

NOTA BREVE - SHORT NOTE

**CTENOGNATHICHTHYS BELLOTTII (DE ALESSANDRI, 1910):
NOMENCLATURAL PROBLEMS AND STRATIGRAPHICAL IMPORTANCE
OF THIS MIDDLE TRIASSIC ACTINOPTERYGIAN FISH**

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Riassunto. Durante la revisione della collezione paleontologica depositata presso il Liceo Ginnasio 'A.Volta' di Como, è stato rinvenuto l'esemplare figurato da De Alessandri (1910) come esemplare tipico della sua nuova specie *Heterolepidotus (?) bellottii*. Ciò solleva una questione nomenclaturale, poichè, considerando perso il materiale originario, è stato recentemente istituito un neotipo in seguito all'attribuzione di questa specie al nuovo genere *Ctenognathichthys* (Bürgin, 1992). Seguendo il Codice Internazionale di Nomenclatura Zoologica, la questione è stata sottoposta alla Commissione Internazionale di Nomenclatura Zoologica. Poichè alcuni requisiti necessari per l'erezione di un neotipo non sono stati soddisfatti, l'olotipo deve essere considerato a tutti gli effetti come l'esemplare portatore del nome. Viene inoltre messa in evidenza l'importanza stratigrafica di questa specie presente sia nella Formazione di Perledo-Varenna (materiale originario) che nella Formazione di Besano (Scisti Ittiolitici di Besano o Grenzbitumenzone Auct.). Questo conferma che la fauna di Perledo, generalmente considerata un tutt'uno, è in realtà composta da almeno tre diverse associazioni di fossili avendo alcune specie (probabilmente 3) in comune con la fauna della Formazione di Besano e della parte inferiore del Calcare di Meride (Ladinico inferiore) e almeno cinque specie in comune con la fauna della Kalkschieferzone (membro sommitale del Calcare di Meride, Ladinico sommitale) rinvenuta a Ca' del Frate (Viggiù, Varese, Italia) e nei pressi di Meride (TI-CH).

Abstract. The existence of one of the original specimens of *Ctenognathichthys bellottii* (De Alessandri 1910), figured and labelled as 'type specimen' by De Alessandri himself, raises a nomenclatural question as there is also a neotype designated by Bürgin (1992). The International Commission of Zoological Nomenclature has been asked to rule on the validity of the neotype. As some of the requirements for the designation of a neotype were not met, the holotype should be treated as the name-bearing type. The discovery of this species in both the Besano Formation (Grenzbitumenzone Auct.) and the Perledo-Varenna Formation is very important from a stratigraphic point of view, confirming that the so called Perledo fish-fauna is composed of different assemblages. In fact, the Perledo fauna has most species in common with the Ca' del Frate (Viggiù, Varese, Italy) fauna from the Kalkschieferzone (uppermost Meride Limestone), which is latest Ladinian in age, while a few of the Perledo species have been found also in the Grenzbitumenzone and/or in the lower Meride Limestone of Lower Ladinian age.

Introduction.

During the revision of the paleontological collection stored in the Liceo Ginnasio 'A.Volta' school in Como (Italy), I was charged by the Archeological Survey of Lombardy with the Triassic vertebrates. This small collection consists of twenty specimens, mainly found in the quarries around Perledo (Lecco, northern Italy). This material proved to be very important because, like almost all the other specimens known from Perledo, it was collected in the first half of the last century and was used by De Alessandri (1910) for his monograph on the Triassic fishes from Lombardy. Since then, very few specimens have been collected and, in any case, nobody has ever described them. Furthermore, the Museo Civico of Milano, which housed the main collection, was destroyed during the Second World War, so that few of the described specimens have survived, the ones stored in the Senckenberg Museum in Frankfurt and in the Italian Geological Survey in Rome, other than those in Como.

The reason why almost all Perledo vertebrates have been found during the last century is still unknown. Quarry work, in fact, was carried on until 40 years ago, but new paleontological finds were limited to a few remains of *Saurichthys* and *Lariosaurus*, while some other specimens have been collected by the author during field surveys.

