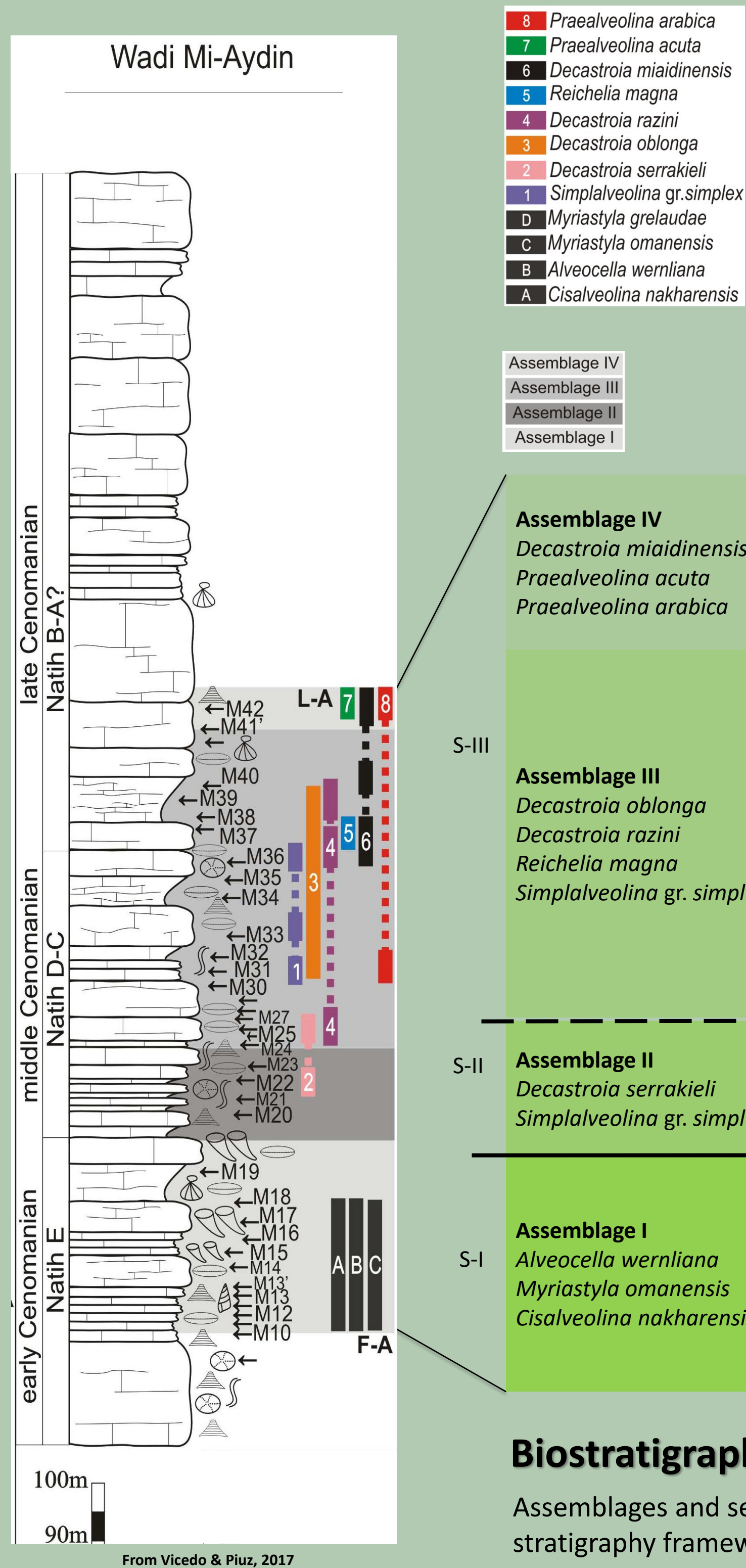


The micropaleontological collections of MCNB: a tool for learning from the past

ABSTRACT: The rich scientific palaeontological collections housed in many public and private institutions are an incredible source of information of past times. The evolution of the Earth is understood by the direct observation of the current dynamic processes and from the study of all the geological and palaeontological elements contained in present and future collections. The natural sciences collections make uncountable contributions to society, not only in terms of reconstructing the Earth history, but also in present and future topics related to agriculture, biological invasions, global climate changes, etc. Each specimen composing the collections can be considered as a potential source of information; hence they should be arranged and conserved for long time preservation. In the reconstruction of past climate crisis, in particular, the analysis of the evolution of the marine microfossil communities is of special interest as they can be extremely sensitive to local, regional and global environmental changes. The micropalaeontological collections play a special role in this scenario, not only in the analysis of the impact of these changes in past ecosystems, but also in the understanding of the meaning of the fall and rise of marine biodiversity. As well as other important microfossil groups, foraminifera are used as bioindicators to evaluate the modifications occurred in the marine water column. The larger foraminifera k-strategists, for instance, living under a shallow-water column conditions were extremely delicate and sensitive to palaeoenvironmental changes. The MCNB scientific micropalaeontological collections preserve an extensive register of this type of foraminifera of different palaeogeographical areas. In particular, the museum houses collections of material collected from both sides of the Mediterranean, mainly from the Cretaceous of the Iberian Peninsula and the Middle East. The specimens kept in these collections are witnesses of some key global changes occurred in that period of the Earth history, such as the Cenomanian–Turonian and the Cretaceous–Paleogene crisis. In some particular cases, the register kept is so complete that permit to observe other local or regional changes, such as the intra–Cenomanian biotic crisis observed in the shallow-water platforms as a consequence of sea-level fluctuations. The scientific micropalaeontological collection of the MCNB can be considered of reference for research community, permitting to develop multidisciplinary studies that contribute to understand the nature of marine ecosystems and its evolution.

