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# Micropalaeontological analysis and Palaeoenvironmental interpretation of the sedimentary sequence in the central Corinth Isthmus (central Greece)

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## Background

Corinth Isthmus is one of the fastest extending regions worldwide as it is a highly active extensional tectonic environment (Briole et al., 2000). More than 40 faults can be recognized along the Corinth Canal most of them being normal and oblique normal with fault planes dipping westwards and eastwards from the central horst, towards the Corinth and Saronic Gulfs respectively (Freyberg, 1973, Papanikolaou et al., 2015). Although the depositional patterns of the sedimentological sequences in Corinth Canal are of great interest as six transgressive-regressive cycles were recognized by Collier (1990), there are few detailed palaeoenvironmental studies based on micropalaeontological evidence (e.g. Krstic and Dermitzakis 1981; Papanikolaou et al., 2015; Pallikarakis et al., 2018).

## Objectives

Purpose of this study is to contribute with detailed micropalaeontological evidence to the reconstruction of the depositional environments of the sedimentary sequence exposed in the central part of Corinth Isthmus.

## Methods

The study area is located at the central part of Corinth Isthmus and includes the sedimentary sequence exposed at about 70 m elevation along the north side of the Corinth Canal (Fig. 1). The sequence is consisted of two different formations from the bottom to the top: about 10 m of beige marls and yellow sandy marls and about 5 m of sandstones and conglomerates. The two formations are bounded by an unconformity surface. Just before the unconformity, the marly sequence ends up with a sandy bed rich in *Cladocora caespitosa* stems and bivalves and it was dated at MIS11 by Pierini et al. (2016).

A total of 22 samples were collected from the marls and the *C. caespitosa* bed for micropalaeontological analysis. The samples were disaggregated with a 5% $H_2O_2$ solution, washed over 0.125 mm mesh sieves, and the residues were oven-dried at approximately 40 °C. Dried material was splitted and microfossils (ostracods and benthic foraminifera) were hand-picked, identified and counted and a detailed quantitative and qualitative micropalaeontological analysis was performed. Additionally, two samples have been prepared for nannofossil biostratigraphy.

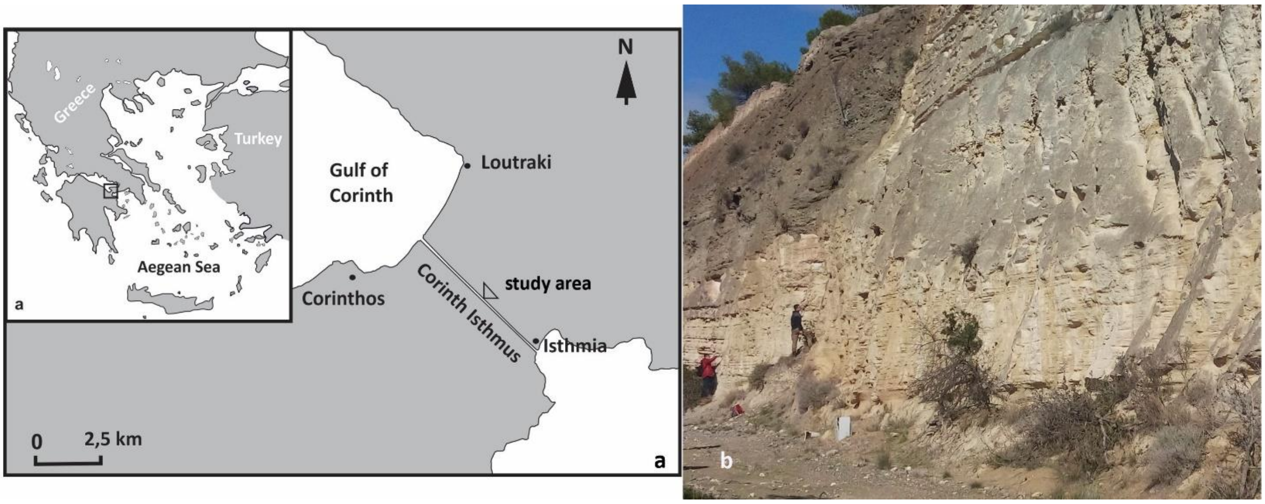


**Figure 1. a. Location map and position of the study area. b. The under study sedimentary sequence.**

## Results and Discussion

Ostracods are the most abundant group in most of the samples, while benthic foraminifera are dominant in the samples from the bed with *C. caespitosa*. A total of 17 ostracod species were identified. The most common and abundant taxa in all the marly and sandy marly layers are the mesohaline *Cyprideis torosa*, *Cyprideis* sp., *Tyrrhenocythere amnicola*, *Loxoconcha* aff. *L. elliptica*, *Euxinocythere schuldtae* and the fresh water-oligohaline species *Candona neglecta*, *C. angulata*. A total of 28 benthic foraminiferal species were identified; specimens are considered transported when showing scarce presence and bad state of preservation. The euryhaline taxa *Ammonia beccarii*, *A. tepida* and *Elphidium* spp. are considered in situ and are present in low numbers in most of the marly layers.

The combined study of ostracods and benthic foraminifera demonstrated four main micropalaeontological assemblages:

*Oligohaline assemblage*: Includes high abundances of *C. torosa* and *Candona* spp. There are not benthic foraminifera present. This assemblage indicates a closed lagoonal environment with very limited communication with the sea and significant fresh water input.

*Mesohaline assemblage*: Characterized by the presence of mesohaline ostracod taxa and very low frequencies of euryhaline benthic foraminifera. This assemblage indicates a closed lagoonal environment with limited communication with the sea and fresh water input. This is the most frequent assemblage in the studied samples.

*Polyhaline assemblage*: Identified by the presence of both mesohaline and shallow marine ostracod taxa (*Aurila convexa*, *Loxoconcha* spp., *Xestoleberis* spp., *Leptocythere multipunctata*). Accordingly, benthic foraminifera present their higher diversity and abundance in this open lagoonal environment represented by euryhaline and marine taxa: *Ammonia* spp., *Elphidium* spp., *Asterigerinata mamilla*, *Cibicides lobatulus*, *C. refulgens*, *Cancris auriculus* and *Neoconorbina* sp.

*Coastal open marine assemblage*: Characterized by high frequencies of coastal marine ostracod and benthic foraminifera taxa. It is present only in the samples from the sandy bed with *C. caespitosa* and bivalves. Represents a normal salinity-high energy, shallow-coastal open marine environment.

## Conclusions

The distribution patterns of the identified ostracod and foraminiferal assemblages combined with the sedimentary facies reflect the various depositional environments which alternate along the studied section. Consequently, the lower formation (beige marls and yellow sandy intercalations) of the sedimentary sequence exposed at the central part of Corinth Isthmus corresponds to a brackish lagoonal environment with salinity alternations due to the communication with the sea (closed-, semi-closed-, open-lagoon) and the fresh water input. At the top of this formation a sandy bed rich in macro- and micro-fossils indicates a radical environmental change: the opening of the lagoon and the establishment of a shallow marine coastal environment, expressing the beginning of a regressive circle.

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