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The importance of ammonoids for a modern integrated Triassic chronostratigraphy

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The Triassic was a great time in the evolution of the Ammonoidea. This group experienced superfast radiations, as well as crises, and very wide varieties of evolutionary trends. The first experiment of uncoiling took place in the Late Triassic, and Triassic ammonoids developed what is probably the widest variety of suture lines in the history of the group. This extraordinary evolutionary liveliness allows the subdivision of the Triassic ammonoids in about 80 families, more than 800 genera and some thousands of species, many of them with short to very short stratigraphic range.
This extraordinary pattern of the Triassic ammonoids was quite soon recognized by the paleontologists during the 19th century. Among them Edmund von Mojsisovics, who built on ammonoids the first chronostratigraphic scale of the Triassic in 1882. This scale, that was updated several times by Mojsisovics until his death, was developed under a strong influence of Albert Oppel and the concept of "zone" applied by Mojsisovics was exactly the same as conceived by Oppel.

Mojsisovics' scale had a tremendous impact on the history of Triassic chronostratigraphy. Most Tethyan substages were introduced on the basis of lithofacies and/or Mojsisovics ammonoid zones in the 19th century. The North American Triassic scale, presented by Silberling and Tozer as an independent scale in the 1960s, was also based on a concept of zone that does not differ notably from that of Mojsisovics (and of Oppel).
The new wave of research started in the 1960s quite soon emphasized several problems with the Triassic ammonoid-based chronostratigraphy. The most important one is the rare occurrence of ammonoids in the Triassic successions, that makes this accurate tool not always of very practical application. In order to overcome this problem, at the end of the 1960s several additional tools were examined by Triassic specialists, and conodont, palynomorph, radiolarian and pelagic bivalve zonations have become gradually more and more popular. No one of these tools actually really challenges the ammonoids in term of power of resolution but, no doubts, these fossils can be applied much more commonly than the ammonoids.

The major innovation in the history of Triassic chronostratigraphy was developed between the 1980s and the 2000s and is directly related to the research aimed at the definition of the GSSPs of Triassic stages. Specialists of different groups were encouraged to work in close cooperation in order to compare and to discuss events and correlations using an integrated general framework. The discussion within the Induan, Ladinian and Carnian Working Groups re-evaluated the chronostratigraphic significance of the ammonoids, that were commonly used as calibration tool for conodonts, palynomorphs and pelagic bivalves. Ammonoids have often resulted more age-diagnostic than other tools, and it is not a coincidence that two GSSPs out of three have been based on ammonoid events.

The ammonoid chronostratigraphy itself has greatly benefited from the discussions within the WGs. Ammonoid specialists changed the way to define zones and started to work on range charts and to look for bioevents, following the approach used by conodont specialists. This new approach led to the revision of many Oppel zones of the Tethyan Middle Triassic. Some conodont specialists, on their side, are now focusing on bioevents and on the reconstruction of evolutionary lineages to identify FADs, instead of improving the resolution of the conodont zones.