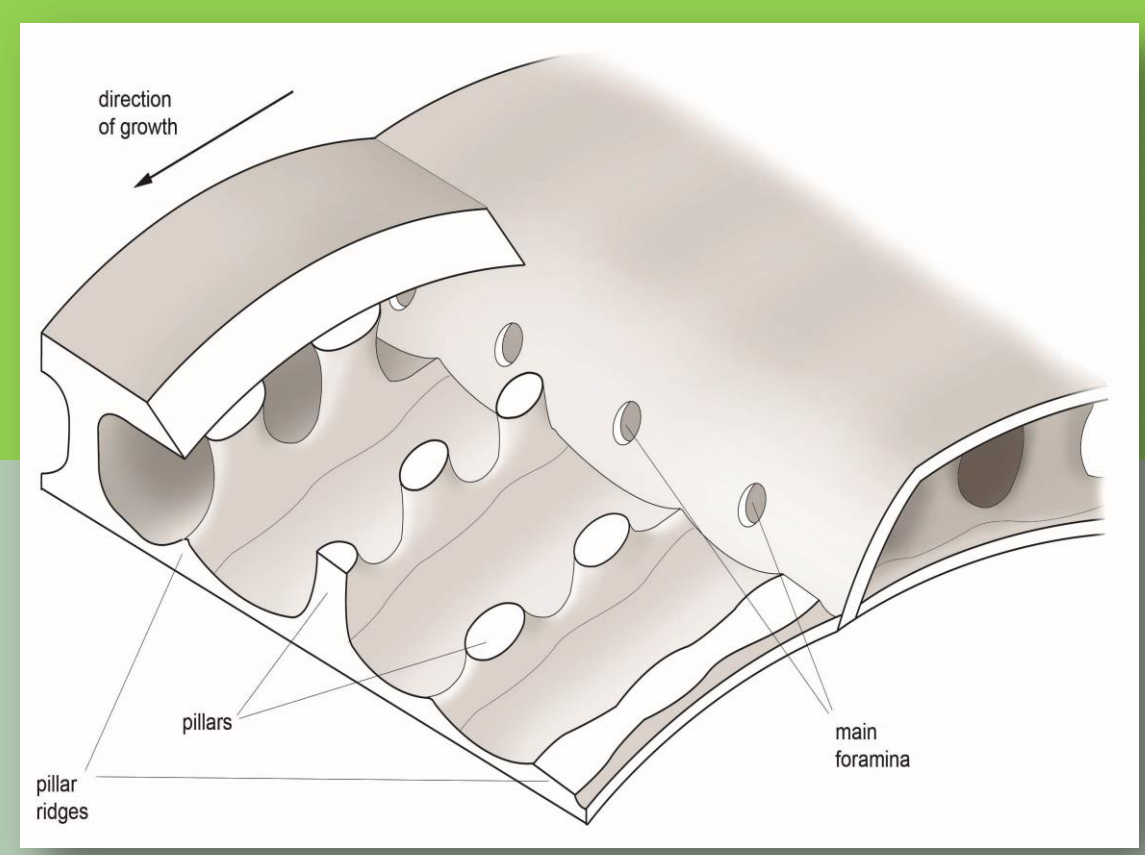
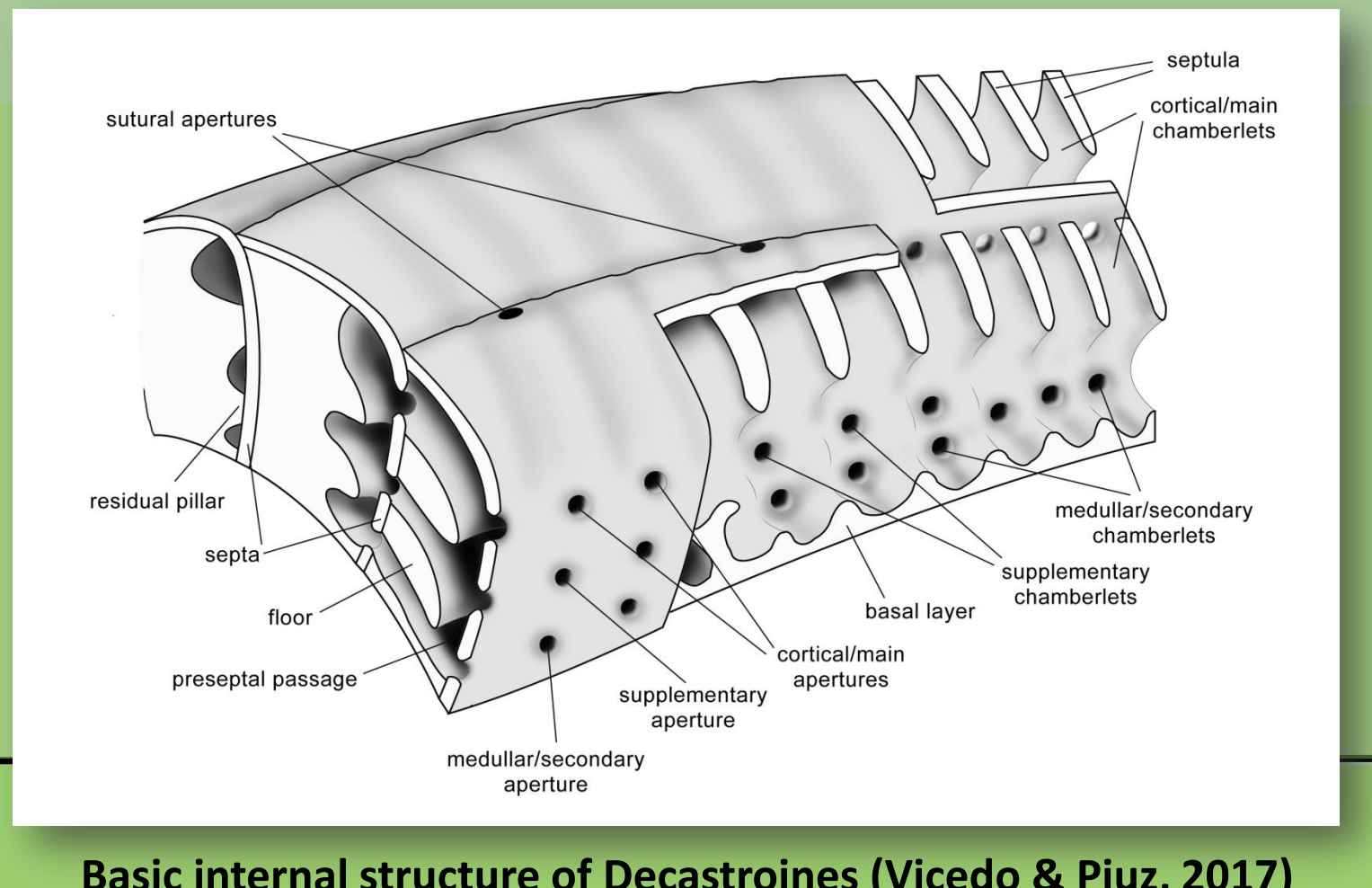
