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**FOSSIL FISHES FROM THE BESANO FORMATION (MIDDLE TRIASSIC,
NORTHERN ITALY) IN THE COLLECTION OF MUSEO CIVICO DI STORIA
NATURALE DI MILANO: PRELIMINARY RESULTS.**

2): TAPHONOMY

Studies on fossil fishes from the Besano Formation have been carried on since last century, but little attention was paid to taphonomic analysis (Tintori, 1991), although mode of preservation of fossil fishes can be very useful in the reconstruction of the depositional environment (see Schäfer 1972; Elder & Smith 1988; Wilson 1989; Viohl 1994 among others). The arrangement of part of the collection of fishes from the locality of Sasso Caldo, stored in the Milano Museum, gave the opportunity to make some preliminary observations. The information inferred from the material studied so far are at present inadequate to give any interpretation: as it has been already specified in part 1, the research on this fauna has just began and needs more deepened studies. The purpose of this work is pointing out the problems of such a complex analysis.

This study, based on a sample of about 550 fishes, has been made taking into consideration not only the different modes of preservation of specimens, but also the lithology of different layers. From the study of the specimens found in the five groups of layers in which this part of the series was divided (see part 1), emerged that the kind of preservation changes within the different levels, according to their lithology, and within every fish group, according to the different anatomical characteristics.

Though wholly complete specimens are present in the collection, most of the fishes show various degrees of disarticulation and then, for the preservation, five categories have been tentatively recognized: 1) articulated; 2) partially disarticulated; 3) completely disarticulated; 4) isolated bones; 5) fragments. For the lithotypes the descriptions made by Bernasconi (1994) were followed.

The series consists of a quite regular alternation of laminated dolomites and black shales, but in the higher levels one can observe the dominance of layers richer in carbonates than in organic matter; on the contrary, in middle and lower layers (from about 71 up to 60) black shales prevail over dolomite beds. This difference of lithologies is reflected also in the preservation of fossils: the number of complete and articulated specimens in the higher levels exceeds that of partially or completely disarticulated ones (fig. 1), while the specimens preserved in the black shales of the lower levels are mostly disarticulated or represented by isolated bones and complete fishes are very rare (fig.2). This situation affects the availability of anatomical information of the different groups of fishes: neopterygians and *Habroichthys*, for instance, which are found mainly in the laminated dolomites of the higher levels, are almost all articulated and complete, but preservation on dolomite is often qualitatively poor; on the contrary, "*Gracilignathichthys*", typical of the shales of the layers 71-68, or specimens of *Saurichthys* found on the same layers, are always completely disarticulated, but with a good preservation of the single bones. The

relation between lithology and mode of preservation of fossils in the different levels has been checked with genera present throughout the series: *Saurichthys* and *Placopleurus*. Specimens of these two genera coming from the higher levels are in fact completely or partially articulated, while those from the lower levels are mostly completely disarticulated or represented by isolated bones.

As a general rule, disarticulated specimens show scattered elements around the body (especially skull bones and distal fin elements), but in some cases they are incomplete. This kind of preservation causes the difficulty of determining the different species, especially for peltopleuriforms and perleidiforms, mostly preserved in the black shales of levels 68-60, and moreover, characterised by a remarkable intraspecific variability. The problems in describing the different species, due to mode of preservation, have been already remarked by Brough (1939); with regard to specimens of the genus *Placopleurus* he wrote: "This little fish is abundantly represented in the collection, but the numerous specimens yield a remarkably small amount of anatomical information.(...). The skull is usually badly crushed and the fins tend to be displaced or lost." (Brough, 1939: 35).

Besides environmental conditions, the sequence and mode of disarticulation of bones and scales differs from species to species, varying with anatomical characteristics and size of fishes. Specimens belonging to the same species, in fact, tend to show the same kind of preservation, probably owing to weakness of some structures or articulations: the neopterygian *Eoeugnathus megalepis* for instance, well represented in the higher layers of the series, often shows a wholly complete body, but with the lower jaws detached from the rest of the skull and in specimens of the genus "*Heterolepidotus*" the ventral region is often torn, as result of release of decay products. Still in the higher levels, the genus *Placopleurus* is represented by specimens complete but strongly arched, as already stressed by Brough (1939: 35). Scales pattern, or maybe the kind of connective tissue holding them together, might have offered different resistance to disarticulation in various groups: genera characterised by the presence of high flank scales, such as representatives of peltopleuriformes and *Pholidopleurus*, generally seem to be more resistant to complete disarticulation. In specimens belonging to these groups scales of the median region of the trunk are often articulated, while the elements of the skull and fins are scattered along or around the body; on the contrary, in specimens belonging to the genus *Aetheodonthus*, which is the best represented perleidiform in this fauna, characterised by a squamation made of small rhombic scales, these latter are found very rarely in connection.

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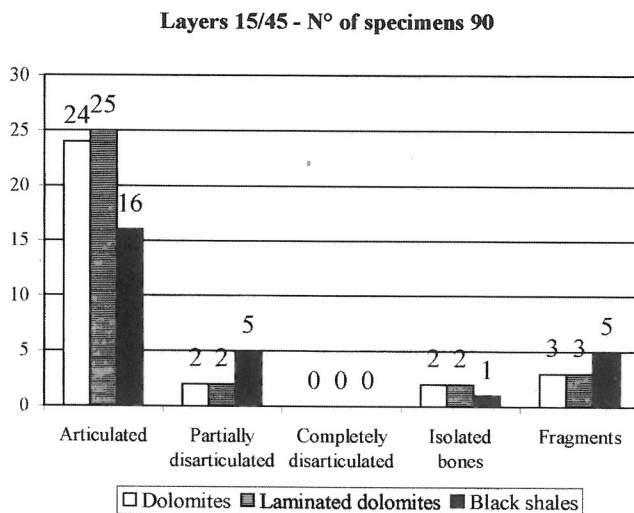


Fig. 1: lithology and kind of preservation of fossil fishes in part of the higher levels of the series.

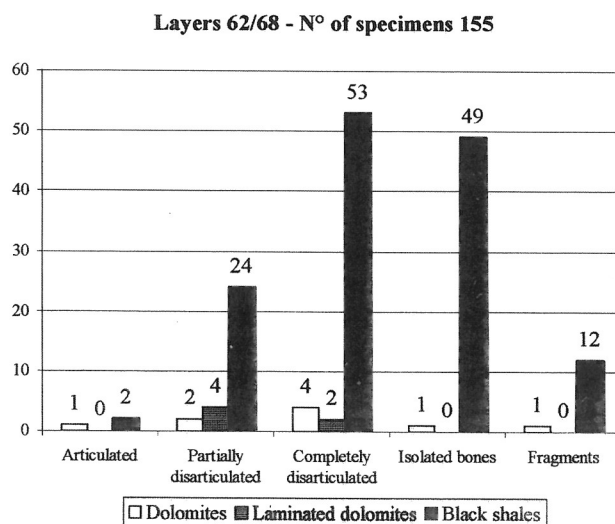


Fig. 2: lithology and kind of preservation of fossil fishes in part of the lower levels of the series

