

Late Miocene anurans from Polgárdi (Hungary)

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Introduction

The Late Miocene (MN13) vertebrate assemblage of Polgárdi is well-known in the paleontological literature (see FREUDENTHAL & KORDOS 1989 and references therein).

For the first time the fossil herpetofauna coming from the classical locality (= Polgárdi 2) has been described by BOLKAY (1913). The subsequent authors focused on different groups or taxa: FEJÉRVÁRY, G. (1917) – anurans; FEJÉRVÁRY, A.M. (1923) – *Pseudopus* (= *Ophisaurus*) *pannonicus*; SZALAI (1934) and MŁYNSKI (1966) – turtles; SZUNYOGHY (1932) and SZYNDLAR (1991a, b) – snakes.

Element	<i>Latonia cf.</i> <i>L. gigantea</i>		<i>Pelobates cf.</i> <i>P. fuscus</i>		<i>Bufo viridis</i>			<i>Hyla</i> sp.	<i>Rana escu-</i> <i>lenta</i> skl.	
	P4L	P4U	P4L	P4U	P4L	P4U	P5	P4U	P4L	P4U
maxilla		1	14							
frontoparietal	1		1				1			
prootic							1			
exoccipital							1			
squamosum			2							
sphenethmoid			1							
praearticular									2	
atlas						1				1
praesacral vertebra	2	1	12	3	1				2	1
sacral vertebra			1		1				1	
urostyle		1				1				
radioulna			1							
ilium			19	3	2			1	5	2
tibiofibula			8	1					2	
femur	1									

Tab. 1. List of isolated bones of anurans from Polgárdi. P4L – Polgárdi 4 "Lower", P4U – Polgárdi 4 "Upper", P5 – Polgárdi 5.

The newly discovered localities near the village of Polgárdi (named as Polgárdi 4 "Lower", Polgárdi 4 "Upper" and Polgárdi 5 – of the same age as Polgárdi 2), were very rich in snake remains (VENCZEL 1994), but their contents in isolated bones of anurans is also noticeable (see tab. 1). The material used in this study belongs entirely to the paleontological collection of the Museum of the Hungarian Geological Institute in Budapest, Hungary.

Systematic part

Discoglossidae

Latonia cf. *L. gigantea* (LARTET, 1851) (figs. 1 – 6)

Material: see Table 1.

The morphology of postcranial elements generally agrees with those of the genus *Latonia* (ROČEK 1994). The outer surface of the maxilla (belonging to a juvenile specimen) is completely smooth, probable representing the ontogenic stadium in which the development of sculpture (= the secondary ossification) was not started yet. A fragmentary maxilla of a juvenile specimen from Sansan, France (MN6), described by ROČEK (1994, fig. 11: A), already with incipient sculpture, had a considerably larger size. The posterior depression, in inner view is not sharply delimited anteriorly.

Abundant large discoglossid remains from Polgárdi 2, described by BOLKAY (1913) as *Pelobates robustus* (pl. 11: figs. 1 – 4) (except for the ilium figured in pl. 11: fig. 5) and *Rana bathyanyi* (pl. 11: figs. 6 – 7) are synonymes of *Latonia gigantea* (ROČEK 1994).

Pelobatidae

Pelobates cf. *P. fuscus* (LAURENTI, 1768) (figs. 9 – 13)

Material: see Table 1.

