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PRELIMINARY NOTE ON A SPECIMEN OF PROLACERTIFORMES (REPTILIA)
FROM THE NORIAN (LATE TRIASSIC) OF PREONE (UDINE, NORTH-EASTERN ITALY)

*DESCRIZIONE PRELIMINARE DI UN PROLACERTIFORME (REPTILIA)
DAL NORICO DI PREONE (UDINE, ITALIA NORD-ORIENTALE)*

Abstract - A new Prolacertiform (Reptilia) from the Norian (Late Triassic) of Preone (Udine, North-Eastern Italy) is described. It is a reptile of medium size, vertebral column composed of ?9 cervical, ?14 thoracic, 2 sacral and more than 13 caudal vertebrae; the cervical vertebrae are elongate. The dentition includes a typical elongate tooth with a flat multicusped crown. The specimen is preliminarily allocated to the genus *Langobardisaurus*, with the specific denomination *tonelloi*.

Key words: *Langobardisaurus*, Reptilia, Norian, Friuli, Italy.

Riassunto breve - Viene descritto un nuovo Prolacertiforme (Reptilia) proveniente dai depositi del Norico di Preone (Udine, Italia Nord-Orientale). Si tratta di un rettile di media taglia; la colonna vertebrale è composta da ?29 vertebre cervicali, ? 14 toraciche, 2 sacrali ed almeno 13 caudali. La dentizione include un caratteristico dente allungato, multicuspidato. Allo stato attuale degli studi si ritiene opportuno assegnare questo esemplare preliminarmente al genere *Langobardisaurus*, con la denominazione specifica *tonelloi*.

Parole chiave: *Langobardisaurus*, Reptilia, Norico, Friuli, Italia.

Introduction

At the end of 1989 Mr. Ruggero Tonello from Montenars donated a fossil which came from the vicinity of Preone (Udine) to the Museo Friulano di Storia Naturale in Udine. The fossil was a reptile, preserved on two blocks of light brown dolomite: it appeared to be preserved mainly on the bigger slab and only partly on the smaller one. Most of the skeleton was covered by dolomite and it was obvious that complex preparation was necessary to clean and consolidate the specimen.

Because of the importance and uniqueness of this find, the specialist staff of the Staatliches Museum für Naturkunde of Stuttgart was assigned the task of preparation. Dr. Wild of Stuttgart Museum and the author agreed that the best option would be to glue the two blocks together again and to prepare them in full relief, paying particular attention to the skull. Before preparing the fossil in this way, full photographic documentation was undertaken, as

this kind of restoration will not allow a later study of details, e.g. especially of the dentition.

Recrystallization has prevented perfect preservation of the bones, but the final result of the restoration and preparation was successful, revealing many interesting skeletal details. The osteology of the specimens of Prolacertiformes kept in the Museo Friulano di Storia Naturale of Udine will be described in detail in a future publication.

Geological setting

This new reptile comes from the "Dolomia di Forni" of Seazza creek valley (Preone, Udine), which is dated to be Alaunian (Middle Norian) in age on the basis of its conodont content (ROGHI et al., 1995). The "Dolomia di Forni" is composed of dolostones whose colours vary from dark to light brown. The beds vary from well stratified (a few centimeters to several decimeters thick) to thin stratified, with dolomitic intraclasts interpreted as turbiditic or debris flow deposits (DALLA VECCHIA, 1991).

Other reptiles from these units which have already been described in the literature include: *Megalancosaurus preonensis*, ? *Langobardisaurus rossii*, *Preondactylus buffarinii* and *Eudimorphodon rosenfeldi*. (DALLA VECCHIA, 1991; 1994; 1995; DALLA VECCHIA et al., 1989; 1991; DALLA VECCHIA & MUSCIO, 1991). A complete list of the fossil vertebrates from this formation can be found in SIRNA, DALLA VECCHIA, MUSCIO & PICCOLI (1994); in this publication the specimen described here is indicated as "*Macrocnemus*".

Systematic Paleontology

Class	Reptilia
Infraclass	Archosauromorpha
Plesion	Prolacertiformes
Genus	<i>Langobardisaurus</i> RENESTO, 1994
Type species:	<i>Langobardisaurus pandolfii</i> RENESTO 1994

Langobardisaurus ? tonelloi n. sp.

