DIPLOMARBEIT

Titel der Diplomarbeit

Foraminifera assemblages in the eastern part of the Stetten-section from the Karpatian of the Korneuburg Basin

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I. Acknowledgements

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II. Abstract

The construction of the bypass road "S1" (Schnellstrasse 1) at Stetten (Lower Austria) gave a unique opportunity to study an approximately 2.5 km long east-west transect through large parts of the Karpatian Korneuburg Basin. 9 sections in two profiles have been recorded and combined. Over 186 samples were examined for foraminifera and ostracods.

This work deals with the foraminifers and gives an overview on taxonomy and the faunal composition in general. The main focus is on the palaeoenvironment of the deposits in the eastern part of the profile (with sections A, F and E) especially. The foraminiferal assemblage spectrum is dominated by the genus *Ammonia* and a few other shallow water benthic species on the shallow end of the ecological spectrum. The "deep" water communities contain large numbers of the benthic genus *Bulimina* and several planktic taxa, such as *Cassigerinella* or *Globorotalia*.

After the identification of distinct ecological groups, an estimation of palaeo-water-depths was conducted. This analysis, which is based on the abundance data of recent benthic foraminifera and their depth distribution, gives a signal for a generally very shallow water depth. The mean depth values fluctuate between 0 and 40 metres.

Furthermore, the results of the assemblage analyses allow a direct correlation of the western part with the eastern part of the section via peak occurrences of certain taxa and lithological structures.

III. Kurzfassung

Der Baubeginn der Umfahrungsstraße "S1" bei Stetten (Niederösterreich) bot die einmalige Gelegenheit, ein 2,5 Kilometer umfassendes Profil durch große Teile des Korneuburger Beckens (Karpat) zu untersuchen.

2 Profile mit 9 Abschnitten wurden aufgenommen und 186 Proben auf den Bestand an Foraminiferen und Ostracoden untersucht.

Die vorliegende Arbeit behandelt den Bestand an Foraminiferen und deren Vergesellschaftungen. Sie gibt einen Überblick über die Taxonomie, wie auch über die faunistische Zusammensetzung und Paläo-Ökologie der Ablagerungen des Ostprofiles (mit den Teilabschnitten A, F und E).

Repräsentativ für die Flachwasserfauna ist die Gattung *Ammonia* gemeinsam mit einigen wenigen anderen Vertretern benthischer Arten. Die im ökologischen Spektrum tiefer anzusiedelnden Abschnitte werden von Vergesellschaftungen, die einen hohen Anteil an der benthischen Gattung *Bulimina* aufweisen, sowie einigen planktonischen Taxa, wie *Cassigerinella* oder *Globorotalia,* dominiert.

Ökologisch aussagekräftige Faunengemeinschaften ermöglichten die Ableitung einer Tiefenzonierung der untersuchten Abschnitte. Diese Art der Analyse basiert ausschließlich auf dem Vorkommen benthischer Foraminiferen und deren Tiefenreichweite. Die Ergebnisse zeigen Paläo-Tiefen zwischen 0 und 40 Metern Wassertiefe - kennzeichnen also durchwegs Flachwasser.

Weiters wurden im Zuge dieser Arbeit Ost- und West- Abschnitte anhand der vorkommender Fossilvergesellschaftungen und lithologischer Daten korreliert.

1. Introduction

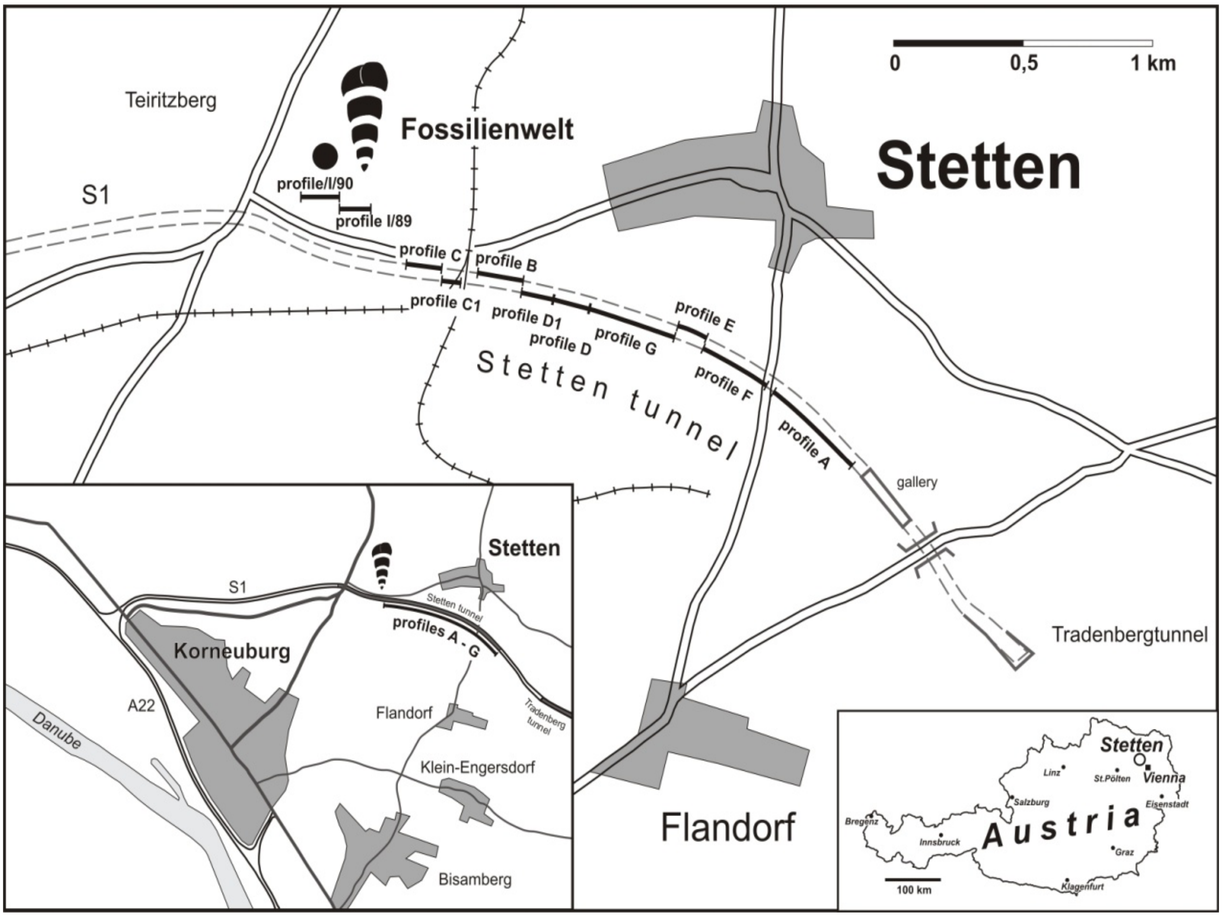

Figure 1: Overview of the Korneuburg area with the Teiritzberg Profiles next to the Fossilienwelt (marked by a Gastropod) and the profiles along the road construction site of the S1 (map by R. ROETZEL, Geological Survey of Austria).

Since the 19th century the Korneuburg area (Fig. 1) is known as a region of interest for Geology and Palaeontology. First scientific work on the region was published by HÖRNES (1848). He described the geology and fossil content from outcrops in Kleinebersdorf, Großrußbach, Karnabrunn and Weinsteig - all 4 located in the Korneuburg Basin. For the next hundred years the Korneuburg Basin constantly attracted interest. SCHAFFER (1907) gave descriptions of the Teiritzberg outcrops. VETTERS (1910) reviewed HÖRNES' outcrops and gave a detailed list of taxa. Furthermore, he investigated the stratigraphic sequence of the Teiritzberg locality.

GLÄSSNER (1924) described a new prawn species and gave new detailed information on the outcrops at the Teiritzberg locality. LANGER'S (1939) works described the stratigraphy near the Bisamberg.

The second half of the 20th century is characterised by even more intense investigations of the Korneuburg Basin. Due to the intensified work in exploration of oil and gas, micropalaeontology became more important.

The work of GRILL for the Geological Survey of Austria (GBA) on this region starting in the late 1940s is of special importance. For example, GRILL (1948) reviewed the stratigraphic framework of the Korneuburg Basin and in 1953, 1962, and 1968 he delivered important descriptions and supplementary data to the geological maps of the region.

TURNOVSKY (1959) and CICHA (1960), amongst others, dealt with the stratigraphy of the region. Apart from that, they published specialized works on microfossils and foraminifers.

BINDER & STEININGER (1967) worked on the ophiurids from Teiritzberg, HENKEL (1968) on nannoplankton stratigraphy, KNOBLOCH (1977, 1981) gave an insight into the plant fossils, and THENIUS (1955, 1974, 1979, 1983) into vertebrates.

STEININGER (1998) wrote in the preface to "Das Korneuburger Becken - Teil 1" about a group of collectors around Dr. SOVIS starting to systematically collect fossils throughout the basin in 1975.

Their work should later on lead to the initiation of the "Projekt Teiritzberg" in 1983, aiming at an overview of the facts known on the Korneuburg Basin and the communication of the results to the broader public. Besides an exhibition called "Projekt Teiritzberg" on the various field projects, a conclusive anthology of the works on the region was released in 1998. Amongst others, this anthology contained works of WESSELY (1998), RÖGL (1998), DAXNER-HÖCK (1998) and ZORN (1998).

In the last few years the exploration of the Korneuburg Basin has undergone a renaissance. The construction of a new bypass road gave the opportunity to study an extensive East - West section of the southern part of the basin. Cooperation between the Natural History Museum (NHM), the University of Vienna and the GBA led to an intense exploration of this part of the basin aiming at a complete assessment of the palaeontology, micropalaeontology, sedimentology and mineralogy.

HARZHAUSER & WESSELY (2003), HARZHAUSER (2002) and LATAL ET AL. (2006) are some examples of recent works on the Korneuburg Basin.

This thesis documents foraminifera assemblages occurring on a segment investigated along the road construction site of the bypass road "S1" and relates it to results from adjacent segments of the area and other available knowledge on the topic.

2. Miocene Paratethyan deposits

2.1. The Paratethys

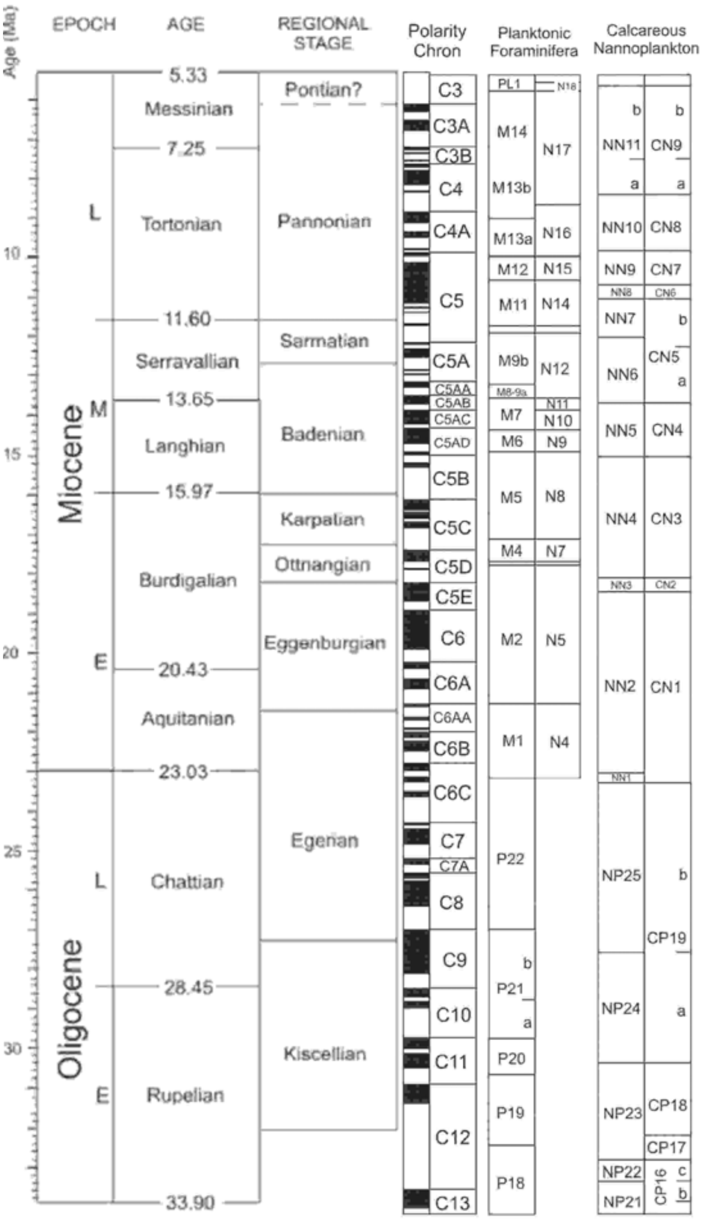

Figure 2: Central Paratethys stratigraphy (after PILLER et al., 2007)

The first to use the term "Paratethys" was LASKAREV (1924). Due to its special endemic fauna and a continuously changing geological framework, the Paratethys sea is recognized as a unique "biogeographic entity" (sensu PILLER et al., 2007, p.151) different from the mediterranean Neogene.

In the early Oligocene, after the collision of the Indian continent with Asia, the Paratethys was at its largest extent. At this stage, it can be divided into three provinces: (**1**) the Western, (**2**) Central and (**3**) Eastern Paratethys.

According to STEININGER & WESSELY (2000), these provinces cover the following units:

1. A western part, that consists of the Rhone Basin and the Molasse Basin of Switzerland and Bavaria.

2. The Central Paratethys reaches from Bavaria to the Carpathians covering also the Alpine and Pannonian Basin systems.

3. The Eastern Paratethys extends up to Lake Aral. According to the distinctiveness of each of the region's faunal composition with an endemic nature and the unique geological development, a regional chronostratigraphy is applied for the Western and Central, as well as the Eastern Paratethys (Fig. 2).

2.2 Paratethyan regional stratigraphy

During the **Kiscellian** stage, the Paratethys was almost completely cut off from the Mediterranean (RÖGL, 1999).

The **Egerian** stage of the Central Paratethys crosses the Oligocene-Miocene boundary. The stage of the Egerian itself is defined by the first occurrence of two foraminifera taxa: the benthic foraminifera *Miogypsina (Miogypsinoides) complanata* and a genus of planktic foraminifera: *Globigerinoides* (PILLER et al., 2007). During the early Egerian the Paratethys opened up in the western part towards the North Sea and in the southwestern part towards the Mediterranean.

Most of the **Eggenburgian** can easily be correlated to the Mediterranean stage of the early Burdigalian. Conformities in characteristic nannoplankton associations are found in the Central Paratethys, which can be assigned to Mediterranean and global nannoplankton zones NN2 and the lower part of NN3 (STEININGER et al., 1985).

The **Ottnangian** and the Karpatian together correlate to the middle to late Burdigalian in the Mediterranean. According to PILLER et al. (2007), the Ottnangian shows a nearly complete marine development in its lower part. The upper part already shows signs of restricted marine influence, and even fresh water environments. During the late Ottnangian a sudden change in the biogeographical pattern of the Paratethys occurred, caused by the uplift of the alpine foreland basin and sea level regression (PILLER et al., 2007). The faunal development and adjustment in the latest Ottnangian results in a large number of endemic taxa predominantly adapted to brackish conditions (HARZHAUSER & PILLER, 2007, PILLER et al., 2007).

The **Karpatian** (Fig. 2) can be correlated to the younger part of the Burdigalian in the Mediterranean stage. This stage is generally characterised by poor stratigraphic resolution because of few index fossils. In the late Karpatian, the occurrence of the planktic foraminifera *Globigerinoides bisphericus* can be used as an anchor point for a definitive stratigraphic assignment (RÖGL et al., 2003). This taxon gives a clear signal for the Foraminifera Zone M4b indicating the latest Burdigalian in the Mediterranean biozonation.

The basal Karpatian is characterized by a transgression and later associated with another sea level rise towards the Middle Miocene (HARZHAUSER & PILLER, 2007). RÖGL et al. (2003) stated that a continuous sedimentation from Ottnangian to Karpatian can only be expected in deeper sections of the Paratethys, while in shallow parts discontinuities can be observed.

In the late Karpatian, in the western realm of the Central Paratethys, the Alpine Foredeep, and the Transylvanian Basin desiccate, but the connection to the Mediterranean remains open, offering a possibility of continuous faunal exchange (RÖGL, 1999).

Figure 3: The Karpatian (modified after RÖGL, 1999). Evaporites are marked in black. The only connection left to the Mediterranean remains in the west of the Central Paratethys.

The base of the Karpatian is defined by the first occurrence of *Uvigerina graciliformis* (PAPP & STEININGER, 1973). Furthermore, the spread of faunal elements from the Mediterranean to the Central Paratethys in the Karpatian is a characteristic event. Several molluscan taxa have their first occurrence in the eastern Paratethys during the Karpatian (PILLER et al., 2007).

The **Badenian** stage covers the larger part of the Middle Miocene. The base of the Badenian is defined by the first occurrence of the benthic foraminifera genus *Praeorbulina* (PAPP & CICHA, 1978). According to KOVAC et al. (2007), the Badenian can be subdivided into three stages of distinct development; the Lagenidae Zone, the *Spiroplectammina* Zone and the *Bulimina/Bolivina* Zone. The palaeogeography of the early to middle Badenian Paratethys is still considered enigmatic. PILLER et al. (2007) refer to the disagreement between POPOV et al. (2004) and the works of RÖGL (1998) or STEININGER & WESSELY (2000) on the existence of an open connection between the Eastern Paratethys and the Mediterranean.

The Samartian is known for its highly endemic fauna that developed in reduced salinity environments. Nevertheless its biostratigraphic zonation is based on molluscs and foraminifers (RÖGL, 1999). Correlating the Samartian to the Mediterranean biostratigraphy is difficult as almost no open seaways were active. The only possibility is by nannoplankton (PILLER et al. 2007). The **Pannonian** and **Pontian** stages represent the Late Miocene in the Central Paratethys. During the Pannonian the reduction of the marine conditions continued. The faunal adaptations to reduced salinity levels - typical for the Samartian - found their end in the late Miocene, as salinity continues to diminish (RÖGL, 1998). The result was the extinction of marine taxa in the western part of the Paratethys.