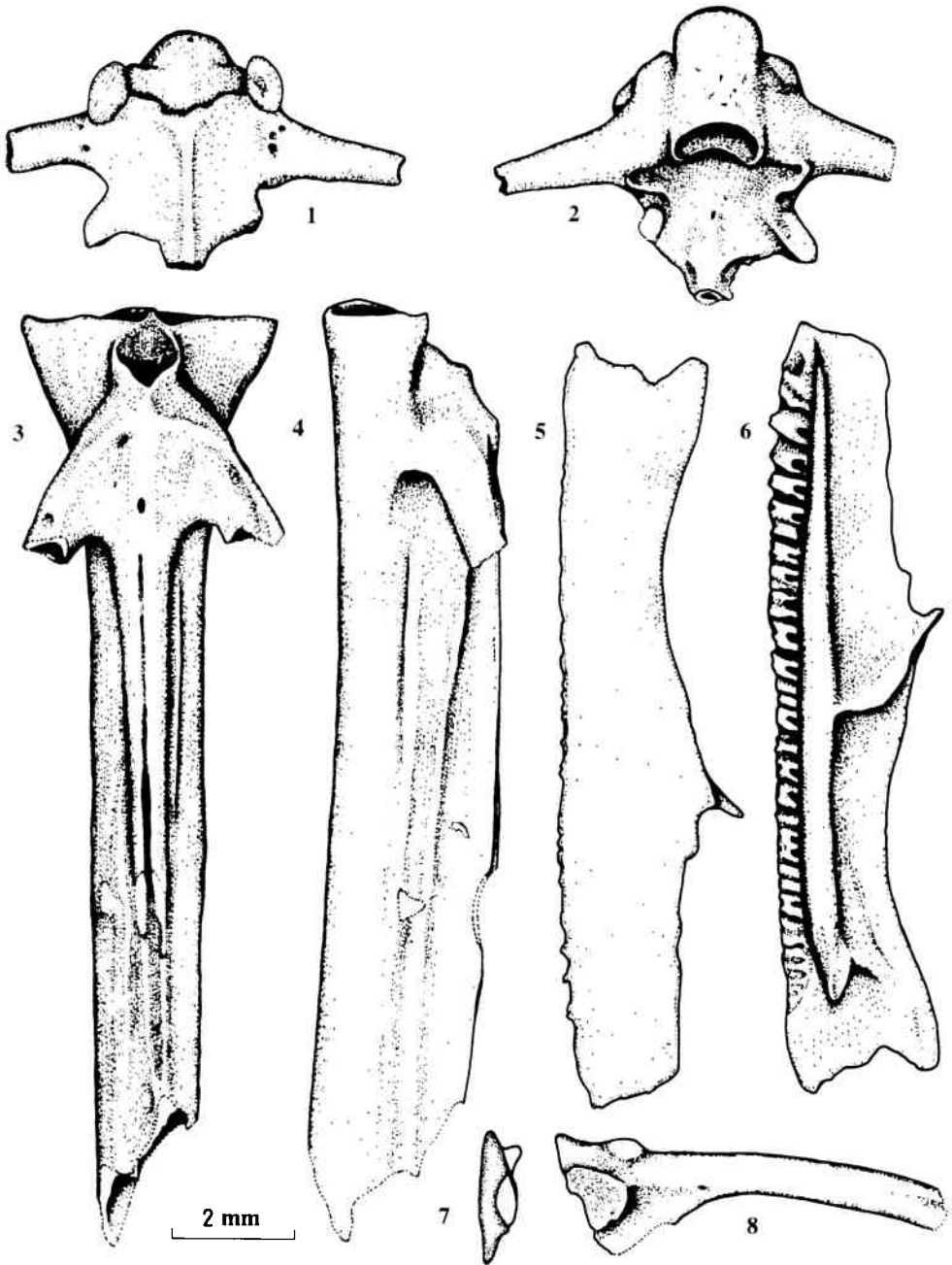
The outer surface of the fragmentary frontoparietal, squamosals and maxillae are sculptured, and are similar in shape and size to those of recent *Pelobates fuscus*. The shape of pars descendens of the ilia display a broad spectrum of intraspecific variation. A well preserved fragment from Polgárdi 4 "Lower" (figs. 9 – 10) is almost identical to that of recent species (see also HODROVA 1985 text fig. 2: 2). The fragmentary ilium described and figured by BOLKAY (1913, p. 195, pl. 11: fig. 5), may have belonged to this form too.