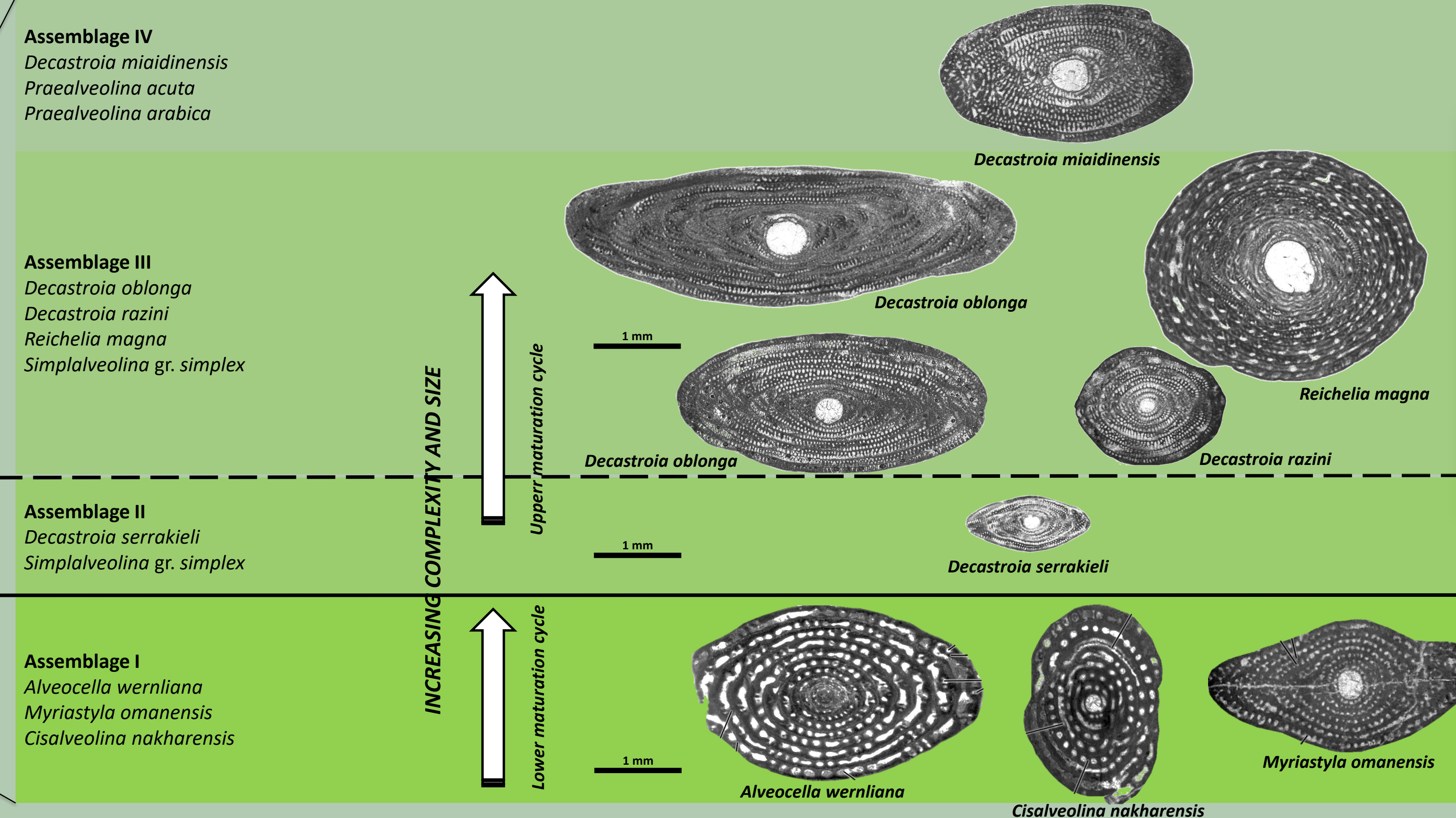