3. Geological setting

3.1. Formation of the Korneuburg Basin

The Korneuburg Basin is of asymmetrical nature and shows a north to south extension of approximately 20 kilometres and a width of seven kilometres (strongly narrowing in the north). After HARZHAUSER & WESSELY (2003), the early history of the Korneuburg Basin's development coexists with the events leading to the emergence of the Vienna Basin. The origin of both geological structures can be explained by tectonic events occurring during the lower Miocene. Both were formed by movement of the Alpine-Carpathian thrust belt. The Korneuburg and the Vienna Basin emerged in the east of an extension assigning to the Bohemian Massif which prevented the advance of the alpine nappes on the western side of this structure (WESSELY, 1998). The divergence in the progression of those structures led to a pull-apart mechanism that formed the basin system and made it subside. This process affected the geology of the region up to the upper Miocene (WESSELY, 1998).

3.2. Basin deposits

The development of the Korneuburg Basin itself can be dated back to the late Eggenburgian and the sedimentation continues well into the Karpatian (HARZHAUSER et al., 2002). Figure 4 gives an overview on the basins deposits and its originating structures.
HARZHAUSER & WESSELY (2003) state, that most of the deposits present in the Korneuburg Formation were deposited during the Karpatian and are represented mainly by silt and sand. A second lithological unit, "Diatomeenschiefer mit Fischresten", is mainly composed of clayey marls with diatomites of Ottnangian and early Karpatian origin (WESSELY, 2009). The Ritzendorf - Formation contains marls and sands. Several scattered Flysch horsts are present throughout the basin and can be correlated with the Greifensteiner Schichten (WESSELY, 2009). The deposits were dated through the correlation of palaeomagnetic data (giving a

signal for Chron C5Cn.2n) with mammal remains (SCHOLGER, 1998, DAXNER - HÖCK, 1998). With this data it was possible to assign the mammal remains yielded to mammal zone MN 5 (16.5 - 16.7 Ma).

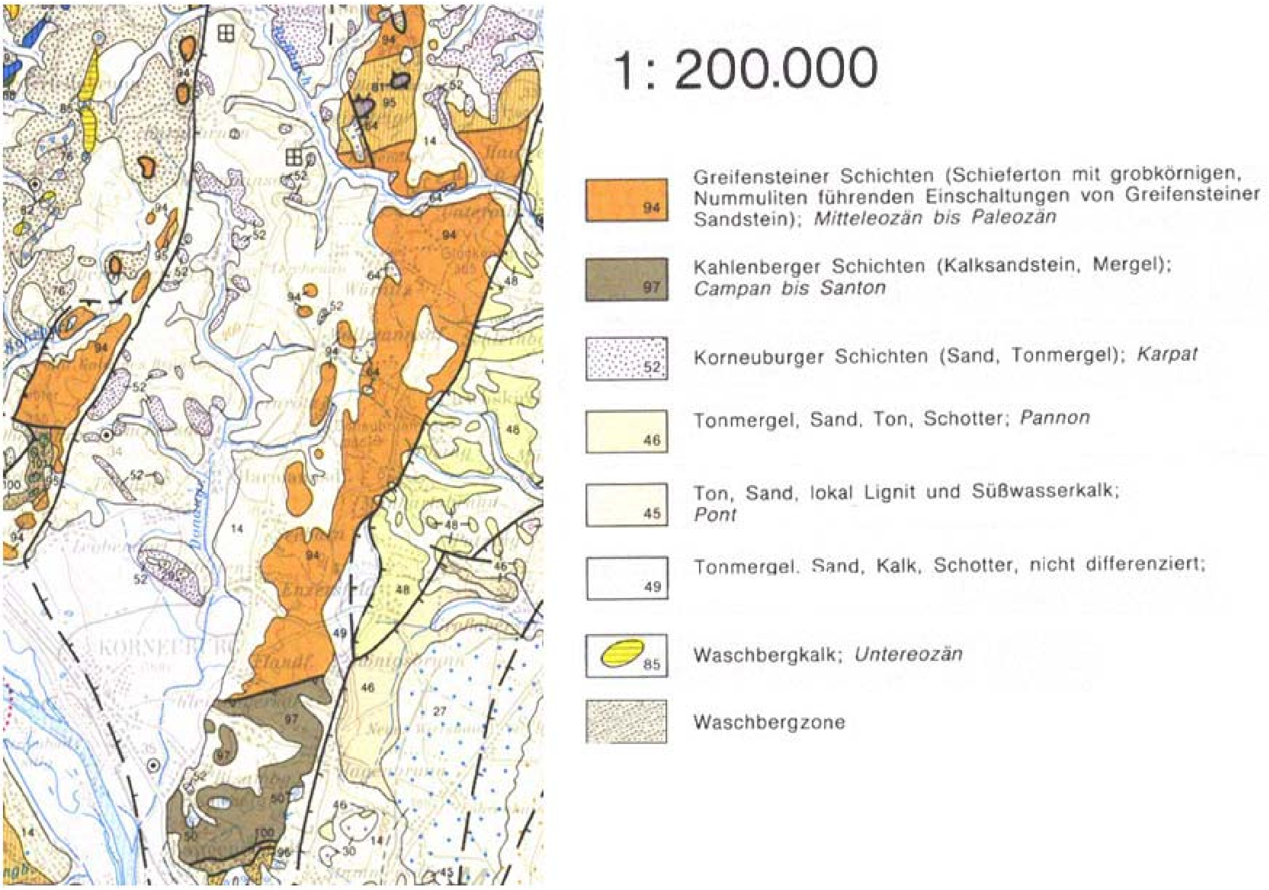

Figure 4: Dominant geological structures in the Korneuburg Basin. Detail of the geological map of Lower Austria provided by the GBA.

3.3. Basin boundaries

The fault that restricts the Korneuburg Basin on its western margin towards the Flysch zone (Schliefberg Fault) was formed in a synsedimentary process (Fig. 5) (WESSELY, 1998). The Schliefberg Fault is associated with the deepest parts of the basin. Here the base subsided down to 800 metres in depth. In the northwest, the Waschbergzone restricts the extent of the basin, while borders in the east and southwest are defined by two flysch units; the Greifenstein and Wolfpassing nappes with early Tertiary and late Cretaceous rocks, and by the Kahlenberg nappe (consisting mainly of late Cretaceous sediments) (WESSELY, 1998).

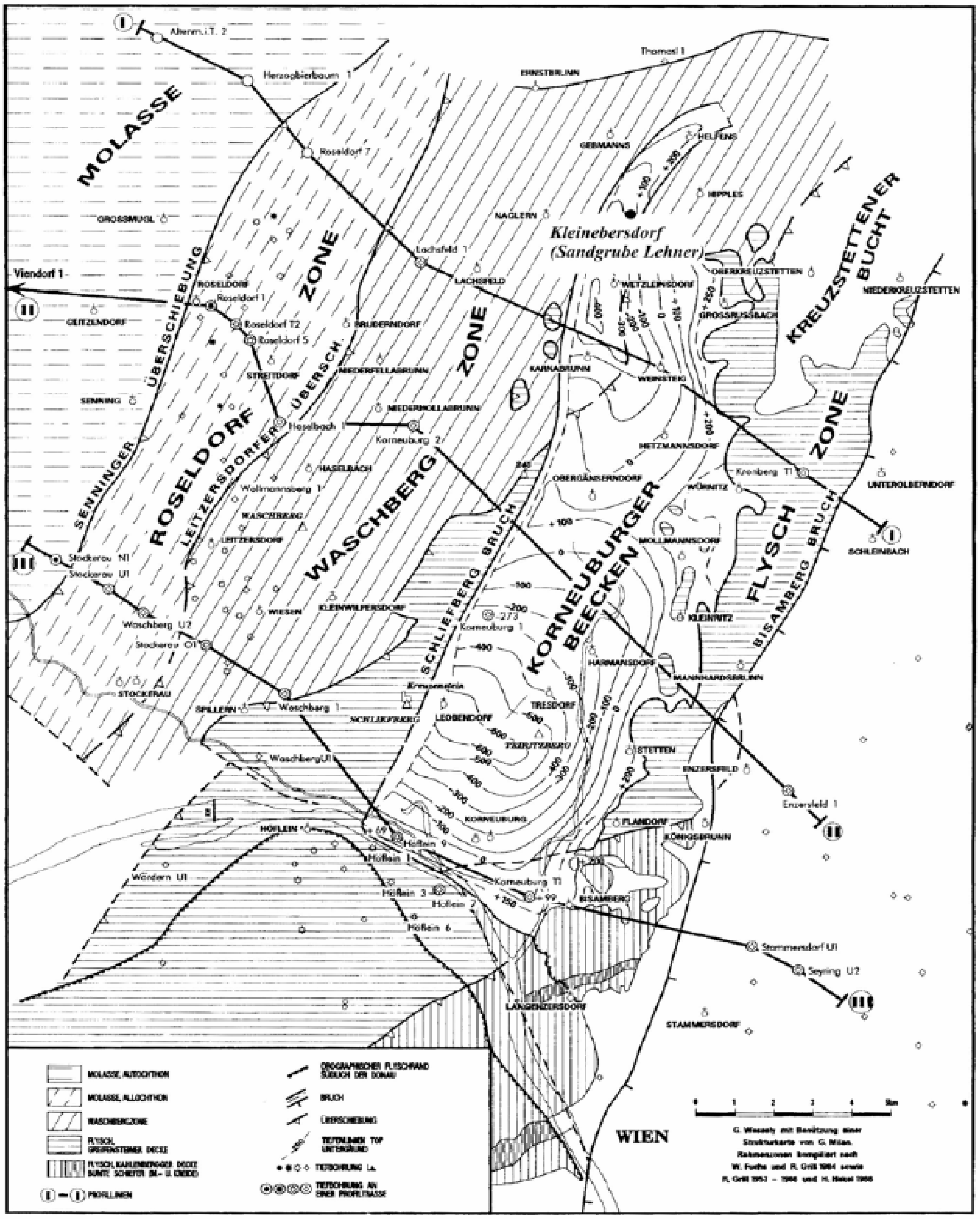

Figure 5: Map of the Korneuburg Basin showing the lithological units, margins and thickness of strata (WESSELY, 1998).

3.4. Biostratigraphic correlation

Since the beginning of its exploration, the Korneuburg Basin was assigned to the Karpatian (16, 4 to 17, 3 Ma). RÖGL et al. (2003) applies the following biostratigraphic tie points:

Calcareous nannofossils:
The Karpatian partly corresponds to Nannoplankton zone NN4 (14.91 to 17.95 Ma). Sections in the Korneuburg Basin yield a variety of taxa. Some specimens seem to be reworked from the later Cretaceous and Eocene but the autochthonous nannofauna gives a clear signal for NN4 (WOLFGRING et al., 2012).

Foraminifera:
Generally, the Karpatian can be assigned to Foraminifera Zone M5 (PILLER et al., 2007). According to RÖGL et al. (2003), the occurrence of *Globigerionoides bisphericus* is an important tool for the correlation of the Paratethyan realm to the Mediterranean stratigraphy - as far as the Upper Karpatian is concerned. The base of the Karpatian cannot yet be correlated to any planktic foraminifera zones. However, the end of the Karpatian is marked by the last occurrence of the planktic genus *Cassigerinella* (CICHA et al., 1998).

Benthic foraminifera assemblages in the Korneuburg Basin have turned out to work well as a biostratigraphic tool. Certain assemblages seem to be characteristic for the Karpatian. For example those around *Uvigerina graciliformis*, are considered a good marker for the Karpatian (RÖGL et al., 2003).

Ostracoda:
The Karpatian ostracod assemblages documented by JIRICEK (1975) have been assigned Ostracod Zone NO6, defined by the first occurrence of *Cytheridea paracuminata paracuminata* (this taxon is also known from the Badenian). However, the absence of confirmed Badenian taxa can be considered as an indication for Karpatian assemblages with a composition strongly dependent on ecological parameters (ZORN, 1998). RÖGL et al. (2003) further stated, that the taxa *Loxoconcha vaisonna* and *Callistocythere karpatienses* are restricted to the Karpatian. Studies on the ostracods of the Korneuburg Basin confirmed the presence of *Loxoconcha vaisonna* (ZORN, 1998) and ostracod assemblages characteristic for the lower Miocene (WOLFGRING et al., 2012).

Molluscs:

Karpatian mollusc assemblages are characterised by immigration of several taxa in the Paratethyan realm from the Mediterranean. Many of those are present throughout the Badenian. While Karpatian sites often show a fluviatile or limnic influence, Badenian outcrops have proven to predominantly show marine features. Furthermore the Karpatian/Badenian transition shows a clear increase in diversity towards the Badenian (ZUSCHIN et al., 2011).

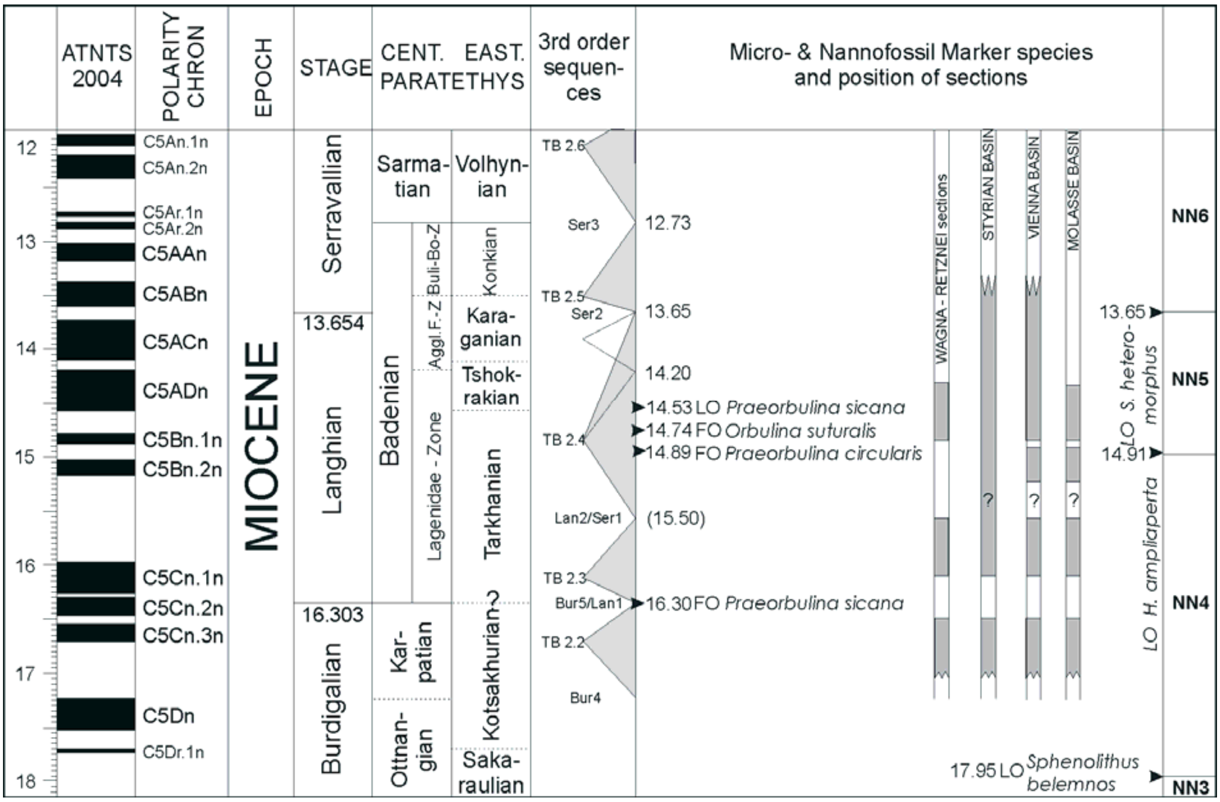

Figure 6: Stratigraphic chart depicting the Miocene with emphasis on first and last occurrences of index taxa (RÖGL et al., 2007).

Mammals:

Mammal zones Mn4b and Mn5 are represented during the Karpatian (RÖGL et al., 2003). DAXNER - HÖCK (1998) described the smaller vertebrate fauna from the Teiritzberg and Obergänserndorf localities as clearly belonging to a lower Mn5.

Magnetostratigraphy:

The standard for palaeomagnetic information for the Karpatian was obtained from a drilling at Nosislav 3 in the Carpathian foredeep (Czech Republic) (RÖGL et al., 2003). The base of the Karpatian is defined by a change from normal polarity in Chron C5Dn, representing the Ottnangian, to reverse polarity in Chron C5Cr. (Fig. 6). The Karpatian/Badenian boundary can be correlated to Chron C5Cn.2n. The Teiritzberg locality, yielding the mammal remains DAXNER-HÖCK (1998) described, shows a normal polarity. In the Molasse-Zone the Teiritzberg strata are overlain by layers yielding the first *Praeorbulina* occurrence. As the first occurrence of *Praeorbulina* indicates Badenian (PAPP & CICHA, 1978), the correlation with magnetostratigraphic data confirms the assignment of the Teiritzberg strata to the Karpatian.

3.5. Palaeoecological framework

HARZHAUSER & WESSELY (2003) described the Korneuburg Basin as having been cut off from the open Paratethyan waters in the southern part. A connection to the open Paratethys was imminent. Otolithes of several fish species, found in the northern part of the basin, were investigated and confirmed as fully marine species (REICHENBACHER, 1998). This fact attests marine conditions. Diverging from the northern part, the southern part of the basin shows predominantly estuarine conditions influenced by a fluviatile system originating in the Vienna Basin (RÖGL, 1998). Cyclic marine ingression have occurred (SCHENK et al., 2010). SCHOLGER (1998) estimated the palaeolatitude for the Korneuburg Basin to be 34° and having performed a rotation of approximately 20 ° since the Karpatian.

According to the composition of the lower vertebrate fauna at two localities in the Korneuburg Basin (Obergänserndorf and Teiritzberg), the annual mean temperature can be reconstructed as 17°C, and the minimum temperature never lower than 3°C as certain taxa cannot tolerate temperatures below 0° C (BÖHME, 2002). This assumption corresponds to some other indicative faunal elements, such as the presence of corals at certain localities in the nothern part of the basin (HARZHAUSER & WESSELY, 2003) or the general composition of the mollusc fauna (HARZHAUSER, 2002).