As for many other old collections, the exact stratigraphic position of the fossils inside the Perledo-Varenna Formation is not known; this is particularly regrettable since the unit is about 600 m thick (Gaetani et al., 1992). Nonetheless, comparison with the other Middle Triassic faunas recovered not far from Perledo (the Kalkschieferzone from Ca' del Frate (Viggiù, VA, Italy) and Meride (TI, CH) and the Besano-Monte S.Giorgio

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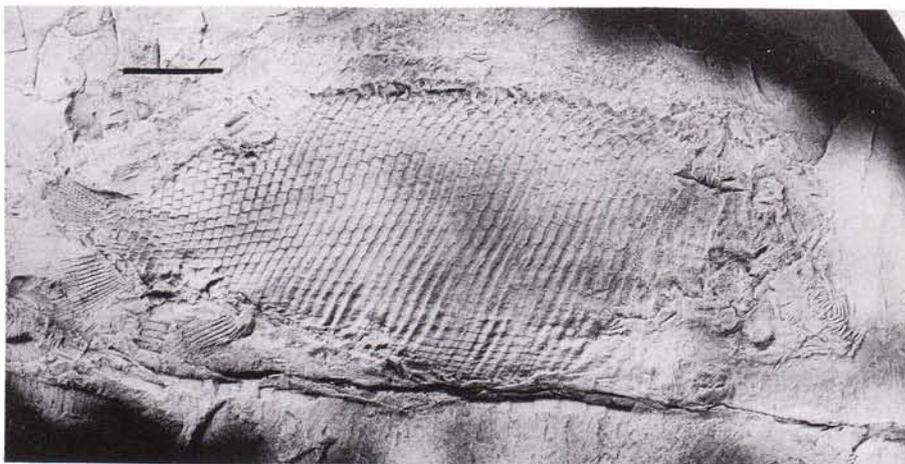


Fig. 1 - *Ctenognathichthys bellottii* (De Alessandri 1910): the holotype from Perledo, stored at the Liceo Ginnasio Statale 'A.Volta', Como, Italy (catalogue n. 96.3890.10623). Specimen dusted with ammonium chloride. Scale bar = 20 mm.

fauna) helps us in the stratigraphic definition of the Perledo fossils.

The lack of a complete modern revision of the Perledo fishes can be easily ascribed to the shortage of new material, giving even greater importance to historical collections.

Bürgin (1992) erected the new genus *Ctenognathichthys*, to which he assigned a few Grenzbitumenzone specimens of the species *Ctenognathichthys bellottii*, originally described on Perledo material as *Heterolepidorus* (?) *bellottii* by De Alessandri (1910). Bürgin (1992, p.78) designated also a neotype for this species, assuming the original specimens to be lost. Actually, the type specimen still exists in the collection of the Liceo Ginnasio 'A.Volta' in Como, where it has been housed for at least 60 years (Fig. 1).

The type specimen of *Ctenognathichthys bellotti* (De Alessandri, 1910).

Bürgin (1992, p. 78), describing the new genus *Ctenognathichthys*, wrote "The holotype was said to be located at the Museo Civico di Como, Italy (De Alessandri: 111). However, an intensive search failed to locate this specimen (G. Achermann, pers. comm.). Thus, it is necessary to designate a neotype. The neotype has been chosen from the Tessin collection and represents an almost complete specimen (PIMUZ T.4349) from Point 902 (layer 165), preserved in lateral aspect (Figs. 83 & 84)".

Actually, I was also asked to help in locating the type specimen. At the time I did not know the exact composition of the Como school collection, so I gave Bürgin (phone comm.) the address and phone number of the Liceo Ginnasio 'A.Volta'. On the other hand, G. Achermann, a Swiss reporter living in Italy, apparently never asked the Director of the Museo Civico di Como about the Perledo material (L. Castelletti, written comm.). Thus, neither was the director of the Museo Civico di Como directly inquired about the Perledo ma-

terial, nor was my suggestion followed. Therefore, Bürgin's reasons for believing the holotype to be lost are very weak (ICZN 1985, art. 75 d(3)). Furthermore, the designation of a neotype is not compulsory (ICZN 1985, art. 75a); in this case it was not necessary because no "exceptional circumstances" (ICZN 1985, art. 75b(ii)) existed, *Ctenognathichthys bellotti* being the only species ascribed to the genus, with no possibility of being confused with similar species. In addition, other rules were not fulfilled by Bürgin (1992) in erecting the neotype, especially regarding its locality and supposed age. It comes, in fact, from the Grenzbitumenzone of Monte S.Giorgio, whose stratigraphic and geographic positions are remarkably different from those of the type specimen (ICZN 1985, art. 75d(5)).