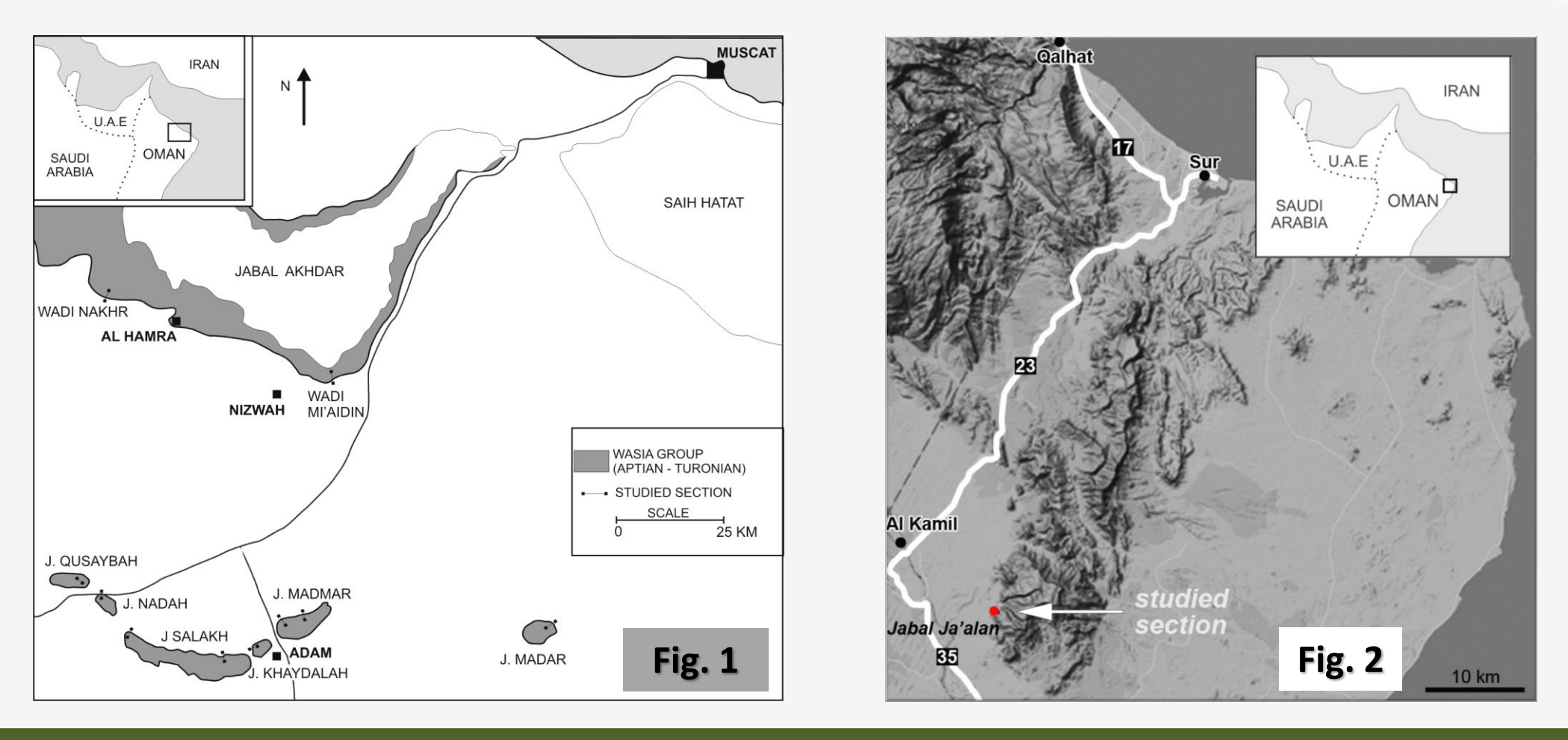
1) Intra-Cenomanian Biotic Crisis