Synonymy: «*Macrocnemus*» in SIRNA et al. (1994), p. 263.

Derivatio nominis: dedicated to the discoverer, Ruggero Tonello from Montenars (Ud).

Holotype: n. 1921 MFSN (Museo Friulano di Storia Naturale, Udine).

Horizon: Lower member of «Dolomia di Forni» (sensu DALLA VECCHIA, 1991), Alaunian 2/3, Norian (Late Triassic) (ROGHI et al., 1995).

Locality: Seazza creek Valley, Preone, Udine, Friuli-Venezia Giulia.

Diagnosis: Prolacertiform reptile of medium size: vertebral column composed of ?9 cervical, ?14 thoracic, 2 sacral and more than 13 caudal vertebrae; cervical vertebrae are elongate. Dentition includes a typical

elongate tooth, with a flat multicusped crown (in total several dozens of small cusps), followed by tricusped teeth which become smaller from the back to the front of the maxilla and lower jaw; conical teeth sharp on the posterior end of the dentary. The ratio of humerus to femur lengths is 0,75. Hind limbs remarkably stronger than anterior ones. Phalangeal formula of the manus 2 3 5(4) 5 4(3) and for the pes 2 3 4 5(4) 3. Metatarsal and metacarpal length increasing from I to IV; metatarsal V short and compressed.

Osteological characteristics

The specimen is nearly complete and is preserved in dorsal view. The anterior part of the vertebral column is partly disarticulated and is bent backwards together with the skull. The latter is exposed in right lateral view. The shoulder girdle is fragmentary and the right forelimb is missing (a part of the humerus is preserved). The pelvic girdle and hind limbs are fully articulated. The distal part of the tail is missing. The complete length of the animal is estimated to be about 40 cm.

Skull and dentition

The skull is elongate, triangular in lateral view and possesses a wide orbital opening. The total length of the skull is 48 mm. The lower jaw and upper jaws are clearly recognizable; some of their teeth are well preserved. The lower jaw is 38 mm long. The dentary carries an elongate

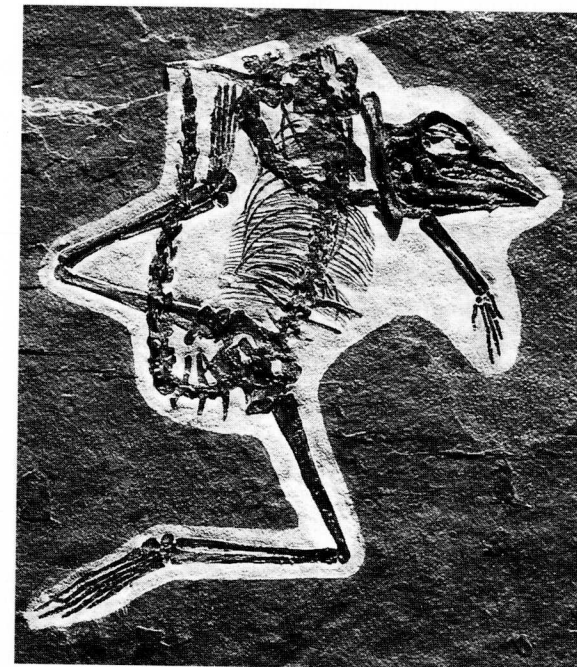


Fig. 1 - *Langobardisaurus ? tonelloi*.
- *Langobardisaurus ? tonelloi*.

posterior multicuspidate tooth of 5 mm length and with dozens of small cusps, this is followed posterior-anteriorly by 5 tricusped teeth decreasing in length, then there are another 4 or 5 smaller tricusped teeth. Some sharp conical teeth (possibly 5) are visible on the anterior part of the dentary they are partly covered by skull bones.

On the maxilla an elongated tooth is developed, very similar to the one in the lower jaw to which it corresponds. A part of the strong fang is also visible: some fifteen cusps can be counted on the outer edge, whereas about ten are visible on the lower surface of this tooth. There are following four tricusped teeth on the upper jaw whose dimensions decrease anteriorly, they appears to be covered by skull elements.

Vertebral column

The articulation between the skull and the cervical vertebral column is not visible because of the backward distortion of the vertebral column and the position of the right humerus, which covers the occiput.