Micropalaeontological investigation in the southern part so far confirmed those environmental parameters. Foraminifera assemblages are strongly dominated by the genus *Ammonia,* especially around the Teiritzberg locality. These associations have proven to be indicative for water temperatures between 10°C and 30°C and depths up to 30 metres (SEN GUPTA, 1999).

3.6. Sections investigated

The section can be divided into an eastern and western part by the segment E, which contacts a flysch horst and as such displays the border between the sections' two parts. Subsection E is not in any way joined together with the others (Fig. 7).

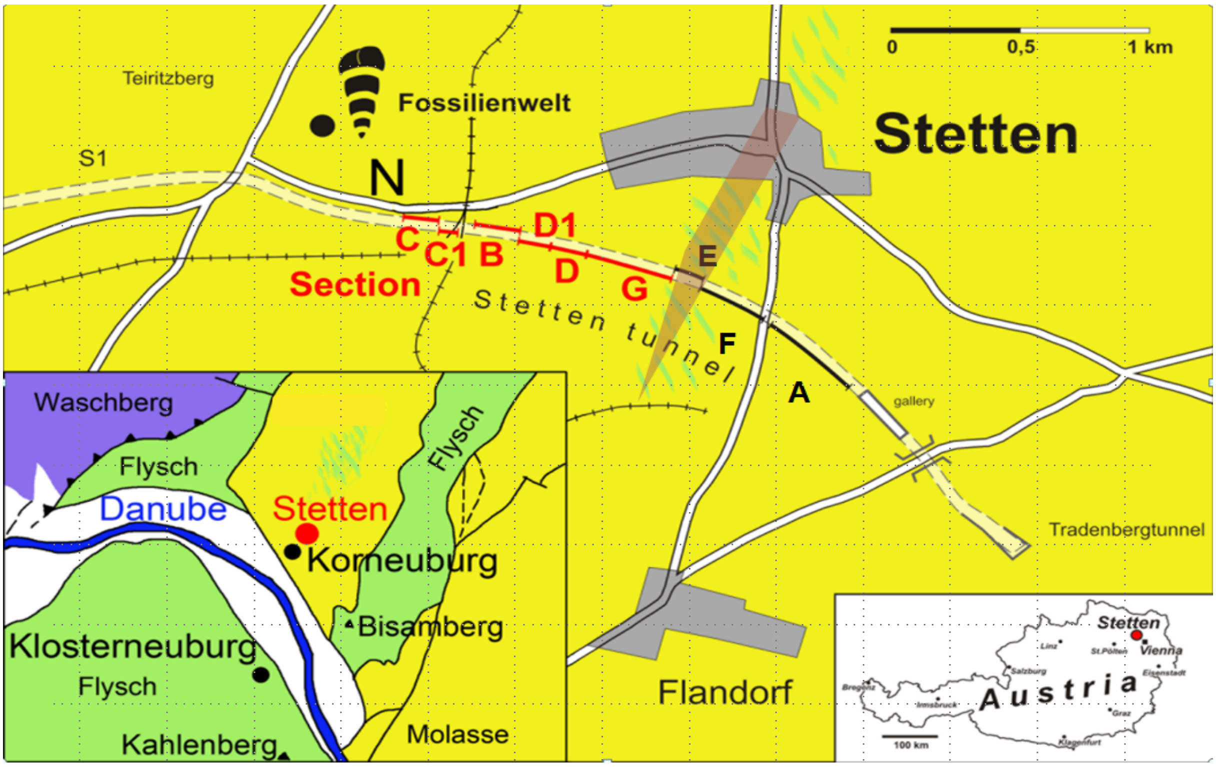

Figure 7: Overview map of the section. Western part of the section highlighted red, eastern part of the section highlighted black. Segment E (brown) covers one of several flysch horsts present throughout the basin (modified after B. SCHENK, GBA)

The western part is represented by the profiles G, D, D1, B, C1, and C while the eastern part consists of profiles A and F.

The western part of the section yields clay, silt, marls and fine sand. The overall grain size increases in profiles C and D, which are in some parts dominated by finesand sequences. Profiles G and D yielded bivalves, gastropods, plants, rarely terrestrial gastropods and wood remains. As far as profile D is concerned, the fossil content changes with lithology, and the remains of plants prevail whilst bivalves and gastropods do not seem to be present in parts dominated by fine to medium sand anymore. The segments D1 and B again consist of clay, silt and fine sand in alternation. In profile B bivalves, gastropods and plants are common. D1 yields terrestrial gastropods. Profile C1 is dominated by clay and silt and shows an increase in grain size resulting in finesand layers towards the top. Plant remains, bivalves and gastropods are common. A tuffite layer is present in the upper part of C1. Profile C shows fine to medium sand layers interrupted by clay and silt. Bivalves are very common, gastropods, plants and fossil wood are present but less abundant.

Part E of the section covers flysch sandstone and clay layers as well as silt, clay and fine sand. Gastropods and bivalves are present. Plants appear in the sandy layers of this part of the section.

The segments A and F consist mainly of silt, clay and marls in alternation to fine to middle sand. Overall grain size increases in profile F. Profile A yields gastropods and bivalve remains and very few plant fossils. The latter become more common in profile F. The top of profile F yields terrestrial gastropods.

4. Material and Methods

4.1. Preparation of samples

Samples analysed were obtained from field work carried out near Stetten in Lower Austria during the early phase of highway construction work for S1 (Schnellstrasse 1) by the GBA in 2008 (Fig. 8).

Figure 8: Sampling was conducted along the road construction site of the S1 (photography provided by H. GEBHARDT, GBA).

A measured section spanning over 2.5 kilometres was sampled. It was subdivided into 9 subsections in 2 profiles and all together 186 sediment samples were taken along the construction site in irregular intervals. All samples had a dry weight of 100 g each. They were then sieved through a combined set of standard sieves (1.0, 0.5, 0.25, 0.125 and 0.063 mm) and separated by fraction size. The coarse fraction of >1mm was ignored in further micropalaeontological investigation.

The following preparation was performed on a total of 30 samples from subsections A, E and F. The sieved fraction sizes were merged, and then split using an "OTTO Mikrosplitter“ to

acquire a portion of processable size. An ideal sample should contain at least 300 foraminifera to have an amount that is big enough to conduct statistical analyses to give a representative insight into the faunal composition. All faunal data used in this thesis was multiplied by split size, if not mentioned otherwise.
The microfossils were picked under a light microscope (Wild M3Z, with 40x magnification). Prior to the exact taxonomical analysis, foraminifera were glued in "Plummer" slides and stored at the GBA. For Scanning Electron Microscope (SEM) photography the SEM at the Department of Palaeontology (Type JSM 6447) and the SEM at the GBA were used. The greater part of the SEM pictures was taken in cooperation with Dr. BETTINA SCHENK, GBA.

4.2. State of preservation

Overall the state of preservation of benthic foraminifera is very good. Most of benthic individuals appeared with their complete tests. In some samples benthic specimen appear to be of smaller size than average without showing a trend for this development. Planktic individuals are more often found in a poor state of preservation. No significant difference in the condition of specimen throughout the different segments could be determined.

4.3. Diversity indices

The calculation of diversity indices was performed using PAST, version 2.12 (HAMMER et al., 2001). Fisher's Alpha index (FISHER et al., 1943), Dominance index (SIMPSON, 1949) and Evenness index (BUZAS & GIBSON, 1969) have been calculated for this analysis.

Fisher's Alpha index:

$$S = \alpha \ln\left(1 + \frac{n}{\alpha}\right) \qquad \textbf{(1)}$$

$S =$ number of taxa
$n =$ number of individuals
$\alpha =$ Fisher's alpha

Fisher's Alpha index strongly focuses on the number of species in relation to the number of individuals. α can reach values from 0 to 1.5, where 1.5 shows a community with a high diversity.

Dominance:

$$D = \sum_{i=1}^{m} \left(\frac{n_i}{n} \right)^2 \qquad \textbf{(2)}$$

m = number of species

n_i = abundance of species $_i$

D reaches values from 0 to 1, where the value 1 explains absolute dominance of 1 species.

Evenness:

$$E = \frac{e^H}{S} \qquad \textbf{(3)}$$

$$H = -\sum_{i=1}^{m} \left(\frac{n_i}{n} \right) \ln \left(\frac{n_i}{n} \right) \qquad \textbf{(4)}$$

e = base of natural logs (BUZAS & CULVER, 1999)

H = (Shannon index for occurrences)

n_i = occurrence of species i

n = total species occurrence

S = number of species

Calculating the Evenness index explains how balanced a community is in regard to faunal composition. A value of "1" for E would indicate an equally distributed faunal composition (BUZAS & CULVER, 1999).

4.4. Palaeodepth zonation

Using the method of HOHENEGGER (1995), an estimation of palaeodepths was conducted, using equation **(5).** This method is based solely on the abundance data of benthic foraminifera. Recent depth ranges of taxa are used as reference (HOHENEGGER, personal communication, March, 2012).

The equation proposed by HOHENEGGER (1995) may be written as:

$$depth = \sum_{i=1}^{m}(n_i l_i d_i^{-1}) \Big/ \sum_{i=1}^{m}(n_i d_i^{-1}) \qquad \textbf{(5)}$$

where

l is the mean depth

n_i represents the abundance of $_i$ species and

d_i the dispersion (distribution along the taxon's depth range)

The depth ranges are needed as input. The location parameters l are weighted by the abundance n and the dispersion d (BALDI & HOHENEGGER, 2008).

4.5. Statistical methods

For computation of statistical analyses the programme PAST (HAMMER et al., 2001) was used. A cluster analysis after WARD (1963), a Correspondence analysis (DAVIS, 1986) and a Non-mentric Multidimensional Scaling (SHEPARD, 1962; KRUSKAL, 1964) including ecological variables was performed.

Samples clustering

The samples were clustered into classes using Ward's (1963) algorithm. The proportion of abundances was calculated to get size independent values, then proportions were linearised using the arcsine-root transformation, because Ward's (1963) method is based on squared Euclidean distances to determine the minimum variance.

Correspondence analysis

This analysis was developed by HIRSCHFELD (1935) and BENZECRI (1973). The underlying algorithms used by PAST for this particular analysis are taken from DAVIS (1986). Working similar to a Principal Components Analysis for counted data, this analysis attempts to cluster samples by minimum distance using Chi-square measurement. This method allows to plot all variables (rows and columns) in the same coordinate system. Therefore, relations between samples and the foraminifera content can be easily identified.

Non-metric Multidimensional scaling

Non-metric Multidimensional scaling was developed by SHEPARD (1962) and KRUSKAL (1964). According to HAMMER et al. (2001), plotting a NMDS in PAST can result in a different graphic output each time, although the same method is used (and numerical distances stay the same). This method allows the implementation of ecological variables additional to the faunal composition per sample. Chord was used as similarity measure.

5. Taxonomy

For the taxonomic assignment of individuals predominantly the works of RÖGL (1998), PAPP & SCHMIDT (1986) and CICHA et al., (1998) have been consulted. The supergeneric classification follows consequently LOEBLICH & TAPPAN (1988).

5.1. List of Taxa

Suborder: Textulariina Loeblich & Tappan, 1988

Superfamily: Lituolacea de Blainville, 1825

Family: Lituolidae de Blainville, 1825

Subfamily: Ammomarginulininae Podobina, 1978

Genus *Ammobaculites* Cushman, 1910

***Ammobaculites agglutinans* (d'Orbigny, 1846)**
(pl. 1, fig. 1)

1846 *Spirolina agglutinans* n. sp.; d'Orbigny, p. 137, pl. 7, figs. 10-12

1998 *Ammobaculites agglutinans* (d'Orbigny); Cicha et al., p. 79, pl. 3, fig. 9

Superfamily: *Trochamminacea* Schwager. 1877

Family: Trochamminidae Schwager, 1877

Genus *Trochammina*, Parker & Jones, 1859

Trochammina sp.

Suborder: Rotaliina Delage & Hérouard, 1896

Superfamily: Chilostomellacea Brady, 1881

Family: Trichohyalidae Saidova, 1981

Genus *Aubignyna* Margerel, 1970

***Aubignyna perlucida* (Heron - Allen & Earland, 1913)**
(pl. 1, fig. 2)

1913 *Rotalina perlucida* n. sp.; Heron-Allen & Earland, p. 139, pl.13, figs. 7-9

1998 *Aubignyna perlucida* (Heron-Allen & Earland); Rögl, p. 139, pl.2, figs. 10-14; pl. 10, figs. 1-2

Family: Gavelinellidae, Hofker, 1956

Genus *Gyroidina* d'Orbigny 1826

Gyroidina parva Cushman & Renz, 1941

1941 *Gyroidina parva;* Cushman & Renz, Cushm. Lab. For. Res., Contr.; p. 17, 23, pl. 4, 2 (plate 5, fig. 4)

Genus *Gyroidinoides* Brotzen 1942

Gyroidinoides umbonatus (Silvestri, 1898)

(pl. 1, fig. 7)

1898 *Rotalina soldanii* d'Orbigny var *umbonata*; Silvestri, p. 329, pl. 6, fig. 14

2009 *Gyroidoides umbonatus* (Silvestri); Gebhardt et al., p. 116, pl. 48, fig. 48

Family: Heterolepidae, Gonzalez-Donoso, 1969

Genus *Heterolepa* Franzenau 1884

Heterolepa praecincta (Karrer, 1868)

(pl. 1, fig. 3)

1868 *Rotalina praecincta*; Karrer, p. 189; pl5, fig. 7

1994 *Heterolepa praecincta* (Karrer); Loeblich & Tappan, p. 163, pl. 360, figs. 1-10

Superfamily: Nodosariacea, Ehrenberg, 1838

Family: Vaginulinidae, Reuss, 1860

Subfamily: Lenticulininae, Chapman, Parr & Collins, 1934

Genus *Lenticulinella;* Samyschkina, 1983

Lenticulinella sp.

Superfamily: Nonionacea Schultze, 1854

Family: Nonionidae Schultze, 1854

Subfamily: Nonioninae Schultze, 1854

Genus *Nonion* de Montfort, 1808

***Nonion commune* (d' Orbigny, 1826)**

(pl. 1, fig. 6)

1826 *Nonion communis* d'Orbigny, p. 128, no. 20

1985 *Nonion commune* (d'Orbigny); Papp & Schmid, p. 45, pl. 17, fig. 6

***Nonion demens* Bik, 1964**

(pl. 1, fig. 4)

1964 *Nonion demens* Bik, pl. 5, figs. 3-8, Text figs. 3c, d

***Nonion tumidulus* Pishanova, 1960**

(pl. 1, fig. 5)

1960 *Nonion tumidulus;* Pishanova; in: Subbotina et al., p. 45, Taf. 3, figs. 9–10.

1998 *Nonion tumidulus* Pishvanova; Cicha et al., p. 113, pl. 66, fig. 5

Genus *Pullenia* Parker & Jones, 1862

***Pullenia bulloides* (d'Orbigny, 1826)**

(pl. 1, fig. 8)

1826 *Nonionina bulloides*; d'Orbigny, p. 128, no. 17

1985 *Pullenia bulloides* (d'Orbigny); Papp & Schmid, p. 45, pl. 34, figs. 6-9

Superfamily: Rotaliacea Ehrenberg, 1839

Family: Rotaliidae Ehrenberg, 1839

Subfamily: Ammoniinae Saidova, 1981

Genus *Ammonia* Brünnich, 1772

***Ammonia* cf *beccarii* (Linné, 1758)**

(pl. 2, fig. 1)

1758 *Nautilus beccarii;* Linné, p. 710, pl. 1, fig. 1.