Thus, in my opinion, even assuming the type specimen to be lost, there was no need to designate a neotype. However, as the ICZN (1985, art. 75h) states that similar cases must be referred to the Commission, I submitted the question to the International Commission on Zoological Nomenclature. Finally, as some of the requirements for the designation of a neotype were not met, the holotype should be treated as the name-bearing type without any further Commission pronouncement (P. Tubbs, written comm.).

By the way, in that same paper (Bürgin, 1992), erecting the new species *Peltopleurus nothocephalus*, Bürgin (1992, p. 123) gave the correct etymology of the specific name, but then used *Peltopleurus nothosomoides* throughout the description as well as in the captions (but see Bürgin, 1992, pag. 5 and 155). That the two names referred to the same species is proved by the holotype (PIMUZ T.2902) which is figured as *Peltopleurus nothosomoides* (Bürgin, 1992, fig. 148) after having been cited as *Peltopleurus nothocephalus*. As Bürgin himself agrees (written comm.), I consider *Peltopleurus nothocephalus* as the valid specific name, for which the etymology has been given, under the ICZN (1985, art. 24). The specific name *Peltopleurus nothosomoides* must then be considered a junior synonym.

The original material of *Ctenognathichthys bellottii* stored in Como consists of a complete specimen, though the body and the posterior half of the skull are



Fig. 2 - The original label, most probably handwritten by De Alessandri, which was glued on the lower surface of the slab of the holotype of *Ctenognathichthys bellottii* (De Alessandri 1910).

preserved as counterparts. Glued to the specimen was a hand-written label (Fig. 2), most probably by De Alessandri himself, as all the specimens he cited in his work (De Alessandri, 1910) bear similar labels. Being on the underside of the specimen, the label is somewhat worn, but still legible: 'Esempl(are) tipi(co)' = type specimen. Also the locality 'Perledo' is clear, even if De Alessandri wrote (1910) that the specimen was without previous label, but being together with the other Perledo specimens and in rock of the same lithology it could well have come from the Perledo area. I agree with his interpretation because its preservation is that peculiar to the Perledo fishes.

In De Alessandri's (1910) picture this specimen appeared incomplete (see also Bürgin, 1992) because the head remained unprepared and covered by a thin layer of matrix. I have prepared the hidden region, but, as in most of the Perledo material, the scarce bone preservation makes the boundaries of the individual bones very uncertain.

The large tooth-bearing bones are detectable and the peculiar teeth, which gave the name to this genus, are also distinctly visible. The broad frontals and the other dermal bones of the skull roof cannot be traced in detail, but they seem very close to the restoration made by Bürgin (1992). The opercular is more rectangular than in Bürgin's restoration, and its size is comparable to that of the subopercular. Unfortunately, the preopercular region is disturbed and its peculiar shape cannot be detected.

Squamation is composed of 43-44 transverse rows, each with 18 scales (respectively about 45 and 20 in the Grenzbitumenzone specimens). Trunk scales are rectangular, and higher than long except in the six most ventral elements of each row, where scales become suddenly

very low, the length being twice their height. Toward the caudal region, scales become gradually rhombic, losing the denticulation of the posterior edge that is quite strong in the trunk region. Also, the ornamentation of the scales varies with position on the body. Along the dorsal margin, in front of the dorsal fin, dorsalmost scales are heavily ornamented with longitudinal ridges. Thinner ridges are present all along the trunk region, being somewhat stronger in the ventral part, just above the low ridges. The small dorsal fin originates at the 31st scale-row, while the anal begins four rows in advance; both fins are very small. The caudal fin shows 6-7 epaxial rays. More than 30 segmented lepidotrichia are preserved and the central ones probably have been destroyed in the past during preliminary preparation. The ventral lobe of the caudal fin, as well as the anal, is preserved as impression: this kind of preservation, with the extremities of the fish remaining on the counterpart, is common among the few known specimens from Perledo.

After the preparation of and the new observations on the Como specimen, described and figured by De Alessandri (1910), its conspecificity with the new material described by Bürgin (1992) and its status as the original type specimen of the type species of *Ctenognathichthys* is beyond any doubt.

Stratigraphic significance of *Ctenognathichthys bellottii*.

While very little interest has been paid recently to the Perledo vertebrate fauna, another famous Middle Triassic paleontological area, the Besano-Monte S. Giorgio, has seen a renewal of studies, especially concerning fishes. The two localities are about 35 km apart from each other and both fossiliferous sequences span almost the whole Ladinian. They formed in the same sedimentary basin, but under different environmental conditions (Bernasconi, 1991; Tintori, 1992; Bernasconi & Riva, 1993; Lombardo, 1997, Tintori & Lombardo, in press).