The cervical vertebrae are elongate: their length is about 10-12 mm. Although the first vertebra is not visible and part of the cervical vertebral column is not preserved, there is space to accommodate at least 8 or 9 cervical vertebrae. Some of the cervicals are preserved in medial section: they are procoelous, and do not present apophyses or other processes, as a result of the preservation.



Fig. 2 - Detail of the dentition of *Langobardisaurus ? tonelloi*.
- Particolare della dentizione di *Langobardisaurus ? tonelloi*.

There are at least 14 dorsal vertebrae, but the anterior representatives are badly preserved and partially covered by cervicals and by a small patch of organic material which probably represents the stomach contents. The posterior dorsal vertebrae are recognizable. The last four are amphicoelous, carrying elongated transverse processes and decreasing in length caudally. About ten pairs of ribs can be seen; they are bent and elongated. There follow two sacral vertebrae with flat and wide transverse processes.

The first three caudal vertebrae show transverse processes which tend to become shortened and reduced. They do not have a marked neural spine. The succeeding vertebrae become more elongate and the transverse processes reduce posteriorly after the 4th and 5th caudal vertebrae becoming vestigia in the following vertebrae. The caudal vertebrae show well developed pre- and postzygapophyses.

The anterior part of the tail is visible in dorsal view and then in lateral view, due to torsion. At least 15 caudal vertebrae are recognizable, but the distal part of the tail is absent.

Forelimb

The right forelimb is complete but disarticulated. The humerus covers the posterior part of the skull and the cervical region of the vertebral column. Only the humerus is preserved from the left limb.

The right limb shows an elongate, sturdy humerus, detached from the shoulder girdle. Radius, ulna and manus are minimally disarticulated. It is evident that in this limb the interosseous space is extremely reduced, a feature also true of the hindlimb.

The ulnar has a circular section and it is rather developed, while the radial, with a quadrilateral shape is considerably reduced; it is also recognizable an elongate central, elongated and stout metacarpals whose length increases from I to IV, and subsequently decreases in V, which is about as long as I.

The osseous material is recrystallized and the bones are fragmentary, preventing a reconstruction of the phalanges. In the 1st digit the end phalanx is claw-shaped, whereas in the other digits the end phalanges are rounded. The phalangeal formula for the manus appears to be 2 3 5(4) 5 4(3).

skeletal elements	measurements in mm
humerus length	36.5
humerus proximal width	5.0
humerus distal width	6.0
radius	27.0
ulna	26.5
metacarpal III	8.0
metacarpal IV	9.0

Tab. I - Measurements of the forelimb.
- Misure relative all'arto anteriore.

Hindlimb

The right limb is complete and well preserved, whereas on the left side the proximal part of the femur is covered by the pelvic girdle. The left hindlimb is partly disarticulated and covered by caudal and sacral vertebrae. In the right limb, the distal parts of tibia and fibula are partly obscured by the tail.

The femur is strong and elongated, the tibia is longer than the fibula.

The right pes presents a calcaneum with circular section, an elongate astragalus and a quite reduced centrale. The distal tarsals are present but are not easily recognizable. Metatarsal V is short and compressed and measures 5 mm long. The other metatarsals are elongate; their length increases from I to IV (from 16,5 to 24 mm). The first phalanx of the fourth toe is 21 mm long.

The phalangeal formula of the pes seems to be 2 3 4 5(4) 3. The last phalanx is slightly bent and ends in a sharp tip. As a consequence of the preservation, the articular facets between the phalanges are not clearly distinguishable and it is not possible to recognize the formula in the left hindlimb because its distal end is missing.

The left pes presents a much better preserved metatarsal area: the calcaneum is circular in shape and there is a strong and elongated astragalus. Metatarsal V is enlarged in its central part and its distal end is concave. This might be due to deformation caused by a compaction onto an underlying bony fragment. The distal part of metatarsal V is slightly bent. Metatarsals I-IV and the phalanges are badly preserved and partly missing.

skeletal elements	measurements in mm	
	right	left
femur length	48.5	49.0
femur proximal width	6.5	7.0
femur distal width	2.5	3.0
fibula	42.5	43.0
tibia	46.0	45.5
metatarsal III	22.0	22.0
metatarsal IV	24.0	--

Tab. II- Measurements of the hindlimb.
- Misure relative all'arto posteriore.