1998 *Ammonia* cf *beccarii* (Linné); Rögl, p. 135, pl. 1, figs. 1-4

Ammonia tepida **(Cushman, 1926)**

(pl. 2, fig. 3)

1926 *Rotalia beccarii* (Linné, 1758) var. *tepida,* Cushman, p. 79, pl. 1 (fide Ellis and Messina,1940)

1998 *Ammonia tepida* (Cushman); Rögl, p. 136, pl. 2, figs.7-9

Ammonia pseudobeccarii **(Putrja, 1964)**

(pl. 2, fig. 2)

1964 *Strebolus pseudobeccarii* n.sp; Putrja, p. 129, pl. 15, figs. 3-4

1998 *Ammonia pseudobeccarii* Putrja; Rögl, p. 135, pl.2, figs. 1-6

Ammonia vienennsis **(d'Orbigny, 1846)**

(pl. 2, fig. 4)

1846 *Rosalina viennensis;* d'Orbigny, p. 177, pl. 10, figs. 22-24 (Nr. 129)

1985 *Ammonia viennensis* (d'Orbigny); Cicha et al., p. 79, pl. 74, figs. 1-3

Family: *Elphididae* Galloway, 1933

Genus *Elphidiella,* Cushman, 1936

Elphidiella subnodosa **(Roemer, 1838)**

(pl. 2, fig. 5)

1838 *Robulina subnodosa* v.M.; Roemer, p. 391, pl 3., fig. 61 (fide Ellis & Messina, 1940)

1998 Elphidiella subnodosa (Roemer); Cicha et al., p. 95, pl 75, figs. 5-6

Elphidium ungeri **(Reuss, 1850)**

(pl. 2, fig. 6)

1850 *Polystomella ungeri;* Reuss, p. 369, pl. 48, fig. 2

1998 *Elphidium ungeri (Reuss);* Rögl, p. 144, pl. 7, figs. 1-2

Genus *Porosononion,* Putrya in Voloshinova, 1958

Porosononion granosum **(d’Orbigny, 1826)**

(pl. 2, fig. 7)

1826 *Nonionina granosa*; d’Orbigny; p. 128, no. 17

1998 *Porosononion granosum* (d’Orbigny); Cicha et al., p. 119, pl 74, figs. 4-5

Superfamily: Bolivinacea Glaessner, 1937

Family: Bolivinidae Glaessner, 1937

Genus *Bolivina,* d'Orbigny, 1839

Bolivina dilatata **Reuss, 1850**

(pl. 3, fig. 1)

1850 *Bolivina dilatata;* Reuss, p. 381, pl. 48, fig. 15

1998 *Bolivina dilatata dilatata;*Cicha et al., p. 83, pl. 43, fig. 20

Bolivina hebes **Macfadyen, 1930**

(pl. 3, fig. 2)

1930 *Bolivina hebes;* Macfayden, p. 59, pl.2, fig. 5

1998 *Bolivina hebes* Macfadyen; Cicha et al, p. 84, pl. 43, fig. 14

Bolivina sagittula **Didkovski, 1959**

(pl. 3, fig. 3)

1959 *Bolivina sagittula;* Didkovski, p. 527, fig. 3

Superfamily: Cassidulinacea d'Orbigny, 1839

Family: Cassidulinidae d'Orbigny, 1839

Genus *Cassidulina* d'Orbigny, 1826

Cassidulina laevigata **(d'Orbigny, 1826)**

(pl. 3, fig. 4)

1826 *Cassidulina laevigata*; d'Orbigny, p. 282, pl. 15, figs. 4-5

1998 *Cassidulina laevigata* d’ Orbigny; Cicha et al., p. 88, pl. 15, figs. 4-5

Genus *Globocassidulina* Voloshinova, 1960

***Globocassidulina subglobosa* (Brady, 1884)**

(pl. 3, fig. 5)

1884 *Cassidulina subglobosa*; Brady, p. 430, pl. 54, figs. 17 a-c

1994 *Globocassidulina subglobosa* (Brady 1881); Jones, p. 60, pl. 54, fig. 17

Superfamily: *Buliminacea* Jones, 1875

Family: *Buliminidae* Jones, 1875

Genus *Bulimina* d'Orbigny, 1826

***Bulimina elongata* d'Orbigny, 1846**

(pl. 3, fig. 6)

1846 *Bulimina elongata*; d'Orbigny, p. 187, pl 11, figs. 19-20, Nr. 197

1985 *Bulimina elongata* d'Orbigny; Papp & Schmid, p. 72, pl. 63, figs. 5-9

***Bulimina schischkinskyae* Samoylova, 1947**

(pl. 3, fig. 7)

1947 *Bulimina schischkinskyae* Samoylova, p. 82, p. 79, pl. 10

1998 *Caucasina schischkinskyae* (Samoylova); Cicha et al., p. 87, pl.47, figs. 2-4

***Bulimina subulata* Cushman & Parker, 1937**

(pl. 3, fig. 8)

1937 *Bulimina elongata* d'Orbigny var. α *subulata*; Cushman & Parker, 1937, p. 51, pl. 7 f. 6-7

1998 *Bulimina elongata* Cushman & Parker; Cicha et al., p. 87, pl. 46, figs. 15-19

Superfamily: *Planorbulinacea* Schwager, 1877

Family: *Cibicididae* Cushman, 1927

Genus *Cibicides* de Montfort, 1808

Cibicides sp.

Superfamily: Fursenkoinacea Löblich & Tappan, 1961

Family: Fursenkoinidae Löblich & Tappan, 1961

Genus *Fursenkoina* Löblich & Tappan,1961

***Fursenkoina capreolata* Poag, 1966**

(pl. 4, fig. 1)

1966 *Fursenkoina capreolata* Poag; Poag, p. 420, pl. 8, figs. 21-22

Suborder: Globigerinida, Delage & Herouard, 1896

Superfamily: Globigerinacea Carpenter, Parker & Jones, 1862

Family: Globigerinidae Carpenter, Parker & Jones, 1862

Genus *Cassigerinella* Pokorny, 1955

***Cassigerinella globulosa* (Egger, 1857)**

(pl. 4, fig. 2)

1857 *Cassidulina globulosa* Egger; Egger, p. 56, pl. 11, figs. 4-7

1998 *Cassigerinella globulosa* (Egger); Cicha et al., p. 88, pl 11, figs. 4-7

Superfamily: Globigerinacea, Carpenter, Parker & Jones, 1862

Family: Globigerinidae, Carpenter, Parker & Jones, 1862

Genus *Globigerina* d' Orbigny, 1826

***Globigerina lentiana* Rögl, 1969**

(pl. 4, fig. 3)

1969 *Globigerina bolli lentiana*; Rögl, p. 220, pl. 2, figs. 1-2, pl. 3, figs. 1-2 (printed as pl. 4)

1998 *Globigerina lentiana* Rögl; Cicha et al., p. 100, pl. 34, figs. 21-23

***Globigerina ottnangiensis* Rögl, 1969**

(pl. 4, fig. 4)

1969 *Globigerina ciperoensis ottnangensis*; Rögl, p. 221, pl. 2, figs. 7-10; pl 4, figs. 1-7 (printed as pl. 3)

1998 *Globigerina ottangensis*; Cicha et al., p. 100, pl 32, figs. 9-14

Globigerina cf. _pseudociperoensis_ Blow, 1969

(pl. 4, fig. 5)

1969 *Globigerina praebulloides pseudociperoensis* subsp.; Blow, 381, pl. 17, figs. 8-9

1998 *Globigerina* cf *pseudociperoensis* Blow, 1969; Rögl, 145, pl. 9, figs. 9-10

Genus *Globigerinella* Cushman, 1927

Globigerinella obesa Bolli, 1957

1957 *Globigerinella obesa* Bolli; Bolli, p. 119, pl. 29, figs. 2a-3

1998 *Globigerinella obesa* Bolli; Cicha et al., 101, pl. 38, figs. 1-3

6. Results

Chapter 6 describes the results of the taxonomic investigation of the eastern part of the section (containing subsections A, F and E). 30 samples have been examined. 10 from subsection A, 14 from F and 6 from E.

6.1. Contents

The highest individual count over the east profile can be found in subsections A and E. Fig. 9 shows total individual counts and Fig. 10 gives information on the abundance between planktic and benthic foraminifera. While E is not clearly connected to the other two segments, A and F display a clear succession. The most individuals have been found in subsections E and A, while F has proven to be rather poor concerning foraminiferal content. Foraminifera are very abundant in subsection E, where all samples contained foraminifera. In samples E_03 to E_06, there were no less than 12,000 individuals present. Most individuals contained E_5 with a total of 35,072 specimens. Samples E_02 and E_08 counted 1,536 and 256 individuals. Figure 10 displays benthic and planktic individuals counted per subsection. This part of the profile is dominated by benthic foraminifera. Only 512 planktic individuals have been found in E_5.

Subsections A and F, showing a cumulative thickness of 165 metres, show a diminishing number of individuals from east to west. Segment A contained a higher amount of planktic individuals. While A_35, A_36, A_37, A_38, A_39 and A_40 are dominated by benthic foraminifera, A_41, A_43 and A_45 show a higher amount of planktic individuals. A_42 did not yield any foraminifera at all. Especially rich on benthic foraminifera content were samples A_36, A_37, A_38 and A_39 with individual counts between 8,000 and 13,000. Beginning with subsection A_40 the values decrease. A_40 only yielded 2,688 individuals (solely benthic). A_41 is dominated by planktic taxa. This sample contained 2,176 planktic and 896 benthic foraminifera. A_42 did not contain any individuals. A_43 contained only 2,048 planktic individuals, A_44 160 planktic and 384 benthic specimens.

Subsection F contained only 5,824 individuals in total. 3,008 of them benthic and 2,816 planktic. In the lower part, F_01 and F_02 did not contain any foraminifera. F_03, F_04 and F_05 only contained benthic individuals, with a maximum of 768 in subsections F_04

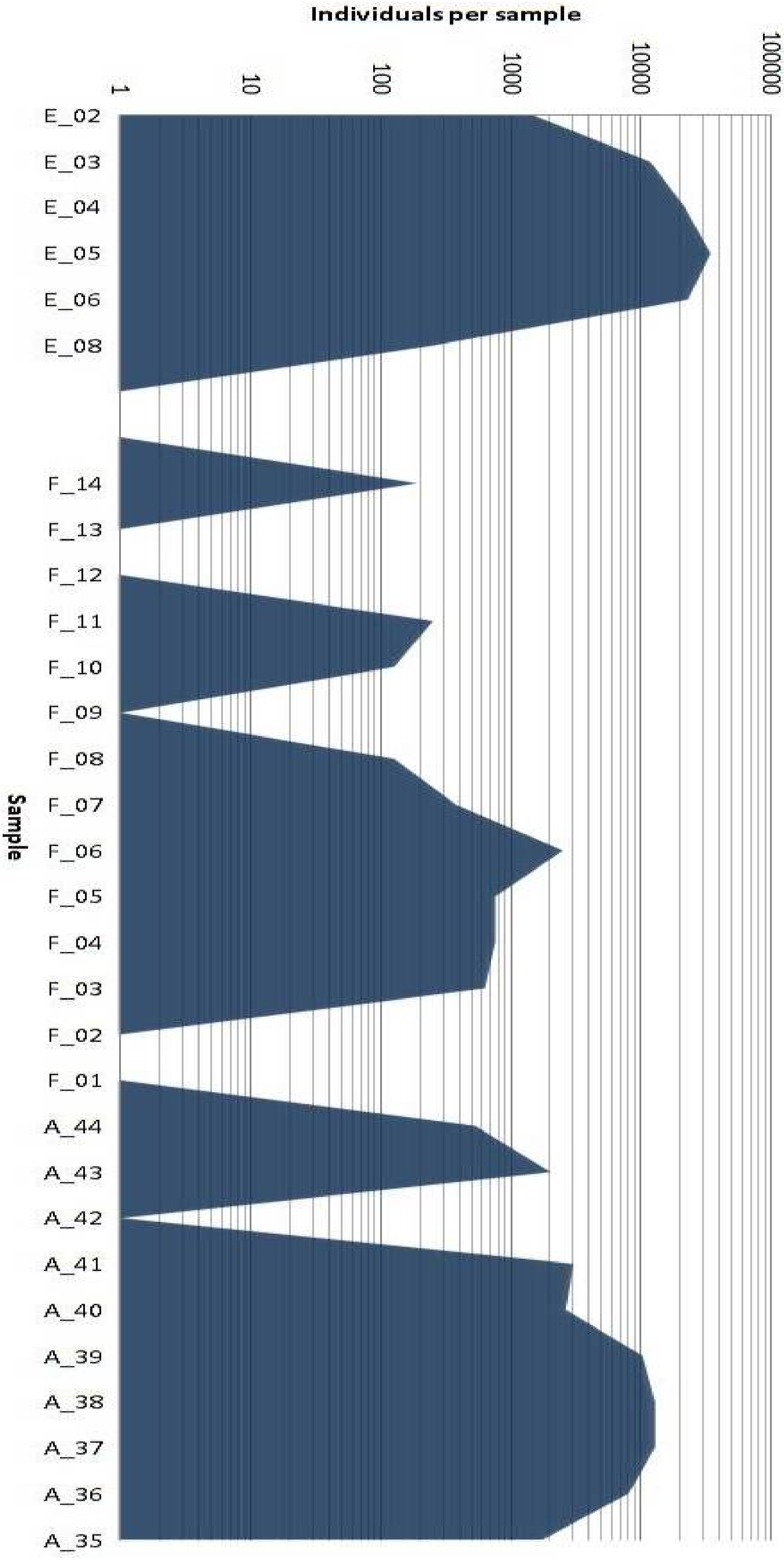

Figure 9: Individuals per sample on a logatithmic scale. Subsection E, compared to A and F clearly yields most individuals. From East to west a decrease of individuals can be observed.

and F_05. From F_06 on, this part of the profile is dominated by planktic taxa. While F_06 still contains a significant amount of benthic foraminifera (768 specimen), the rest of subsection F altogether only counts 64 benthic individuals. In the higher regions of this part of the profile samples without foraminifera also get more frequent. F_09, F_12 and F_13 counted 0 individuals.

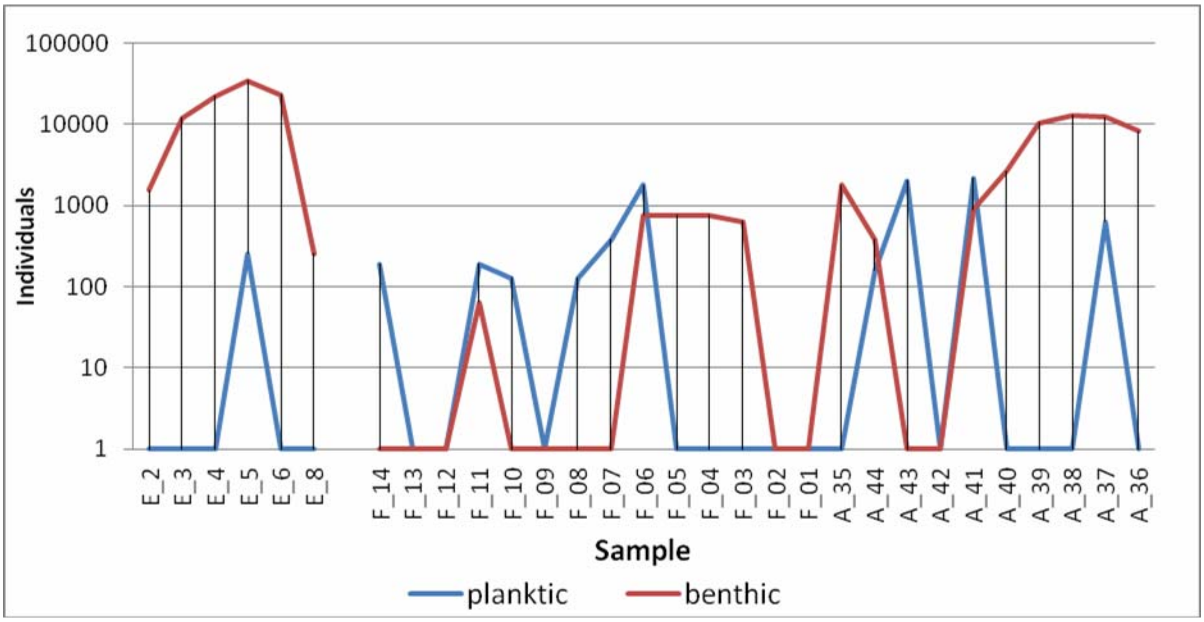

Figure 10: Benthic and planktic individuals throughout the east profile on a logarithmic scale.

6.2. Dominant taxa

Approximately 85 percent of the whole foraminifera count are represented by only 5 taxa. Figure 11 shows these five most common taxa, seen over their combined frequency in all 3 segments of the eastern profile. They are *Ammonia beccarii, A. viennensis, A. pseudobeccarii, Aubignyana perlucida* and *Bulimina elongata* .

The category "Others" resembles to taxa where each single one did not show a frequency over 5 % over the whole eastern profile.

Amongst this category mostly shallow water benthic foraminifera associated with the genus *Ammonia* can be found in subsections E and A, as planktic taxa are very rare in these subsections. In the higher levels of subsection F a higher percentage of total individuals per sample belonged to planktic taxa. Nevertheless, planktic taxa are also included in "Others" in this plot.

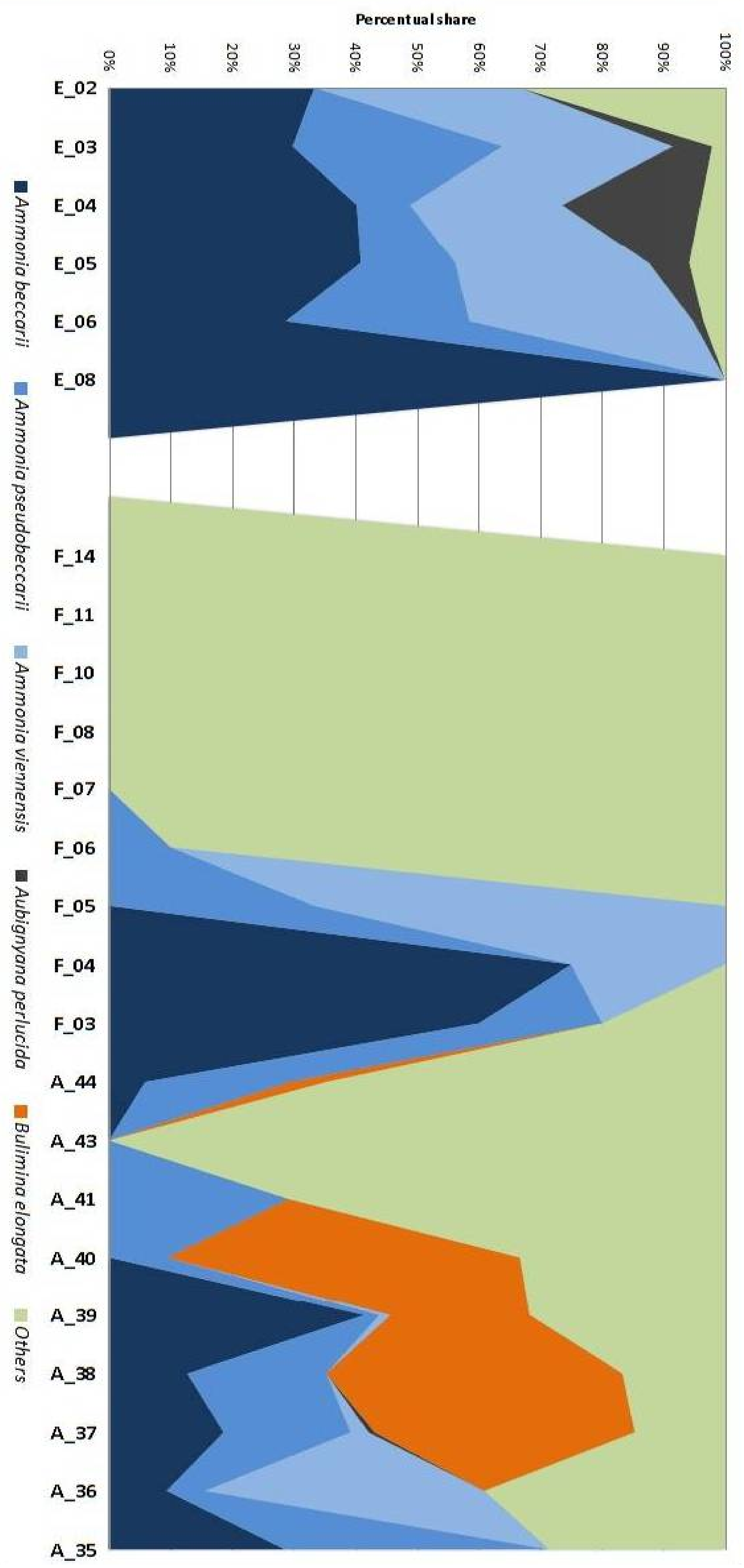

Figure 11: The five most common taxa and their relative abundance throughout the east section of the profile. Highlighted blue are *A. beccarii* , *A. viennensis*, *A. tepida*. *B. elongata* is highlighted brown. Highlighted black is *A. perlucida*. Other taxa, where each single one did not show a frequency over 5 % over the section.

