natricine (and also some teeth of fresh-water fishes) collected at Brisighella, indicate the presence of fresh-water in the neighbours of the fossiliferous site. *Trionyx* is common also in coastal-lagoonal waters. Nevertheless the aquatic species are represented by one or two fragments. On the contrary the dominant form is *Ophisaurus* cfr. *O. pannonicus*. If we accept an ecology of this species similar to that of recent *O. apodus* we can recognize a generally arid environment. The presence of an erycine belonging (or very close) to the living genus *Eryx* (and in any case to

a fossorial form) confirms the presence of a sandy habitat. The presence of a varanid indicates a warm climate. The composition of herpetofauna differs in the various fissures but *Ophisaurus* is always present with the exception of BRS2. In this fissure the remains of small lower vertebrates are lacking. In the richest fissure (BRS3) all the species, with the exception of the turtles are present. The different herpetological assemblages found in each fissure is due, very probably, to different taphonomic conditions.

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