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THE ICHTHYOFAUNA OF THE ZORZINO LIMESTONE

Fishes represent most of the vertebrate fossils found in the Zorzino Limestone, since the first findings about 30 years ago. In no other Triassic, or possibly Mesozoic site, it is possible to found such a great variety of taxa. In the classic Monte San Giorgio – Besano area, famous for its rich and diversificate faunas, for example, the ichthyofauna is made of about 40 genera spread over 15 million years, while in the Zorzino Limestone we may reach 40-50 genera for a single level. For this reason the fauna coming from this unit is fundamental to understand and to follow the extraordinary diversification reached by fishes during the Late Triassic. During the Norian, in fact, we can assist to the gradual passage from a more primitive fauna, dominated by the paleopterygians, who flourished all through the Paleozoic until the Middle-Late Triassic, to the more advanced one, represented by neopterygians: these latter made their appearance since the late Permian/ early Triassic, but only in the Norian they were able to bloom reaching also some important feeding and swimming specializations.

Just in this point of view we can group the numerous taxa present in the Zorzino Limestone according to their size and trophic adaptations, so that it can be more easily appreciable the great diversification reached by them. Concerning predators, feeding both on other fishes and nectonic organisms, like crustaceans, the smallest of them are represented by pholidophorids (among them, the genera *Pholidophorus*, *Pholidoctenus*, *Pholidorhynchodon*). These fishes, which constitute about the 70% of the ichthyofauna found in the Zorzino Limestone, belong to a complex group, for a long time considered at the beginning of teleosts, but whose phylogenetic position is still under discussion. In this group the intrageneric and intraspecific variation is really remarkable, making particularly difficult their study. Generally, they show a dentition made of long and pointed teeth, differently developed according to each genus, which made them able to catch smaller fishes, adults or maybe larval stages. Larger active predators, about 25-30 cm long, are still represented by paleopterygians, since most of the more advanced neopterygians "preferred" to achieve new specializations exploiting new niches. The perleidiforms *Gabanellia* and *Thoracopterus*, though heirs of a group on the wane, show a specialized morphology; the first might has been a fast-swimmer, with a fusiform outline and a large falcate caudal fin, which could catch its preys with large, strong and acuminate teeth. The latter shows an extraordinarily similar morphology to that of extant "glinding fishes" (Exocoetidae), with the highly developed pectoral fins and the fin made of a ventral lobe longer than the dorsal one.

Saurichthys and *Birgeria*, other representatives of these high-specialized paleopterygians, with species reaching and exceeding one meter length, are, among fishes, the larger predators. Their specializations to the predation were so efficient that allowed them to dominate throughout the Triassic. *Saurichthys*, whose morphology

was similar to that of barracuda, was probably able to reach high speed in a short time; it swallowed the whole pray after striking it with a bite (Gozzi, this volume). *Birgeria*, more similar to the modern grouper, was furnished with a large and mobile mouth, which allowed it to expand quickly the oral cavity, engulfing water and the preys in it.

Among predators, also coelacanthids and sharks are reported in the Zorzino Limestone. Little is known about the first group, owing to the scarcity of specimens; at least, two genera inhabited the waters of the basin, one of which could reach one meter length.

Concerning sharks, we only know the teeth of a small genus, *Pseudodalatias*. These teeth are arranged in a series made of 11 triangular and serrated elements and, according to their size, they could belong to a fish reaching no more than 20-25 centimeters in length.

What could these predators eat? Besides pholidopholiformes, other groups of small or very small fishes (less than 10 centimeters in length) lived in the water body of the basin; for example a quite common pholidopleurid, characterized by a body extremely elongated, symmetrical tail and thin teeth, and rare peltopleuriformes, with their typical high flank scales: they were extremely diffused in the Middle Triassic and in the Norian we can see the few last representatives.

Without any doubt, the real protagonists of the ichthyofauna from the Zorzino Limestone are represented by durophagous neopterygians. The new arrangement of the skull bones, reached by these more advanced forms, allowed the development of a more powerful muscolar system and consequently, the capability of exerting a strong pressure on a small area. In this way, these animals were able to crush hard-shelled organisms.

During the Norian several groups appeared and occupied these still unexploited trophic niches; their success allowed them to reach the end of the Mesozoic or even the Eocene. Among these groups, one of the most interesting is represented by pycnodontiforms: just as they appear, during the Norian, they immediately show a good differentiation, with at least 3 genera. Pycnodonts are characterized by deep and flattened bodies, which allowed them to move in complex environment such as reefs, where they could find the food. Their anterior, chisel-like and projecting teeth were used in catching the prey; this latter was successively crushed with the large and strong inner teeth. Throughout the Norian pycnodonts are small (except *Brembodus*), but later they could reach even one meter in length, as happened in the Cretaceous.

A very successful Norian group is represented by semionotiforms; they include taxa similar to pycnodonts in body and teeth morphology, such as *Sargodon*, and other characterized by more fusiform outline, as the common *Paralepidotus ornatus*. Besides other well known genera, as *Dapedium* and *Semionotus*, there are many still undescribed taxa, as evidence of the great diversification reached by this group in this period. Differently from pycnodonts and *Sargodon*, in the other semionotids the anterior teeth were much less differentiated, as we can see at present in the gilthead. Besides these "true" durophagous, we have other fish groups that we can consider as "semi-durophagous", since their teeth were not strong enough to crush too hard shells. Anyway, they could catch and eat at least crustaceans or small molluscs; among them, the most common are represented by macrosemiids, as *Legnonotus* and related forms.

Recently, a new genus has been identified: although it belongs to the more primitive perleidiformes, it shows a dentition comparable to that of macrosemiids.
Nowithstanding more of 30 years of excavations and research and the hundreds of specimens found, the study of this ichthyofauna is far to be complete: most of the collected material still waits for preparation and successive description, activities that need time and means.
Without any doubt, the fish fauna of the Zorzino Limestone has not finished to surprise us, yet: we hope, in the future, to give much more complete informations about this exceptional assemblage.

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