7. Diversity indices

Fisher's Alpha index (Fisher et al., 1943), Dominance index (Simpson, 1949) and Evenness index (Buzas & Gibson, 1969) were calculated for the eastern part of the profile (Figs. 12,13,14).

Table 1 and figures 12, 13 and 14 show these three diversity indices together with the profiles of subsections A, F and E. Samples without any foraminifera present do not show up in those charts.

Table 1: Values for Evenness, Fisher's Alpha and Dominance index:

	Evenness	Fisher	Dominance		Evenness	Fisher	Dominance
E_02	1.00	0.36	0.33	**A_41**	0.90	0.33	0.41
E_03	0.76	0.50	0.29	**A_43**	1.00	0.10	1.00
E_04	0.52	0.78	0.28	**A_44**	0.84	1.53	0.16
E_05	0.47	0.85	0.29	**F_03**	0.86	0.41	0.44
E_06	0.71	0.46	0.30	**F_04**	0.88	0.25	0.63
E_08	1.00	0.13	1.00	**F_05**	0.94	0.25	0.56
A_35	0.90	0.49	0.31	**F_06**	0.68	0.88	0.27
A_36	0.50	1.51	0.25	**F_07**	1.00	0.12	1.00
A_37	0.52	1.06	0.26	**F_08**	1.00	0.15	1.00
A_38	0.58	0.71	0.31	**F_09**	1.00	0.15	1.00
A_39	0.52	0.97	0.28	**F_11**	0.88	0.30	0.63
A_40	0.65	0.59	0.40	**F_14**	1.00	0.14	1.00

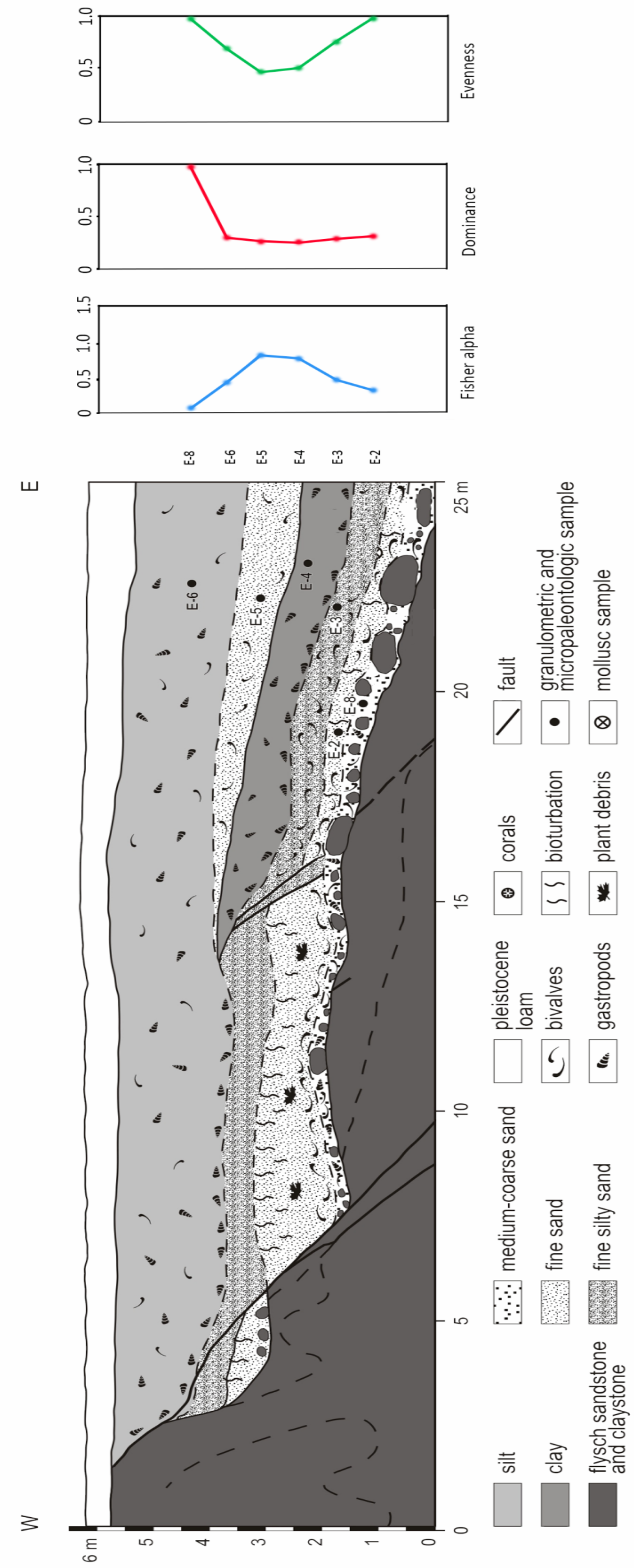

Figure 12: Diversity indices for subsection E (profile drawing by R. ROETZEL, GBA). Sampling spots in the profile do not exactly match those depicted next to the diversity graphs due to the disturbance in section E.

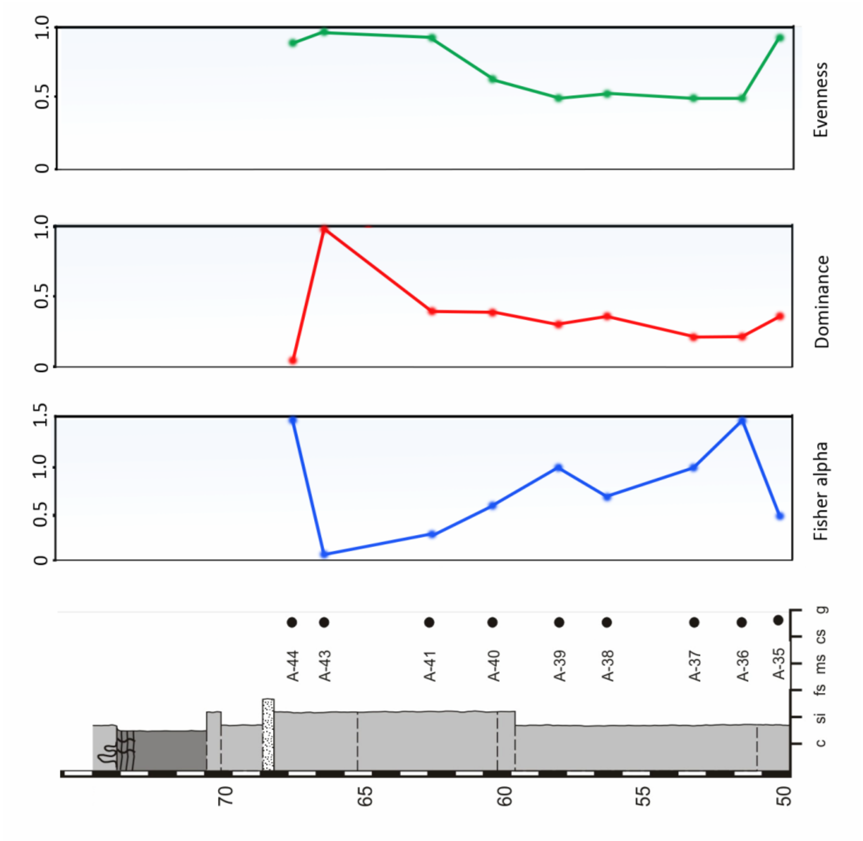

Figure 13: Illustrating indices for subsection A. Profile drawing by R. ROETZEL, GBA. For the key to symbols see Fig. 12.

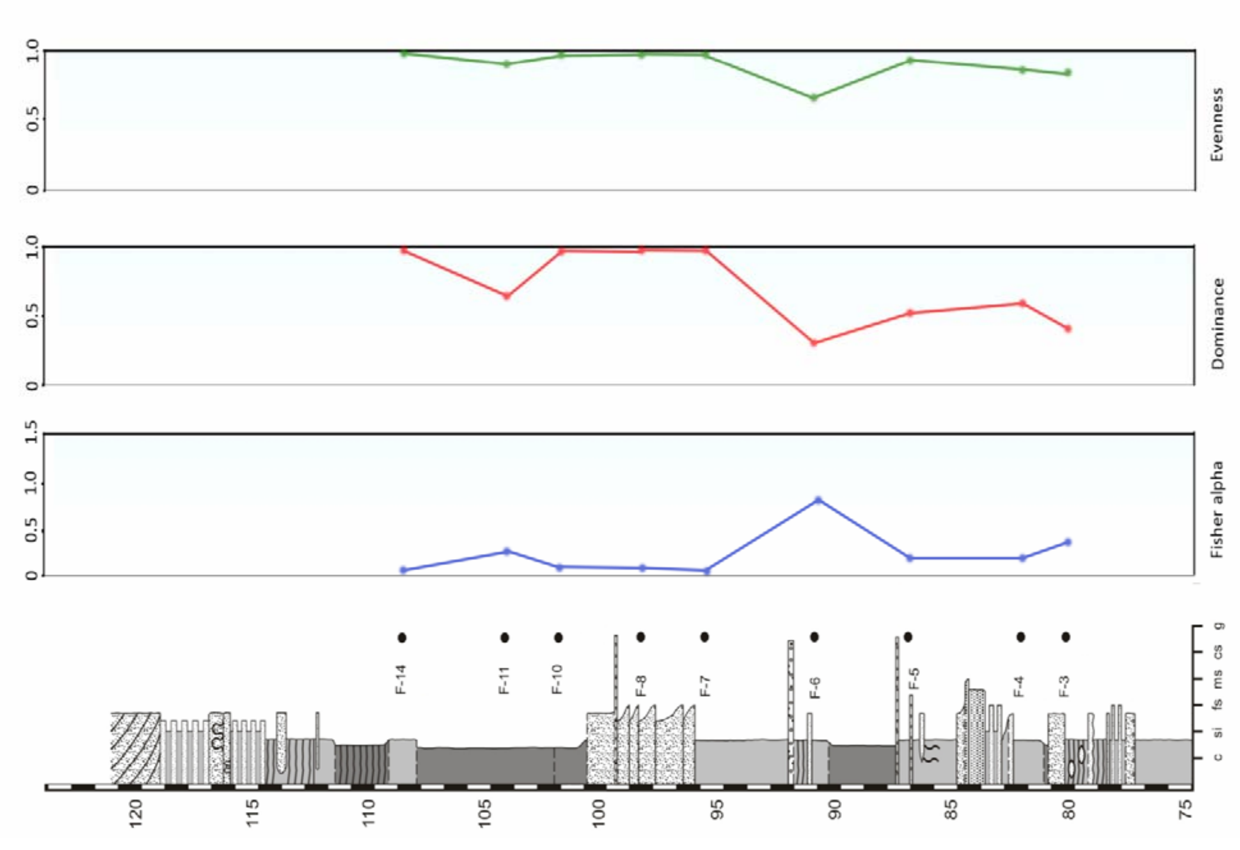

Figure 14: Illustrating diversity indices for subsection F. Profile drawing by R. ROETZEL, GBA. For the key to symbols see Fig. 12.

Both indices, Fisher's Alpha and Dominance are closely related in regard to the parameters they observe. Higher dominance values correlate to low values in the calculation of Fisher's Alpha. Especially with regard to these indices, the total sample size has to be considered. Comparing subsections A and F, subsection A gives higher values for diversity than F and generally shows a lower dominance. A decrease in species richness towards subsection F can be determined. This decrease correlates to the diminishing number of individuals per sample (see Fig. 9).

The highest diversity values were found in the lower levels of subsection A and some parts of subsection E. Dominance index shows very high values in the upper parts of subsection F. The reason for these results can be seen in context to the overall individual count. Subsection F yielded very few individuals per sample, especially from the highest five segments. After the samples have been split, some of them only contained one individual (see Appendix ii). Species evenness (BUZAS & GIBSON, 1969) as indicator for the balance of a community reaches its highest value in the upper subsection F indicating a less diverse community. Subsections A and E show the lowest values.

8. Discussion

8.1. Analysis of assemblage types

The investigation of the section gave a clear signal for different ecologically influenced foraminifera assemblage types (see fig. 10).

The 3 representatives of the genus *Ammonia* do not show significantly different ecological characteristics, all 3 are typical elements of sandy high energy areas affected by tidal currents and indicate depth ranges of approximately 0-40 metres, whereas *Bulimina elongata* is a valuable marker for muddy low energy environments (MURRAY, 2006). Furthermore, the depth range of *B. elongata* is established lower than the one taking effect in the genus *Ammonia*. Apart from the *Ammonia* group, *Bulimina elongata,* and *Aubignyana perlucida* no other taxon has a higher abundance than 5 percent. *Bulimina elongata* was especially well represented in subsection A. In samples A_37 to A_41 this taxon shows its highest abundance. The mass occurrence of *B. elongata* in this subsection coexists with the assemblage of shallow water benthic foraminifera around the genus *Ammonia,* typical for segments A and E.

Subsection F does not display the mass occurrence of *B. elongata*. In the lower parts of this segment the environment is dominated by the genus *Ammonia.* The upper parts of segment F lacks the *Ammonia* dominated environment, typical for the rest of the eastern profile. Planktic taxa are represented here more often than in other segments. Diversity indices show very high values for dominance and species evenness. While subsections A and E include gastropods and bivalves and show mostly sequences of clay, silt and fine-sand, F only contains gastropods and bivalves in layers at the lowermost part of this subsection. The uppermost top of this profile yields mainly plants and terrestrial gastropods. Furthermore, a coarsening upward sequence is preserved towards the top of subsection F. It is questionable if the individuals found in subsection F are autochthonous or washed in or even reworked as this part of the profile features terrestrial fossils. Amongst planktic taxa, worthy of mentioning is *Cassigerinella globulosa*, which has its last occurrence in the Karpatian (CICHA, 1998).

8.2. Estimation of Palaeodepths

Using the method of HOHENEGGER (1995), an estimation of palaeodepths was conducted (Fig. 14), using equation **(5)**. See Appendix iii for depth ranges of benthic foraminifera.
Samples containing only planktic taxa were not valid for this screening and may appear as "zero-depth" localities. This is the same for samples without any foraminifera content. The subsections F_01, F_02, F_09, F_12, F_13 and A_42, did not yield foraminifera, subsections F_08, F_14 and A_43 only contained planktic taxa.

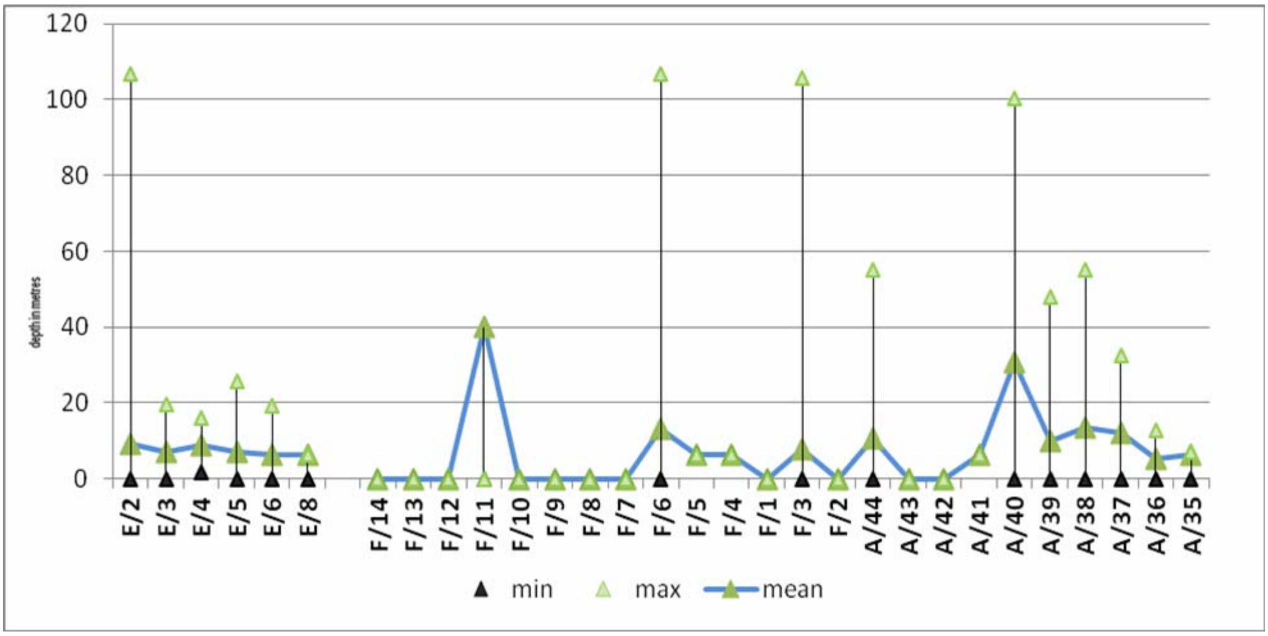

Figure 15: Palaeo-depth estimation (after HOHENEGGER, 2005) with mean, minimum and maximum values in metres.

The benthic foraminifera assemblages in the Korneuburg Basin give a clear signal for a very shallow environment. The maximum mean depth calculated was 30 metres at segment A_40. Everywhere else the mean water depth did not exceed 20 metres except at F_11 where the calculation was conducted with one taxon only, *Cassidulina subglobosa* whose mean depth occurs at 40 metres depth. The palaeo-depth estimation confirms RÖGL's assumptions (1998, p. 123) for the Korneuburg Basin to be a "shallow open embayment of 19-20m water depth" . The highest depth values have been calculated for subsection A. Those comparatively high values for palaeo-depth correlate with the frequent occurrence of *Bulimina elongata*. This taxon is tolerable to higher water depths than *Ammonia* (MURRAY, 2006).