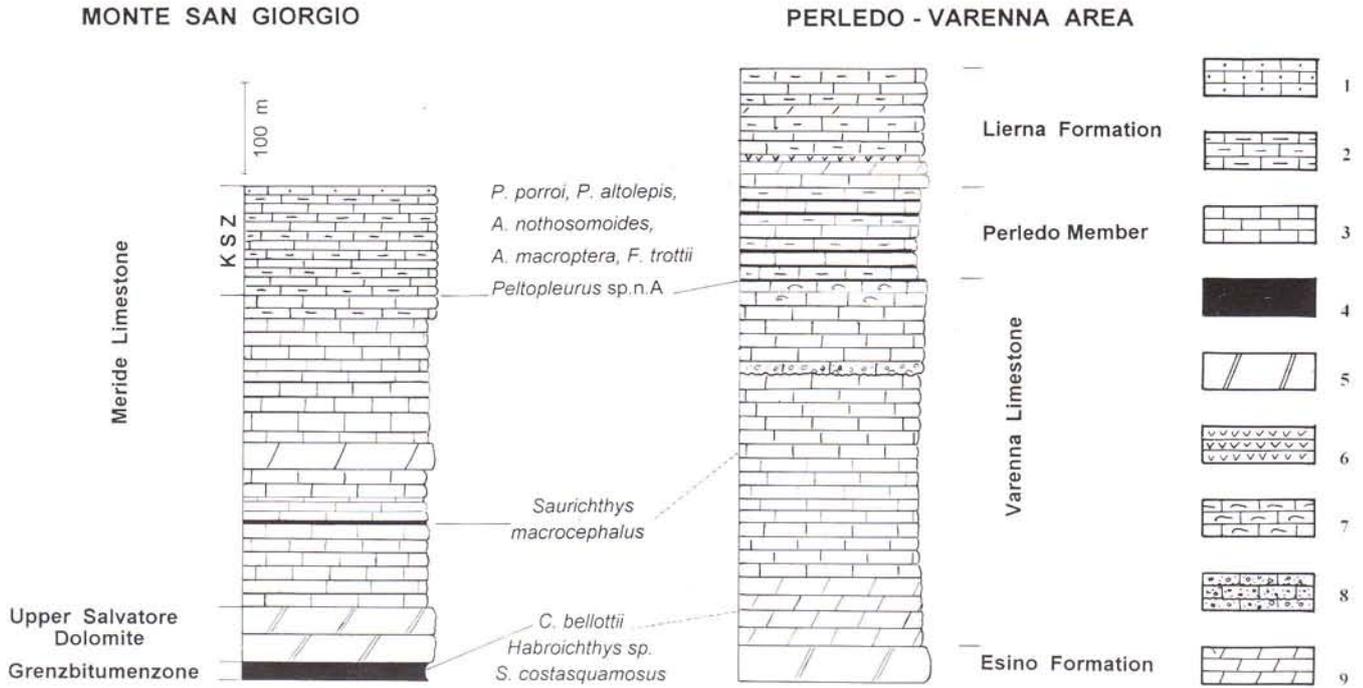


Fig. 3 - Stratigraphy of the Besano-Monte S. Giorgio and the Perledo-Varenna area with correlation based on fishes present in both the sequences. KSZ, Kalkschieferzone; *P. porroi*, *Probalecites porroi*; *P. altolepis*, *Perleidus altolepis*; *A. nothosomoides*, *Allolepidotus nothosomoides*; *A. macroptera*, *Aneurolepis macroptera*; *F. trottii*, *Furo trottii*; *C. bellottii*, *Ctenognathichthys bellottii*; *S. costasquamosus*, *Saurichthys costasquamosus*. Lithology: 1, sandy limestones; 2, marls; 3, thin bedded limestones, sometime laminated; 4, organic matter rich shales; 5, massive dolostones; 6, volcanic ashes; 7, biocalcarenitic limestones; 8, intrabasinal breccias; 9, thin bedded dolostones.