Bufo nidae

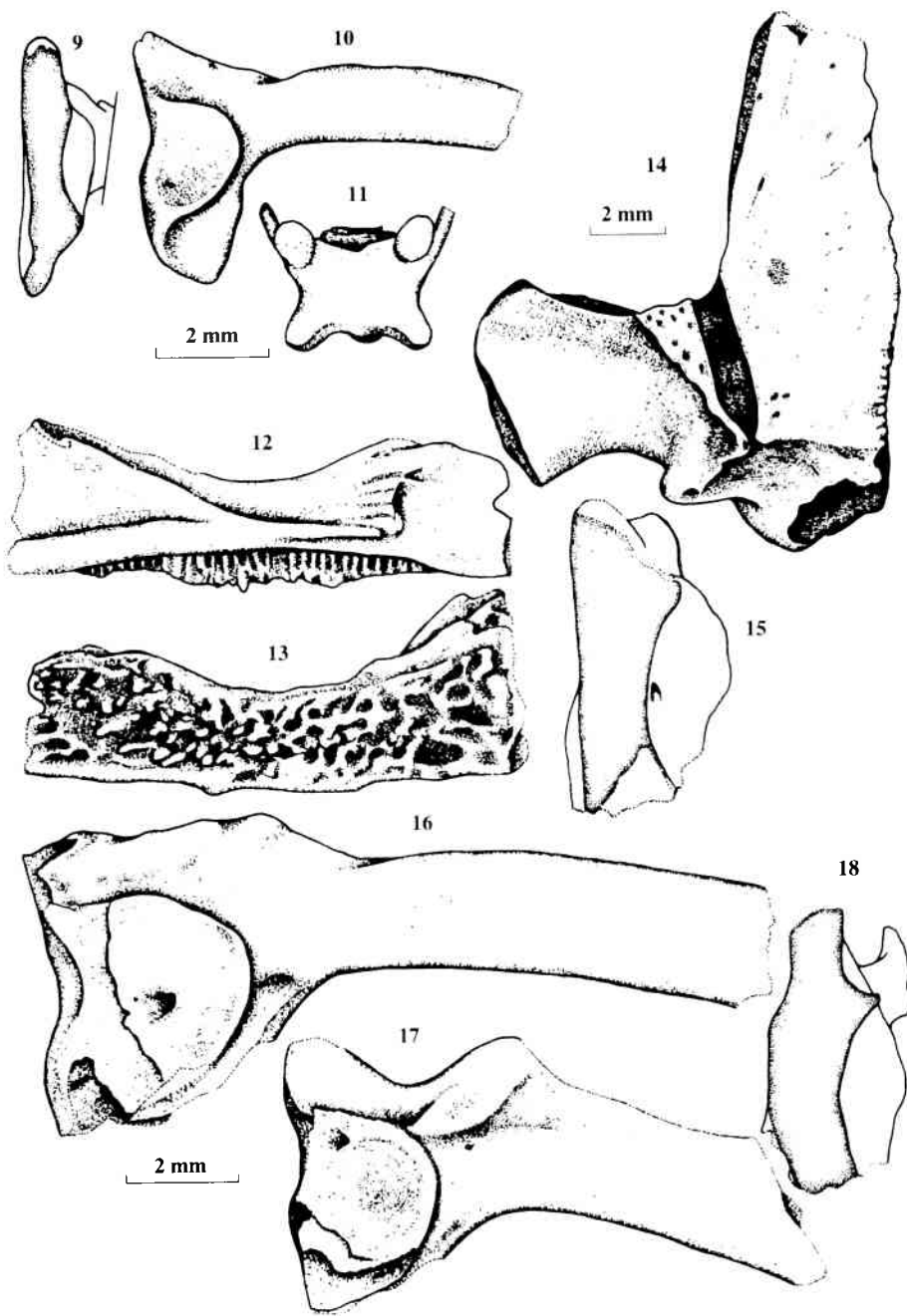
Bufo viridis LAURENTI, 1768 (figs.14 – 16)

Material: see Table 1.

The fused frontoparietal, prootic and exoccipital from Polgárdi 5, belonged to a rather big specimen. The surface of the frontoparietal and the tectum supraorbitale show secondary ossification (fig. 14). The supraorbital canal, posteriorly closed from above by bony ridge, is relatively long, deep and slightly directed anterolaterally. The ilium fragment from Polgárdi 4 "Lower" has the tuber superius only slightly divided in two protuberances and the pra-acetabular fossa is weakly developed (figs. 15 – 16).



Figs. 1 - 8. Fossil remains of *Latonia* cf. *L. gigantea* (Figs. 1 - 6) and *Hyla* sp. (Figs. 7 - 8) from Polgárdi 4 "Upper". Figs. 1 - 2: praesacral vertebra; Figs. 3 - 4: urostyle; Figs. 5 - 6: right maxilla; Figs. 7 - 8: right ilium. 1, 3 - dorsal views; 2 - ventral view; 4, 5, 8 - lateral views; 7 - posterior view.



Figs. 9 – 18. Fossil remains of *Pelobates* cf. *P. fuscus* (Figs. 9 – 13), *Bufo viridis* (Figs. 14 – 16) and *Rana esculenta* synklepton (Figs. 17 – 18). Figs. 9 – 10: right ilium; Fig. 11: praesacral vertebra; Figs. 12 – 13: right maxilla; Fig. 14: left frontoparietal, prootic, exoccipital; Figs. 15 – 16: right ilium; Figs. 17 – 18: right ilium. Figs. 9 – 13 and 15 – 18: Polgárdi 4 "Lower", Fig. 14: Polgárdi 5. 9, 15, 18 – posterior views; 10, 13, 16, 17 – lateral views; 11, 14 – dorsal views; 12 – medial view.