8.3. Correlation of sections

Abundance data of the eastern part of the profile shows a peak in *Bulimina elongata* in subsection A (A_36 to A_41). The same peak in the occurrence of this taxon can be found in the western part of the profile at subsection D (D_01 to D_07). In other parts of the profile *Bulimina elongata* shows only sporadic occurrence (Schenk, personal communication, January, 2011).

As the whole section is divided by a flysch layer at subsection E, the remarkable mass-occurrence of *Bulimina elongata* in parts of subsection A (A_37 to A_40) allowed to correlate the west and east section of the profile biostratigraphically (Fig. 16).

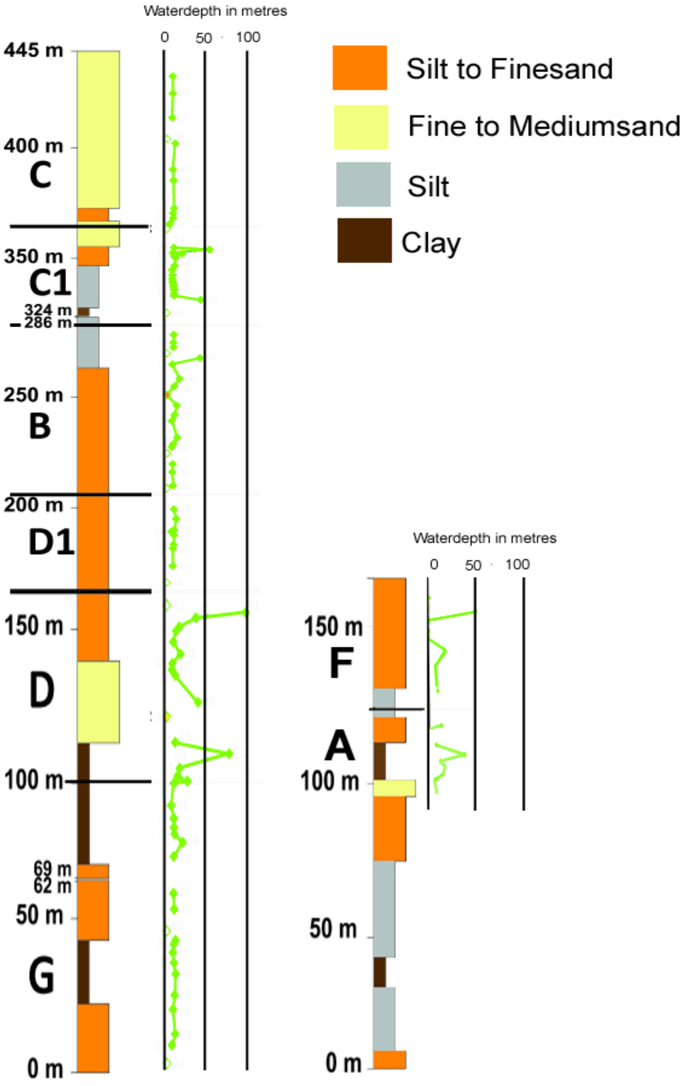

Figure 16: Simplified west and east part of the section together with the reconstructed palaeo-depths. Subsection A, as well as subsection D yield a very high amount of *B. elongata* at approximately 100 metres.
Furthermore the lithological succession in both parts of the profile seems similar (for a detailed profile see Appendix i). (profile after B. Schenk, GBA).

8.4. Statistical analyses

8.4.1. Samples clustering

The first step was to cluster the subsection samples by their faunal composition to check ecologically relevant evidences (Fig. 17).

Four ecological assemblage types were identified for the east section of the profile.

The first assemblage type (light blue) consists of samples with mostly very shallow environment, with a faunal composition dominated by the genus *Ammonia*.

The second group (purple) yields *Ammonia* in association with a high amount of *B. elongata* and shows slightly higher depth values than the samples solely dominated by *Ammonia*.

The third group of samples (yellow) did not show any foraminifera.

The first branch of the last group (green), F_06 and F_11, leads planktic as well as benthic taxa but did not show any of the taxa usually abundant. The very last branch consists of samples with a very low individual count and only yields planktic foraminifera (*G. lentiana*) .

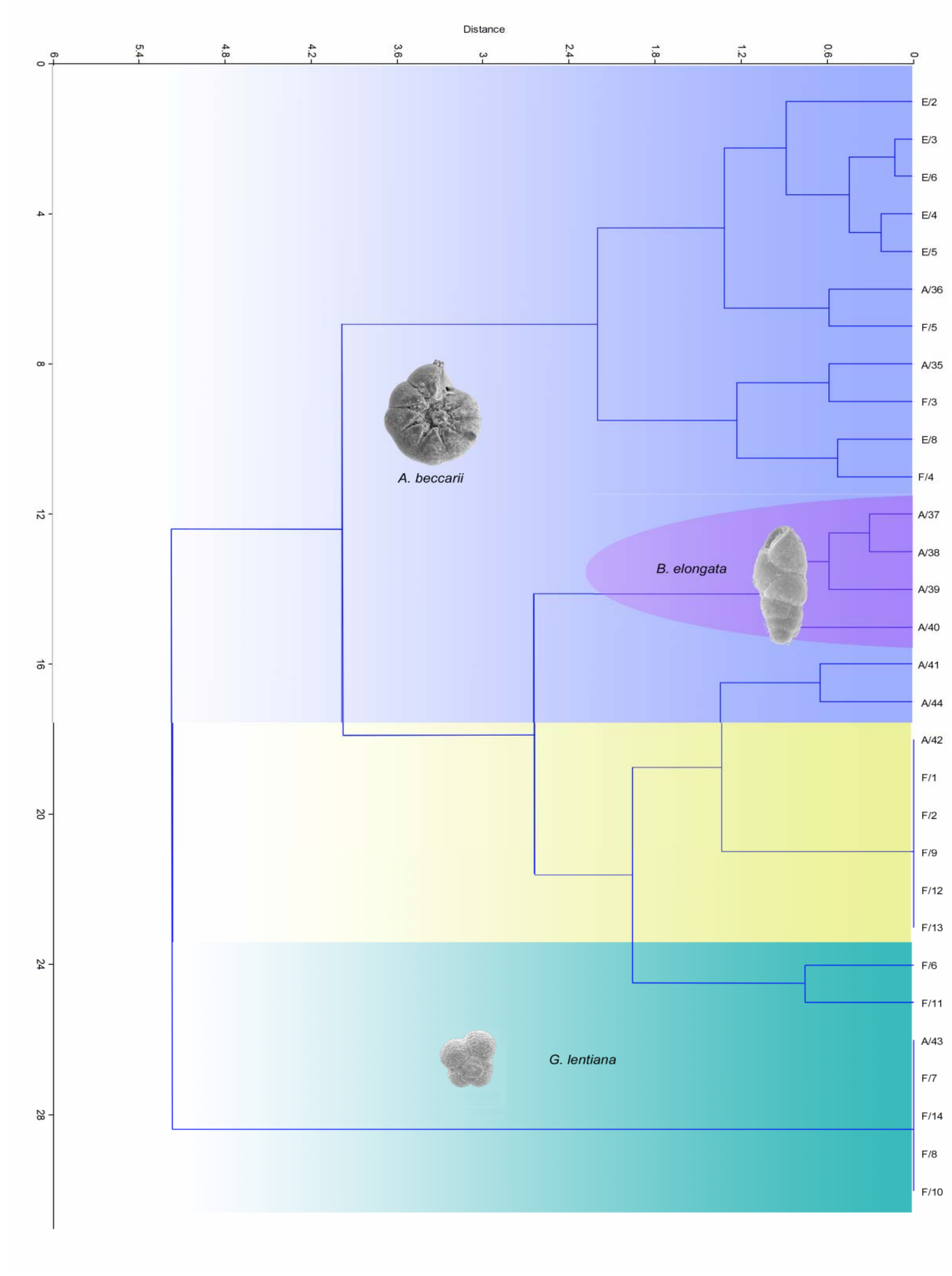

Figure 17: Cluster analysis of subsections after WARD (1963), using relative Euclidean distances.

8.4.2. Correspondence Analysis

A correspondence analysis was used to support environmental interpretations and the assignment of samples to defined eco-types (see Fig. 18).

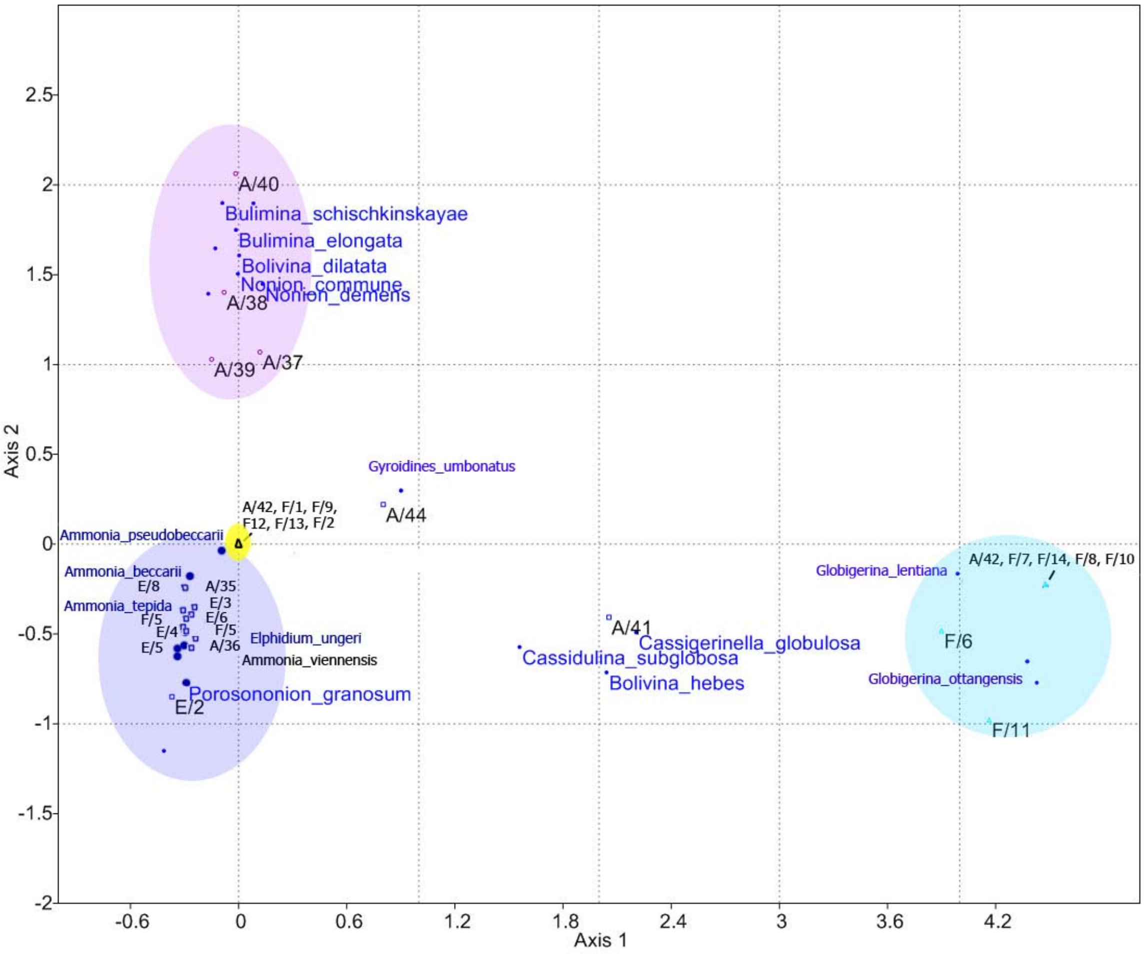

Figure 18: Correspondence analysis for subsections E, A and F. Variance for Axis 1: 22.126; Axis 2: 15.176.

The correspondence analysis separates the four assemblage types. The samples dominated by *Ammonia* are located in the lower left part of the plot, containing all samples belonging to subsection E and some to subsection A. Samples without foraminifera content can be found on the zero point of both scales. All four subsections with high frequencies of *B. elongata* can be found in a cluster (A_37, A_38, A_39, A_40). On the end of the x axis a group containing samples with only few benthic and some planktic foraminifera can be found.

8.4.3. Non-metric Multidimensional scaling

The palaeodepth values for each subsection in the eastern part of the profile and the proportion of clay (HOHENEGGER, personal communication, March, 2012) were included as ecological variable. The result depicting the different assemblage types best was chosen here. As missing environmental data are extrapolated in this method, samples not eligible for the depth zonation after HOHENEGGER (2005), because they did not yield any benthic foraminifera, and as such did not give any values for palaeodepth, are after all included in this analysis (Fig. 19).

This analysis shows 4 perfectly isolated groups and their relation to depth and grain size. On the shallow end, according to direction of the environmental parameter "depth", mostly samples showing *Ammonia* as dominant factor (marked with a blue square) appear. Samples with a high abundance of *B. elongata* (purple circle) appear distinctly deeper and overall show a higher amount of clay than those dominated solely by *Ammonia*. Those samples containing only planktic or only very few benthic species in association with planktic genera are plotted with high palaeodepth value and show a high value of clayey sediment.

Samples not leading any foraminifera are grouped around the zero points of the two axes after their environmental parameters.

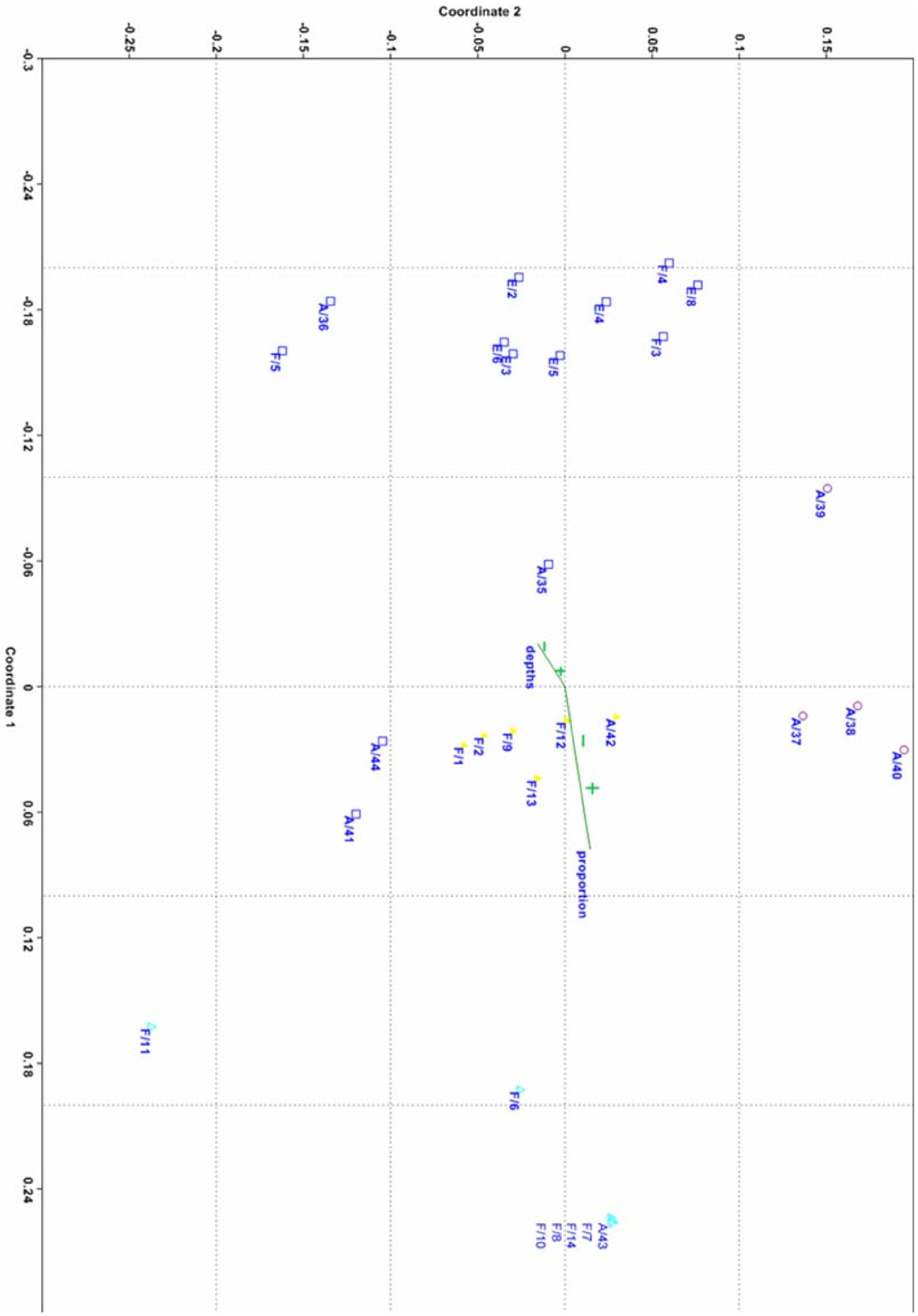

Figure 19: Non-metric Multidimensional scaling using Chord and palaeodepth values and the proportion of clay as environmental parameters. Stress: R²= 0.3412.

9. Conclusion

The results of the examination of foraminifera assemblages at the outcrop at the road construction site of the S1 can be included into the larger scenario of an early Miocene estuarine to marine embayment depicted by RÖGL (1998).

In this study three subsections with a cumulative thickness of 190 metres have been examined. They yielded typical Lower Miocene benthic foraminifera assemblages. The allocation to the Karpatian is very likely but only based on little evidence. The presence of *Cassigerinella globulosa*, having its last occurrence in the Karpatian and the absence of Badenian index taxa, such as *Praeorbulina*, cannot directly be seen as definite indicator for the Karpatian in this environment, but makes the assignment to this stage more likely (CICHA et al., 1998).

The autochthony of the planktic foraminifera sampled is questionable, but at least the frequent appearance of *Cassigerinella globulosa* throughout the whole profile can be considered useful information. However, marine ingression events might have washed in some planktonic specimens thus resulting in the sampling of partly allochthonous material. The fact that some specimen have their origin in layers yielding high amounts of terrestrial fossil content (higher layers of subsection F) supports this hypothesis.