In the Besano-M.te S. Giorgio-Viggiù area, the site of Ca' del Frate (Viggiù-VA) has been exploited since the beginning of the 80s (Tintori et al., 1985; Tintori & Renesto, 1990; Tintori, 1990a,b). It is situated in the Kalkschieferzone, the upper member of the Meride Limestone (Senn, 1924). This member yields vertebrates from several levels (Bürgin, 1995; Furrer, 1995; Wirz, 1945; pers. obs.) across its 100 m of thickness; fish species, though, seem to have an uneven distribution, some of them being very common throughout the unit, and others being represented by single or rare specimens. Lombardo (1997) describes 15 species from Ca' del Frate, while in different levels in the area of Meride only a few species have been found, some so far unknown from Ca' del Frate (Tintori et al., in press). After the 1996-97 field seasons in Ca' del Frate and Meride, the recovered fish specimens number more than 3,000, of which at least 95% belong to the small species *Probalecites porroi* and fewer than 5% have been collected around Meride.

A few fish species are common to Perledo and Ca' del Frate: *Probalecites porroi*, *Perleidus altolepis*, *Allolepidotus bellottii*, *Peltolepus* sp. n. A, *Aneurolepis macroptera* and *Furo trottii*. Other species found in the Perledo area are unknown in the Kalkschieferzone, but have been found in the older vertebrate levels of the Monte S. Giorgio area (Fig. 3).

For instance, apart from a detached mandible (Tintori et. al, in press) and a large skull recently found

in the lower Kalkschieferzone near Meride, *Saurichthys* seems to be absent in the middle Kalkschieferzone fossiliferous level of Ca' del Frate. This fact led Tintori (1990b) to assume, for the first time, that the Perledo fauna, where *Saurichthys* is well represented, embraces different fossil assemblages. Actually, Rieppel (1985), in his revision of the Middle Triassic *Saurichthys*, observed that *Saurichthys macrocephalus* is present in both the Perledo and the lower Meride Lm. faunas and that *Saurichthys costasquamosus* has been found in the Grenzbitumenzone and the Perledo faunas, without discussing the stratigraphical implications.

Ascribing Grenzbitumenzone specimens to the species *Ctenognathichthys bellottii*, which is not found above this level, Bürgin (1992) further strengthened the similarity between the Grenzbitumenzone and part of the Perledo faunas, to which belongs the original specimen described by De Alessandri (1910).

The fact that *Saurichthys costasquamosus* and *Ctenognathichthys bellottii* are found in the Perledo-Varenna Formation, and are yielded also by the earliest Ladinian beds of the Grenzbitumenzone, seems to contradict the age of the base of the former unit, which is considered upper Early Ladinian on the basis of conodonts (Gaetani et al., 1992). However, the actual age difference between the two units yielding *Saurichthys costasquamosus* and *Ctenognathichthys bellottii* may be very small (A. Nicora, pers. comm). The fact that these two species are found also in the late Early Ladinian suggests their di-

tribution could cover a wider time-span than we previously knew. Actually, two species of *Cnenognathichthys*, one very close to *Cnenognathichthys bellottii*, have been recently found in the Middle Ladinian Pro-santo Formation of Eastern Switzerland (Bürgin, pers. comm.). The same can be hypothesized for other fishes of the Grenzbitumenzone: some factors, such as a change in the depositional environment in the Besano-Monte San Giorgio area, may have prevented their local preservation later in the Ladinian. We suggest that during the Lower Ladinian the required conditions for vertebrate fossilization ended in the area of Besano-Monte San Giorgio, while, with slightly different characteristics, they persisted in the Perledo-Varenna area. Only in the latest Ladinian were both areas again suitable for preserving a significant vertebrate record: at that time the Kalkschieferzone and the Perledo member yield a very similar fauna.

The stratigraphic distribution of fish species or genera will be more precisely known when all the species

contained in the three major vertebrate levels of the lower Meride Limestone have been individuated (Furrer, 1995). Thus, it seems that much evidence supports the hypothesis that the Perledo fauna consists of three fossil assemblages, corresponding to the Grenzbitumenzone (lowermost Ladinian), the lower Meride Limestone (lower Late Ladinian) and the Kalkschieferzone (uppermost Ladinian).