<u>LOCALITIES</u>	<u>AGE / BIOZONE</u>	<i>Latonia</i> sp.	<i>Latonia</i> cf. <i>L. gigantea</i>	<i>Latonia gigantea</i>	<i>Bombina</i> sp.	<i>Bombina</i> cf. <i>B. bombina</i>	<i>Bombina variegata</i>	<i>Eopelobates bayeri</i>	<i>Pelobates</i> sp.	<i>Pelobates</i> cf. <i>P. fuscus</i>	<i>Pelobates sylvaticus</i>	<i>Pitobatrachus langhae</i>	<i>Bufo bufo</i>	<i>Bufo viridis</i>	<i>Hyla</i> sp.	<i>Rana esculenta</i> skl.	<i>Rana dalmatina</i>	<i>Rana arvalis</i>	<u>SOURCE</u>	
Beremend 16/9	Early Biharian								●					●		●			VENCZEL pers.obs.	
Betfia 2/1 – 4	Early Biharian							●				●	●	●		●	●			BOLKAY 1913, FEJÉRVÁRY 1917
Betfia 9A	Early Biharian					●	●			●			●	●	●	●	●			VENCZEL pers.obs.
Vcelare 6/1	Villanyian (MN 17)				●	●					●		●				●	●		HODROVA 1985
Osztramos 1E	Ruscinian (MN 15)			●																VENCZEL pers.obs.
Osztramos 1C	Ruscinian (MN 15)				●					●			●				●			VENCZEL pers.obs.
Osztramos 1B	Ruscinian (MN 15)								●					●			●			VENCZEL pers.obs.
Polgárdi 2	Turolian (MN 13)			●									●				●			BOLKAY 1913, ROČEK 1994
Polgárdi 4U	Turolian (MN 13)		●							●				●			●			this paper
Polgárdi 4L	Turolian (MN 13)		●							●				●			●			this paper
Polgárdi 5	Turolian (MN 13)													●			●			this paper
Tardosbánya	Turolian (MN 12)	●																		ROČEK 1994
Rudabánya	Vallesian (MN 9)	●																		ROČEK 1994
Devínska Nova Ves	Astaracian (MN 6)			●				●					●		●					ROČEK 1988, HODROVA 1988

Tab. 2. Fossil record of anurans in some Miocene – Lower Pleistocene localities. Loc. 1 and 5 – 13 in Hungary, Loc. 2, 3 in Romania, Loc. 4, 14 in Slovakia.

Hylidae

Hyla sp. (figs. 7 – 8)

Material: see Table 1.

The dimension and shape of the ilium is typical for *Hyla*; the tuber superius is undivided, prominent and laterally projected. According to SANCHIZ & MŁYNARSKI (1979), osteologically *Hyla arborea* can not be distinguished from the other member of the genus (*H. meridionalis*), consequently the assignment of the above discussed remain to the former can not be demonstrated. The remains of Hylidae in the Tertiary of Europe are not very numerous (HODROVA 1987 and references therein; HODROVA 1988).

Ranidae

Rana esculenta synklepton (figs. 17 – 18)

Material: see Table 1.

The remains, despite of their fragmentary state are comparable with those of recent *Rana ridibunda* – *R. esculenta* group. The tuber superius of ilia is situated antero-dorsally to acetabulum, its surface being flattened. The tuberculum medium, situated on the medial surface of the bone is usually well developed. Remains of *Rana esculenta* from Polgárdi 2, previously have been reported by BOLKAY (1913).

Concluding remarks

During Messinian times the fluctuating climatic conditions, with partially decreasing humidity (MÜLLER 1983, RÖGL & STEININGER 1983), produced great faunistic changes (STEININGER et al. 1985), which may be evidenced even by the anurans of Polgárdi. In the Polgárdi 4 "Lower" and "Upper" localities, the relative abundance of pelobatid remains against Discoglossidae, as well as the lack of some anuran groups (e.g. Palaeobatrachidae), may be evidence of climatic and paleoenvironmental changes. During Pliocene times, the genus *Latonia* is well represented in some Hungarian localities (abundant remains, belonging to rather large specimens are present in Beremend 1 locality - pers.obs.), surviving up to the Late Pliocene (see tab. 2.). The remains of *Pelobates robustus* from Polgárdi 2 belong only partially to *Latonia gigantea* (see above), while those from Betfia (= Püspökfürdő), Romania belong to *Pelobates fuscus*, the latter form being very abundant in the newly discovered localities from Betfia too (e.g. in Betfia 9A).

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