As the genus *Ammonia,* which has a high tolerance level concerning reduced salinity (RÖGL, 1998), shows very high dominance (in some samples an almost monospecific occurrence), the reconstruction of brackish conditions is a possible solution. RÖGL (1998) described the foraminifera fauna at Teiritzberg as adjusted to brackish waters. Reconstructions of the Korneuburg Basin locate a fluvial system towards the eastern margin of the basin (HARZHAUSER & WESSELY, 2003; LATAL et al., 2006), making fluviatile influence in the probed area very presumable. The profile examined in this study is located further to the southeast than the Teiritzberg locality, and the benthic foraminifera assemblages examined in this study fit previous palaeoecologic and palaeogeographic reconstructions of the region. Therefore, a reconstruction of this part of the basin as a near-shore environment is very likely. The three subsections investigated in this work show an increase in the frequency of plant fossils towards the top of the profile. Reconstructions by HARZHAUSER & WESSELY (2003) and LATAL et al. (2006) locate the area of this study only 4 kilometres from the east coast of the basin.

The reconstruction of palaeo - water- depths after the method of HOHENEGGER (1995) has proven the best applicable solution in this environmental setting. As the origin of the planktic specimen is questionable, this method, based only on the abundance of benthic foraminifera, delivered the best results. The depth values fluctuate between 0 and 40 metres and as such, they except fully marine conditions vital for some planktic taxa.

Peaks in the occurrence of *B. elongata* made a correlation of the eastern and western part of the sections possible. As this taxon requires slightly deeper waters, the palaeo-water-depth zonation provided similar results as well on the western as on the eastern part of the profile, and a similar succession of palaeo-depths in adjacent layers.

This study fits the big picture of a shallow Paratethyan embayment with brackish water influence proposed by other recent works on the basin.

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Plates

Plate 1:

Fig. 1: ***Ammobaculites agglutinans (*****d'Orbigny)**

Fig. 2: ***Aubignyana perlucida*** **(Heron-Allen & Earland)**

Fig. 3: ***Heterolepa praecincta*** **(Karrer)**

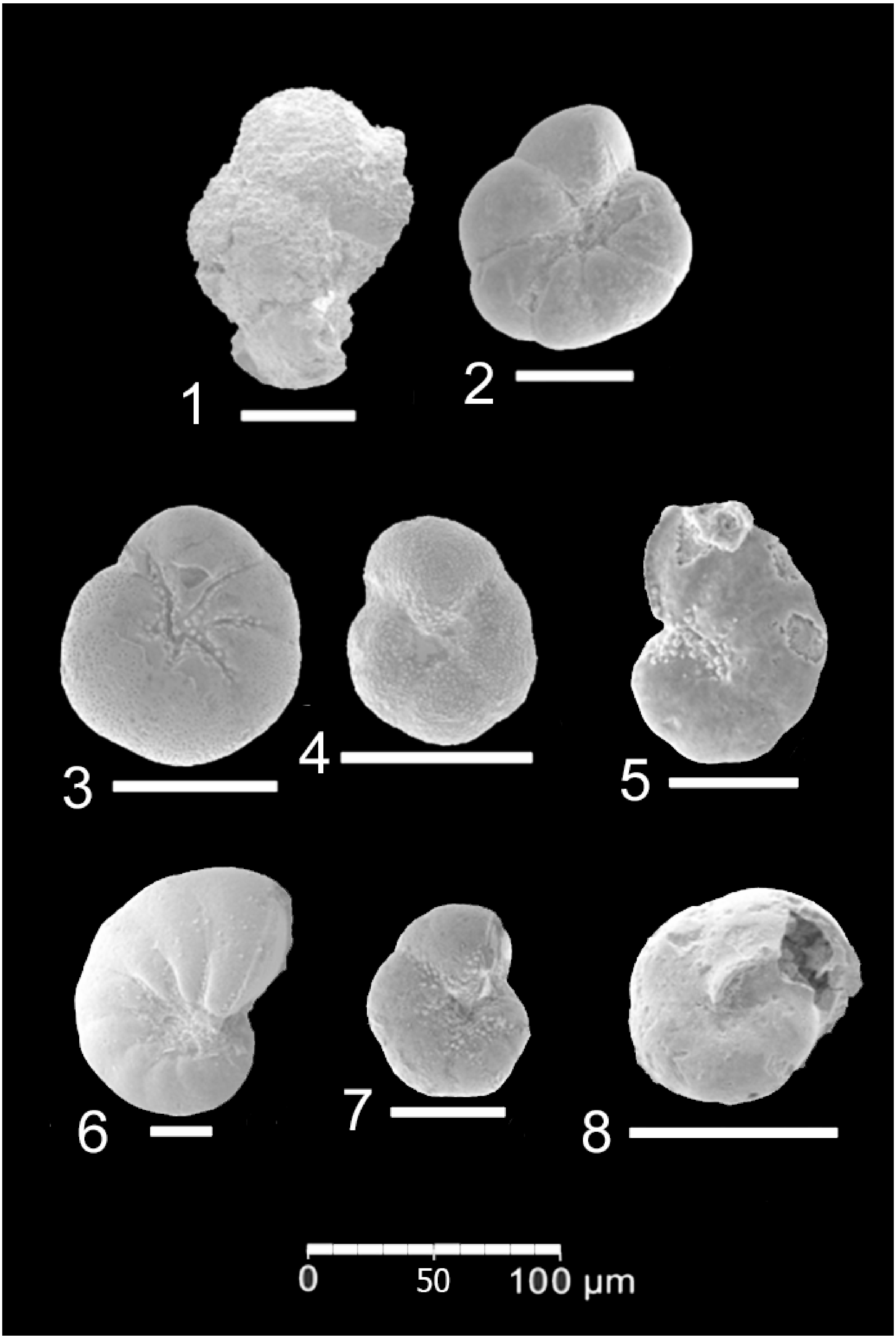
Fig. 4: ***Nonion demens*** **Bik**

Fig. 5: ***Nonion tumidulus*** **Pishanova**

Fig. 6: ***Nonion commune*** **(d'Orbigny)**

Fig. 7: ***Gyroidinoides umbonatus*** **(Silvestri)**

Fig. 8: ***Pullenia bulloides*** **(d'Orbigny)**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8
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100 µm

Plate 2:

Fig. 1: *Ammonia beccarii* (Linné)

Fig. 2: *Ammonia pseudobeccarii* (Putrja)

Fig. 3: *Ammonia tepida* (Cushman)

Fig. 4: *Ammonia viennensis* (d'Orbigny)

Fig. 5: *Elphidiella subnodosa* (Roemer)

Fig. 6: *Elphidium ungeri* (Reuss)

Fig. 7: *Porosononion granosum* (d'Orbigny)

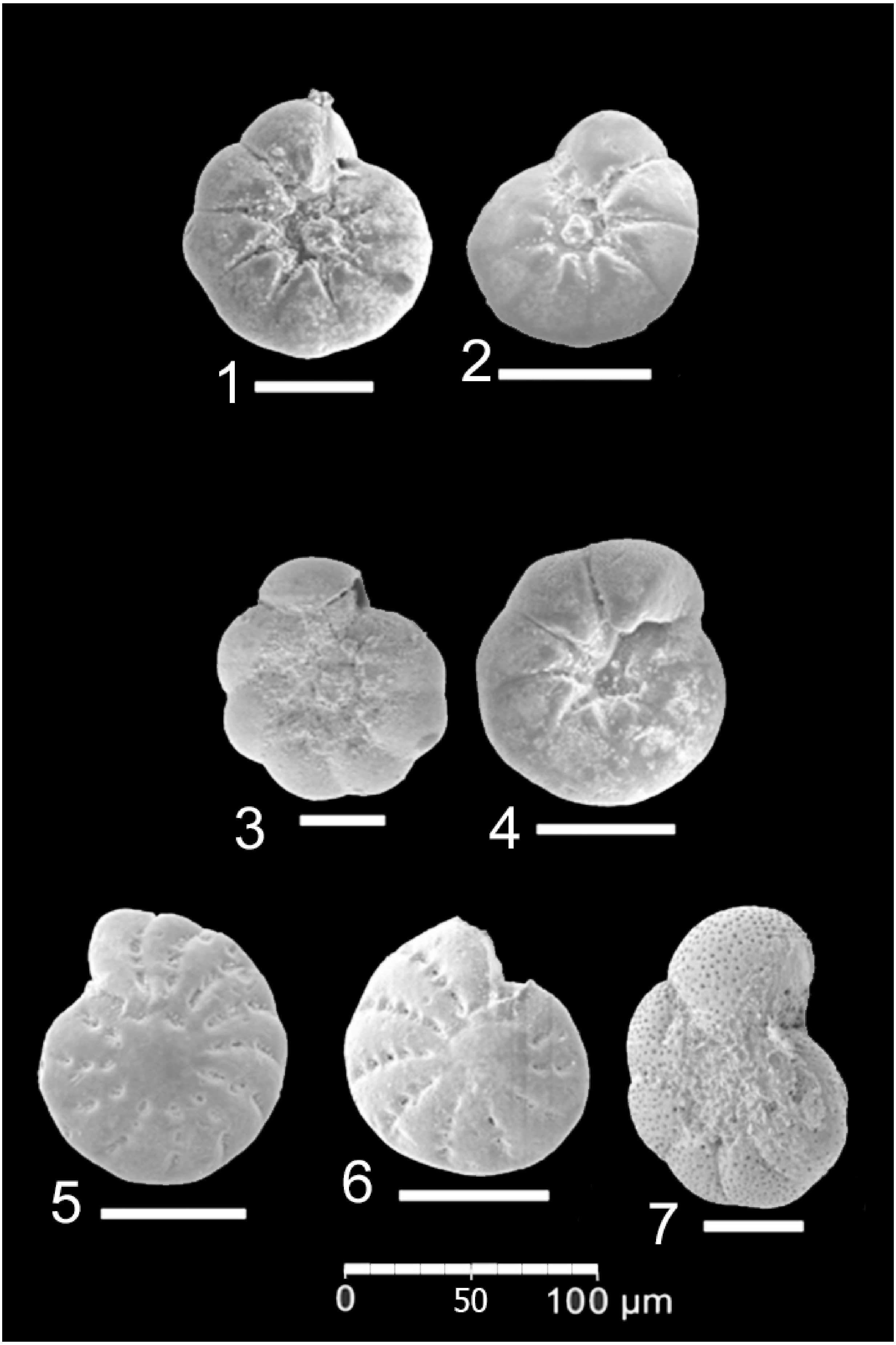
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Plate 3:

Fig. 1: ***Bolivina dilatata*** **Reuss**

Fig. 2: ***Bolivina hebes*** **Macfadyen**

Fig. 3: ***Bolivina sagittula*** **Didkovski**

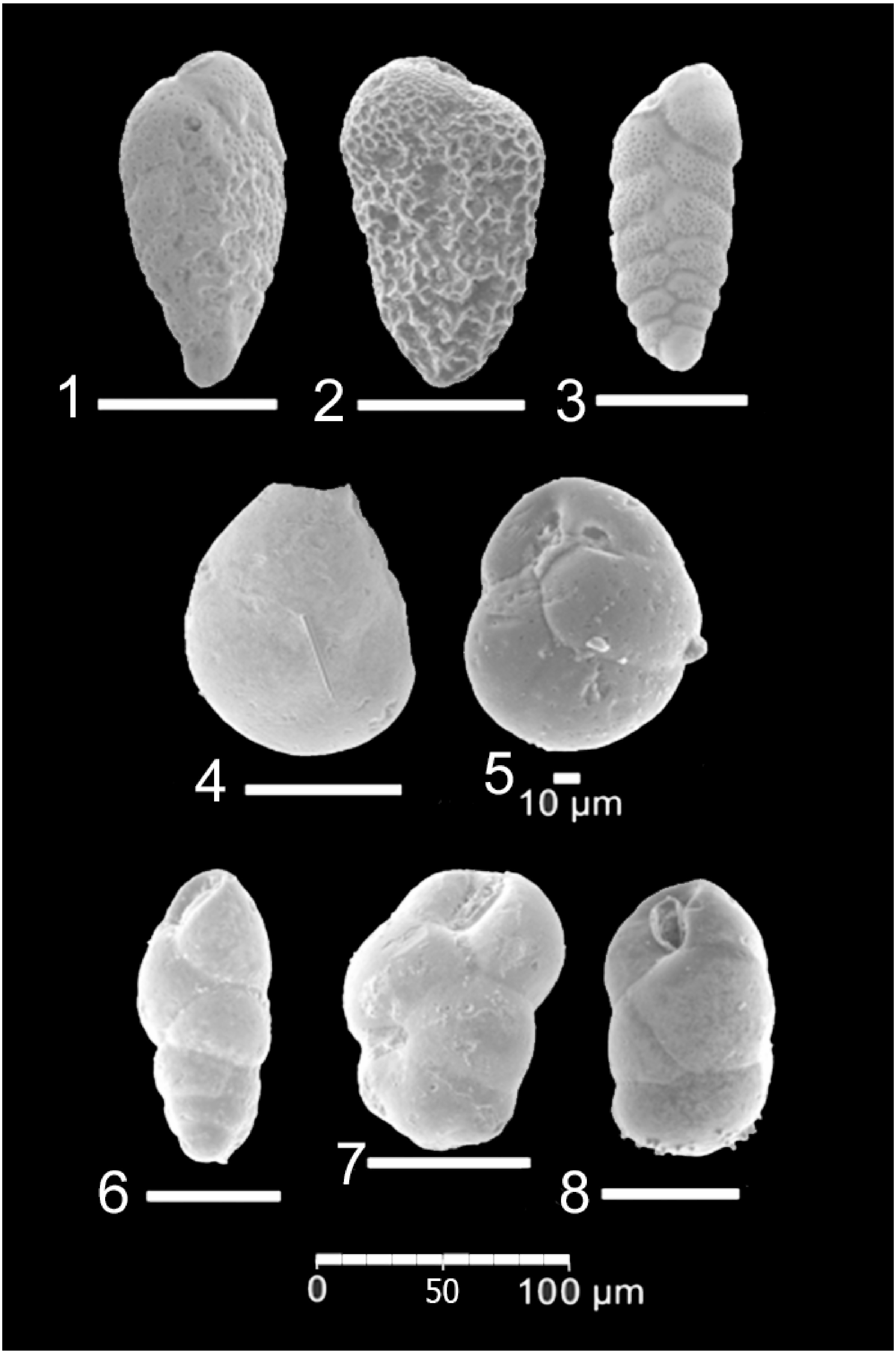
Fig. 4: ***Cassidulina laevigata*** **(d'Orbigny)**

Fig. 5: ***Globocassidulina subglobosa*** **(Brady)**

Fig. 6: ***Bulimina elongata*** **(d’Orbigny)**

Fig. 7: ***Bulimina schischkinskayae*** **Samoylova**

Fig. 8: ***Bulimina subulata*** **Cushman & Parker**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100 µm

Plate 4:

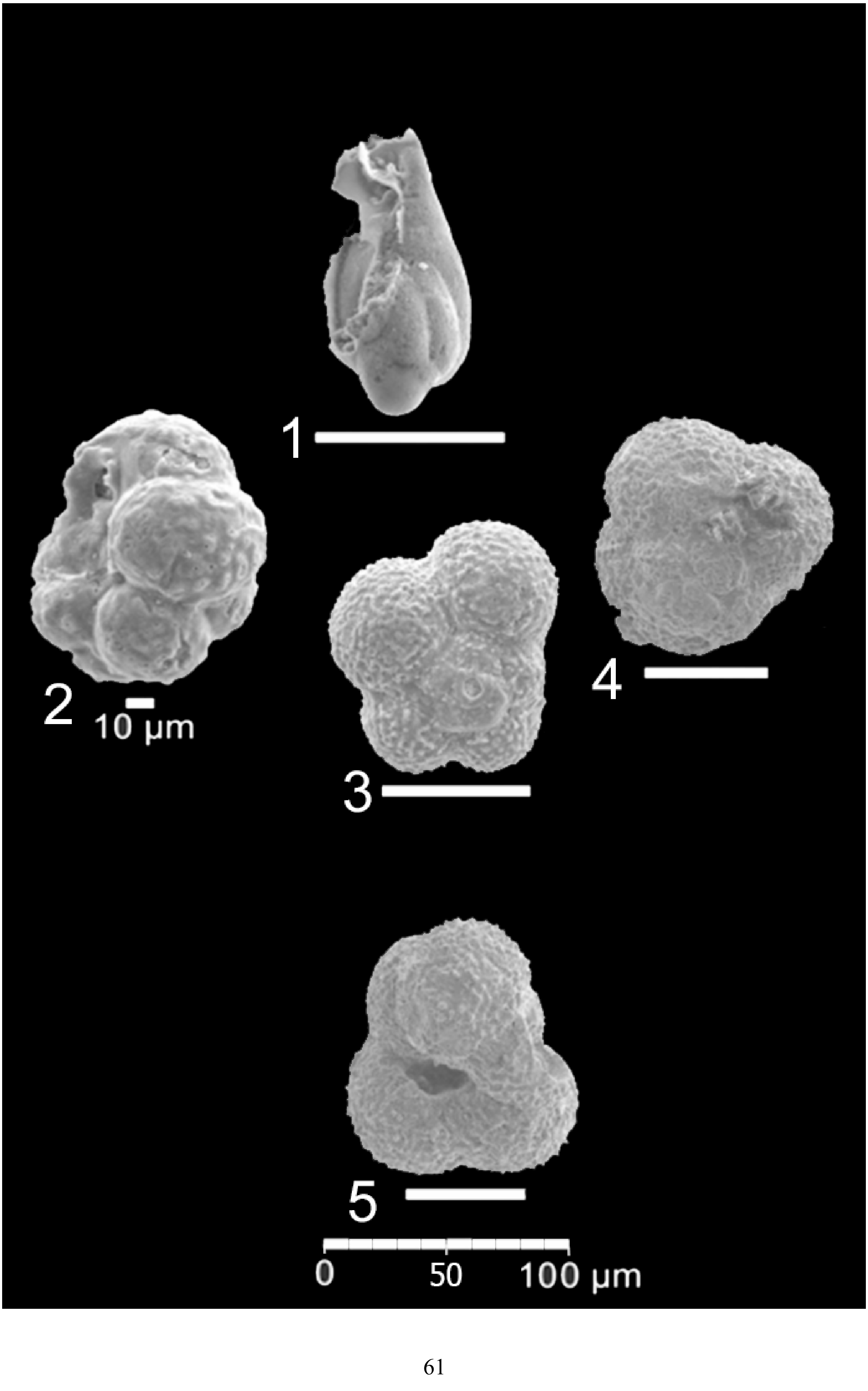
Fig. 1: ***Fursenkoina capreclata*** **Poag**