Systematic conclusions

Preliminary study of MFSN 1921 reveals several similarities with members of the plesion Prolacertiformes CAMP, 1945. In the description of another prolacertiform from this same area (BIZZARINI & MUSCIO, 1995), it has been pointed out that the genera which can be referred to are *Macrocnemus*, *Tanystropheus* and *Langobardisaurus*. As far as the latter genus is concerned, it should be borne in mind that there are substantial differences between *L. pandolfii* RENESTO, 1994 and *L. ? rossii* BIZZARINI & MUSCIO, 1996.

In some respects the specimen described above seems to lie close to *Langobardisaurus*, whereas other characteristics suggest a position intermediate between *Langobardisaurus* and *Macrocnemus* (for instance, as far as the limb length in *L. pandolfii* and *L. ? rossii*, the humerus and femur are, respectively, longer than the radius and tibia, with a ratio varying between 1.5 and 1.2, while in *Macrocnemus* these ratios are 1.06-1.08 for humerus/radius and 0.90-0.98 for femur/tibia, cfr. tab. III).

The phalangeal formulae of the new specimen appear substantially different to those of *Langobardisaurus pandolfii*, *L. ? rossii* or *Macrocnemus* but, as already mentioned, these parts are preserved in a way which do not allow definite counting. The dentition is very significant because of the unique elongate, strong multicuspidate tooth; this tooth is not known in any of the genera mentioned above. Therefore, at this initial stage of the study, it seems appropriate to tentatively attribute this specimen to the genus *Langobardisaurus*, with the specific denomination *tonelloi*. A detailed examination of the features and habitat of this specimen lies outside the aims of this publication. However, it is possible to suggest areas for further work. For instance, dental features - as they appear in this specimen - suggest a varied diet, as pointed out for *L. ? rossii* (BIZZARINI & MUSCIO, 1995) rather than an insectivorous diet as suggested for *L. pandolfii* (RENESTO, 1994). Also, the limb structure might indicate that this reptile's habits were not exclusively terrestrial.

	<i>L. ? tonelloi</i>	<i>L. ? rossii</i>	<i>L. pandolfii</i>	<i>Macrocnemus</i>	<i>Tanystropheus</i>
font		BIZZARINI & MUSCIO, 1995	Renesto, pers. com.	RIEPEL, 1989	WILD, 1973
length of the specimen	>40 cm	40 cm			
length of the skull	48 mm	35 mm			
humerus	36.5 mm	35.5 mm			
radius	27 mm	23 mm			
ulna	26.5 mm	26 mm			
metacarpal III	8 mm	7 mm		IV>III	III>IV
metacarpal IV	9 mm	7 mm			
femur	48.7 mm	40 mm			
femur distal width	2.7 mm				
femur prox. width	6.7 mm				
fibula	42.5 mm	23 mm			
tibia	45.7 mm	27 mm			
metatarsal III	22 mm			IV>III	III>IV
metatarsal IV	24 mm				
humerus/femur	0.75	0.89	0.66	0.76-0.80	0.64-0.78
humerus/radius	1.35	1.54	1.5	1.06-1.08	
femur/tibia	1.06	1.48	1.16-1.19	0.98-0.90	1.16-1.39
humerus/metacarpal III	4.56	5.07	7.2		
humerus/metacarpal IV	4.05	5.07		3.70	
femur/metatarsal III	2.21		2.6		
femur/metatarsal IV	2.03			1.82-2.01	
manus phal. formula	2, 3, 5(4), 5, 4(3)	2, 3, 3, 4, 3	2, 3, 4, 5, 3	2, 3, 4, 5, ?3	2, 3, 4, 4, 3
pes phal. formula	2, 3, 4, 5(4), 3		2, 3, 4, 5, 3		2, 3, 4, 5, 4

Tab. III- Morphometric comparison between the skeleton of *Langobardisaurus*, *Macrocnemus* and *Tanystropheus*.

- Tabella di comparazione fra le misure scheletriche di *Langobardisaurus*, *Macrocnemus* e *Tanystropheus*.

A revision of all prolacertiform reptiles from the Upper Triassic of the Alps is needed, both for a clarification of their systematic positions, and discussion of their taphonomy, palaeoecology and functional morphology.

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