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REFERENCES

- Bernasconi S.M. (1991) - Geochemical and microbial controls on dolomite formation and organic matter production/preservation in anoxic environments: a case study from the Middle Triassic Grenzbitumenzone, Southern Alps (Ticino, Switzerland). Diss. E.T.H.-Zürich, n. 9432, 198 pp.
- Bernasconi S.M. & Riva A. (1993) - Organic geochemistry and depositional environment of a hydrocarbon source rock: the Middle Triassic Grenzbitumenzone Formation, Southern Alps, Italy/Switzerland. In: Spencer A.M. (ed.) - Generation, Accumulation and Production of Europe's hydrocarbons III, *Spec. Publ. Europ. Assoc. Petrol. Geoscientists*, n. 3, pp. 179-190, Springer Verlag, Heidelberg.
- Bürgin T. (1992) - Basal Ray-finned Fishes (Osteichthyes; Actinopterygii) from the Middle Triassic of Monte San Giorgio (Canton Tessin, Switzerland). *Schweiz. Paläont. Abh.*, v. 114, pp. 1-164, Basel.
- Bürgin T. (1995) - Actinopterygian fishes (Osteichthyes; Actinopterygii) from the Kalkschieferzone (Uppermost Ladinian) near Meride (Canton Ticino, Southern Switzerland). *Eclogae geol. Helv.*, v. 88, n. 3, pp. 803-826, Basel.
- De Alessandri G. (1910) - Studii sui pesci triassici della Lombardia. *Mem. Soc. It. Sc. Nat.*, v. 3, n. 1, pp. 1-145, Milano.
- Furrer H. (1995) - The Kalkschieferzone (Upper Meride Limestone; Ladinian) near Meride (Canton Ticino, Southern Switzerland) and the evolution of a Middle Triassic intraplateau basin. *Eclogae geol. Helv.*, v. 88, n. 3, pp. 827-852, Basel.
- Gaetani M., Gnaccolini M., Poliani G., Grignani D., Gorza M. & Martellini L. (1992) - An anoxic intraplateau basin in the Middle Triassic of Lombardy (Southern Alps, Italy): anatomy of a hydrocarbon source. *Riv. It. Paleont. Strat.*, v. 97, n. 3-4 (1991), pp. 329-354, Milano.
- Lombardo C. (1997) - Ittiofauna della Kalkschieferzone (Calcarea di Meride, Ladinico Superiore) di Ca' del Frate (Viggiù, Varese). Tesi di dottorato, Università degli Studi di Milano, 198 pp., Milano.
- International Commission of Zoological Nomenclature (1985) - International Code of Zoological Nomenclature. 338 pp. International Trust for Zoological Nomenclature, London.
- Rieppel O. (1985) - Die Gattung *Saurichthys* (Pisces, Actinopterygii) aus der mittleren Trias des Monte San Giorgio, Kanton Tessin. *Schweiz. Paläont. Abh.*, v. 108, pp. 1-103, Basel.
- Senn A. (1924) - Beiträge zur Geologie des Alpensüdlandes zwischen Mendrisio und Varese. *Eclogae geol. Helv.*, v. 18, n. 4, pp. 552-632, Basel.
- Tintori A. (1990a) - Ca' del Frate (Varese). In *Pesci Fossili Italiani: scoperte e riscoperte*, pp. 25-35, Milano.
- Tintori A. (1990b) - The vertebral column of the Triassic fish *Saurichthys* (Actinopterygii) and its stratigraphical significance. *Riv. It. Paleont. Strat.*, v. 96, pp. 93-102, Milano.
- Tintori A. (1992) - Fish taphonomy and Triassic anoxic basins from the Alps: a case history. *Riv. It. Paleont. Strat.*, v. 97, n. 3-4 (1991), pp. 393-408, Milano.
- Tintori A. & Lombardo C. (in press) - Late Ladinian fish faunas from Lombardy (N-Italy): behaviour and paleoenvironment. In: Arratia G. & Schultze H.P. (eds.) -

- Proceedings of Second International Meeting on Mesozoic fishes "Systematics and the fossil record", pp. ,Buckow.
- Tintori A., Lombardo C., Danini G.L., Felber M., Marazzi B. & Vendico M. (in press) - Scavi paleontologici nella Kalkschieferzone di Meride (Canton Ticino, Svizzera): Risultati preliminari della campagna 1997. *Geol. Insubrica*, Lugano.
- Tintori A., Muscio G. & Nardon S. (1985) - The Triassic fossil Fishes localities in Italy. *Riv. It. Paleont. Strat.*, v. 91, n. 2, pp. 197-210, Milano.
- Tintori A. & Renesto S. (1990) - A new *Lariosaurus* from the Kalkschieferzone (Uppermost Ladinia) of Valceresio (Varese, N. Italy). *Boll. Soc. Paleont. It.*, v. 29, n. 3, pp. 309-319, Modena.
- Wirz A. (1945) - Beiträge zur Kenntnis des Ladinikums im Gebiete des Monte San Giorgio. *Schweiz. Paläont. Abh.*, v. 65, pp. 1-84, Basel.