Biological crisis: examples from the MCNB micropalaeontological collections



1) INTRA-CENOMANIAN BIOTIC CRISIS. Several classical sites in the Oman Mountains (Fig. 1) reveal well-exposed successions of Cenomanian age belonging to the Natih Fm. At that time, the Arabian platform was dominated by a very wide shallow water carbonate platform colonized by rich biotic communities, such as the larger benthic foraminifera (LBF). This interval of time has been considered classically as dominated by a relative environmental and biological stability. However, recent studies of the micropalaeontological collections of the MCNB of this interval and this area have revealed interesting new data. A marked intra-Cenomanian drop of the eustatic sea level, that resulted in a regional emersion of shallow water platforms during an uncertain period of time, caused the extinction of the previous alveoliniform taxa. The alveoliniform population recovered later but with new structures, reflecting a different phylogenetic relationship in respect it was previously thought (see the results in Piuz, Meister & Vicedo, 2014 and in Vicedo & Piuz, 2017).

2) K/Pg BOUNDARY BIOTIC CRISIS. An outstanding site in the western flank of Jabal Ja'alan (Oman Mountains) has revealed a new and exceptional succession across the K-Pg boundary (Fig. 2). The larger foraminifera of the Simsima Fm. (late Maastrichtian) seem to disappear abruptly, being replaced with a rich association of larger rotalids appearing in carbonates deposited in a restricted platform environment (Murka Fm). This unit also contains calcareous algae of Paleocene age. Generally speaking, the environmental crisis occurred during the K/Pg interval had devastating consequences for the latest Cretaceous LBF populations, as it has been observed in many other localities. However, from the geological register outcropping in Jabal Ja'alan we can hypothesize that there was a different biological recovery among the different groups of larger foraminifera.



Biostratigraphy
 Assemblages and sequence-stratigraphy framework

Phylogenetics
 Two successive episodes can be observed in the diversification of the Natih alveolinoids: a lower maturation cycle, corresponding to Assemblage I, and an upper cycle, corresponding to Assemblages II to IV.

2) K/Pg Boundary Biotic Crisis