Fig. 2: ***Cassigerinella globulosa*** **(Egger)**

Fig. 3: ***Globigerina lentiana*** **Rögl**

Fig. 4: ***Globigerina ottnangensis*** **Rögl**

Fig. 5: ***Globigerina pseudociperoensis*** **Blow**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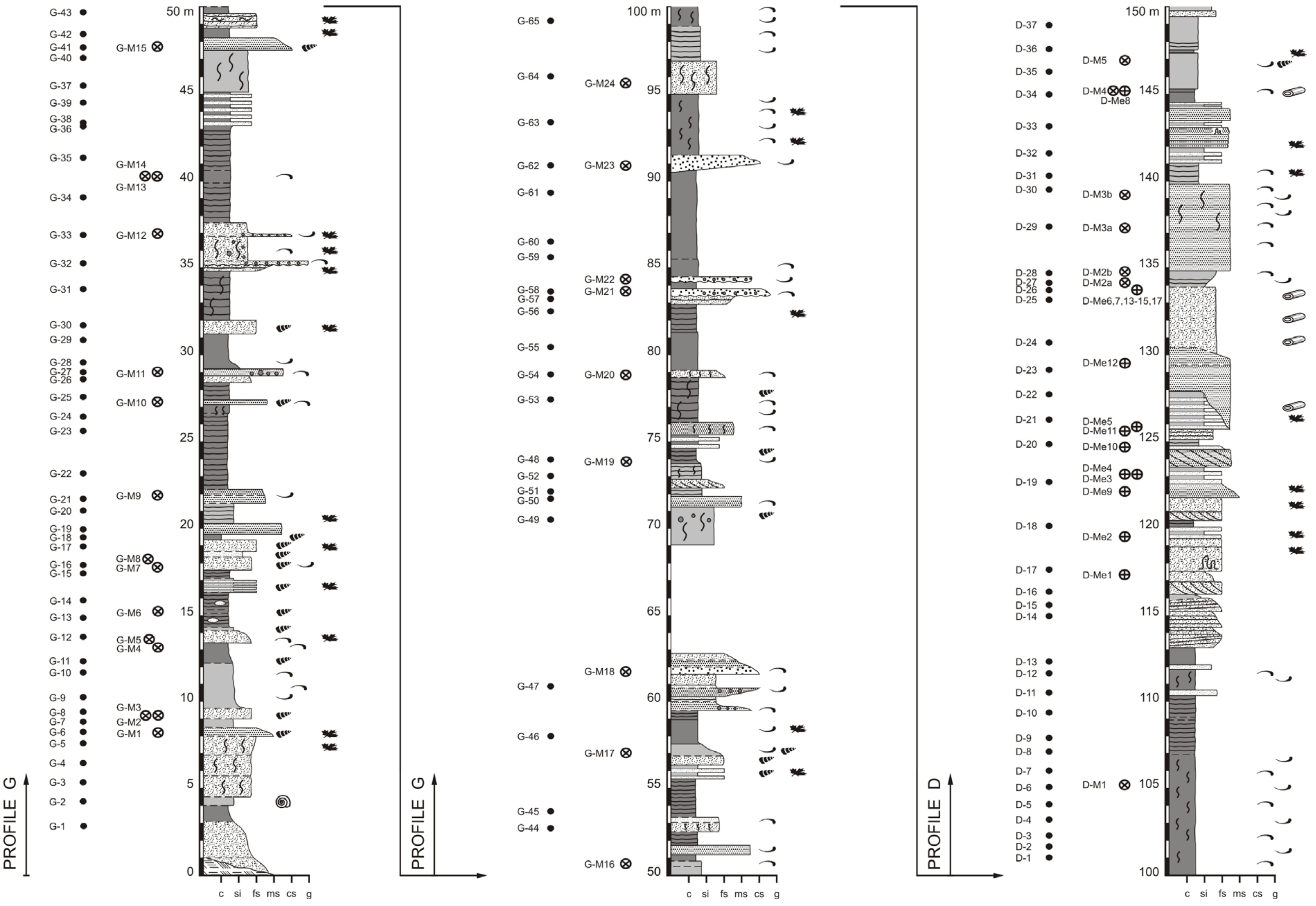
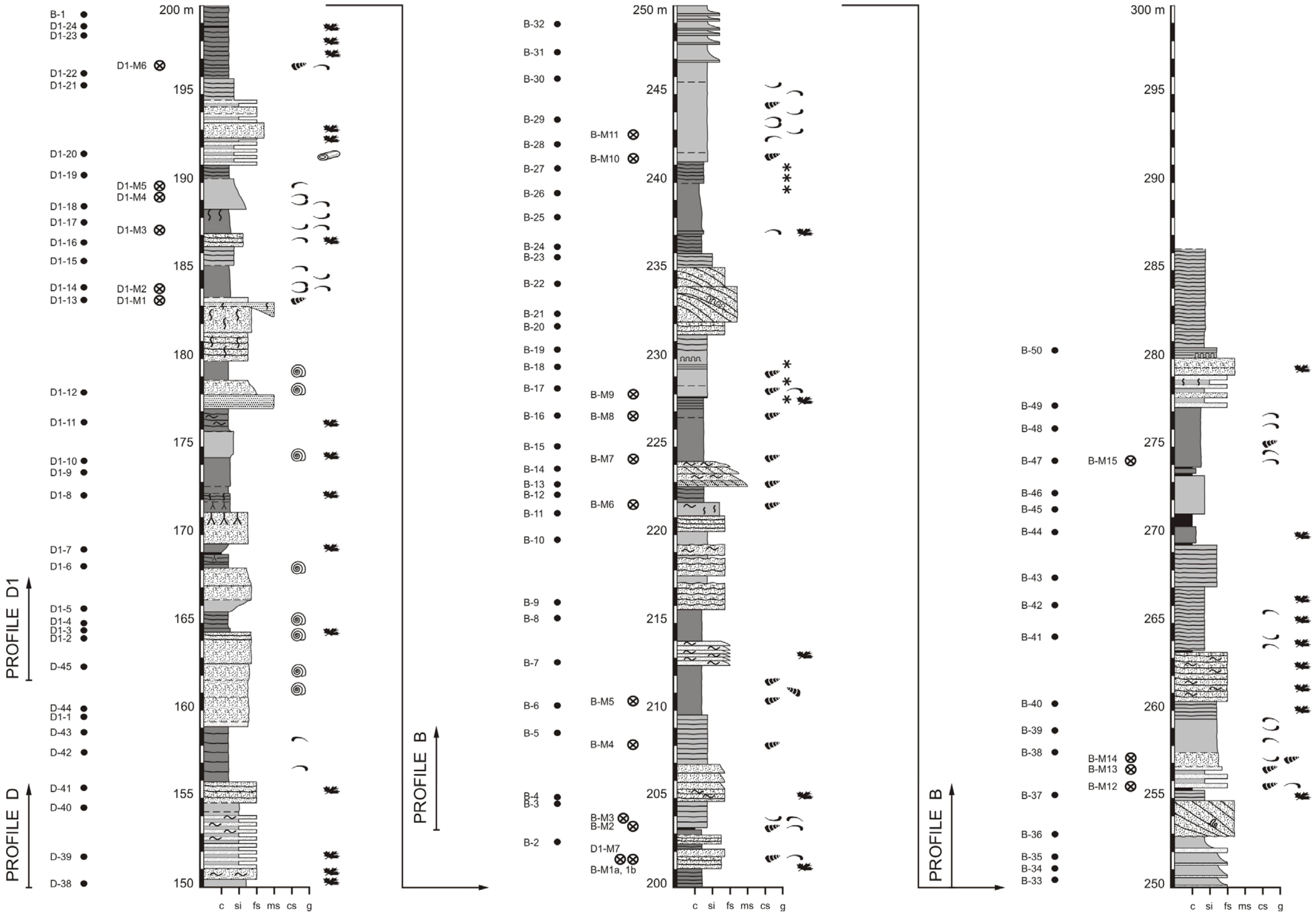
100 µm

Appendix i.: Profiles

All profiles drawn by R. ROETZEL (GBA).

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PROFILE D1
PROFILE B
PROFILE B
200 m
195
190
185
180
175
170
165
160
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150
250 m
245
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230
225
220
215
210
205
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300 m
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270
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c
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B-1
D1-24
D1-23
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D1-21
D1-20
D1-19
D1-18
D1-17
D1-16
D1-15
D1-14
D1-13
D1-12
D1-11
D1-10
D1-9
D1-8
D1-7
D1-6
D1-5
D1-4
D1-3
D1-2
D-45
D-44
D1-1
D-43
D-42
D-41
D-40
D-39
D-38
D1-M6
D1-M5
D1-M4
D1-M3
D1-M2
D1-M1
B-32
B-31
B-30
B-29
B-28
B-27
B-26
B-25
B-24
B-23
B-22
B-21
B-20
B-19
B-18
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B-15
B-14
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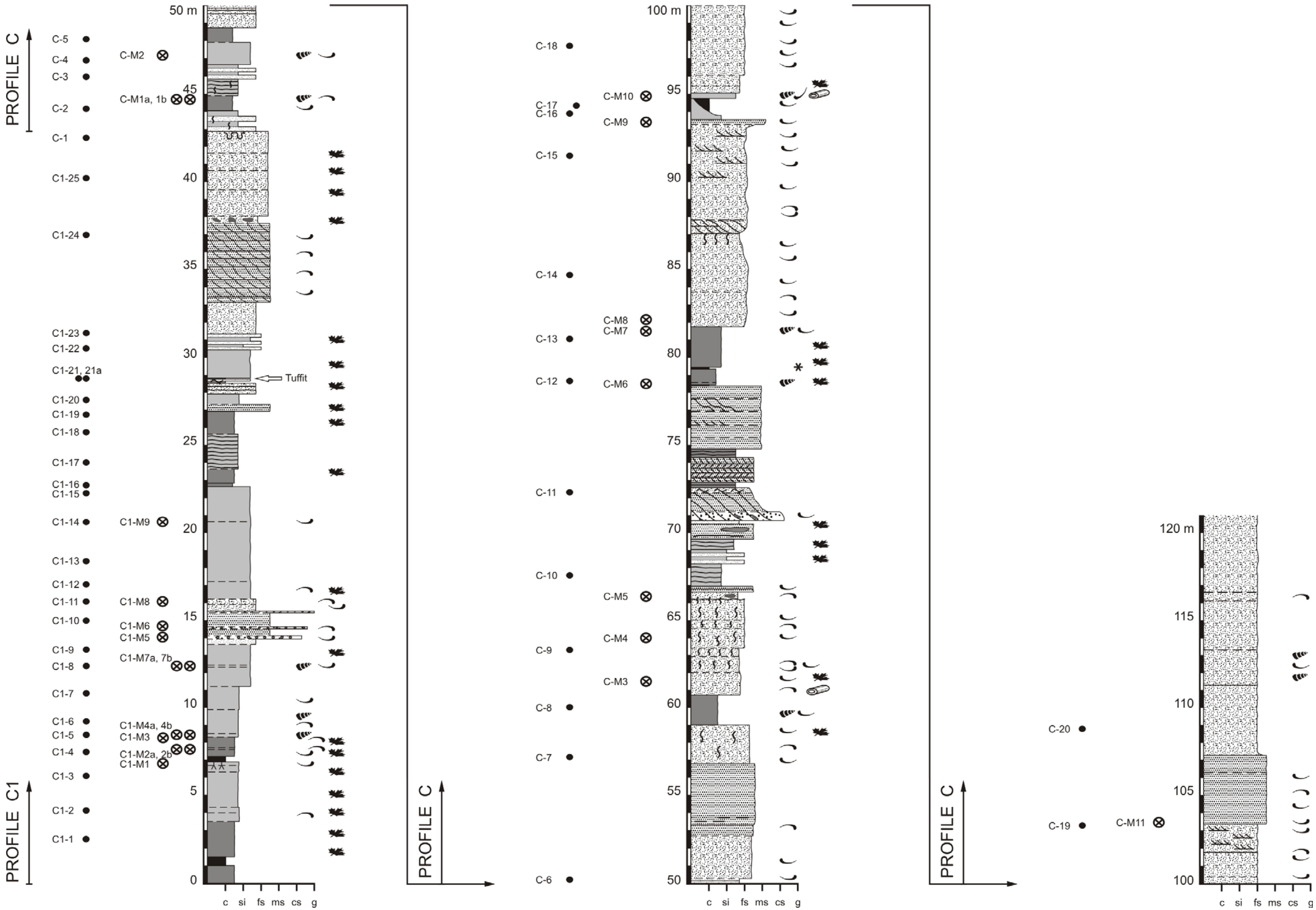
B-10
B-9
B-8
B-7
B-6
B-5
B-4
B-3
B-2
B-M11
B-M10
B-M9
B-M8
B-M7
B-M6
B-M5
B-M4
B-M3
B-M2
D1-M7
B-M1a, 1b
B-50
B-49
B-48
B-47
B-46
B-45
B-44
B-43
B-42
B-41
B-40
B-39
B-38
B-37
B-36
B-35
B-34
B-33
B-M15
B-M14
B-M13
B-M12


PROFILE C
PROFILE C1
C-5
C-4
C-3
C-2
C-1
C1-25
C1-24
C1-23
C1-22
C1-21, 21a
C1-20
C1-19
C1-18
C1-17
C1-16
C1-15
C1-14
C1-13
C1-12
C1-11
C1-10
C1-9
C1-8
C1-7
C1-6
C1-5
C1-4
C1-3
C1-2
C1-1
C-M2
C-M1a, 1b
C1-M9
C1-M8
C1-M6
C1-M5
C1-M7a, 7b
C1-M4a, 4b
C1-M3
C1-M2a, 2b
C1-M1
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PROFILE C
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C-12
C-11
C-10
C-9
C-8
C-7
C-6
C-M10
C-M9
C-M8
C-M7
C-M6
C-M5
C-M4
C-M3
100 m
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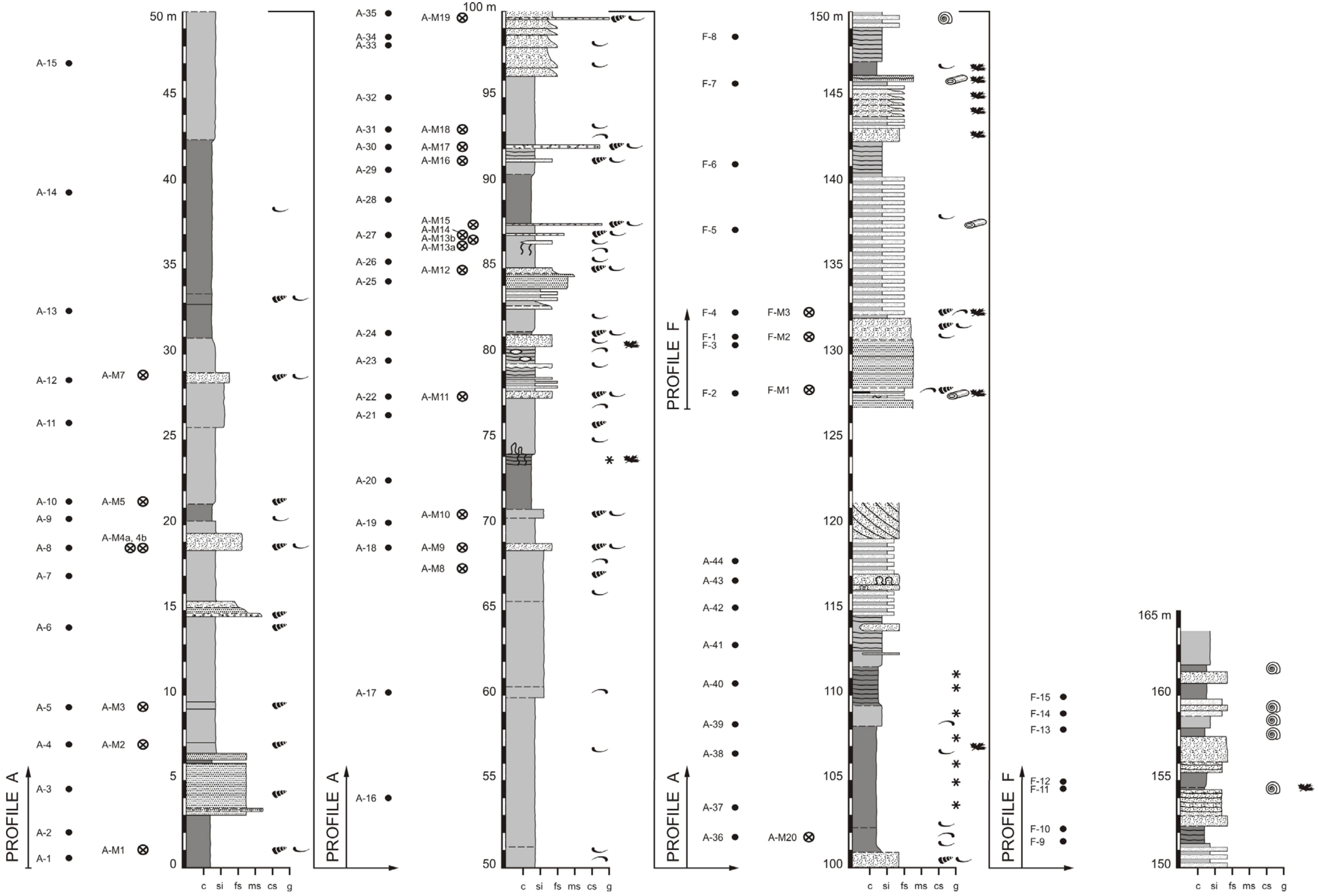
90
85
80
75
70
65
60
55
50
c
si
fs
ms
cs
g
PROFILE C
C-20
C-19
C-M11
120 m
115
110
105
100
c
si
fs
ms
cs
g


PROFILE A
PROFILE F
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100 m
105
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125
130
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150 m
155
160
165 m
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A-43
A-44
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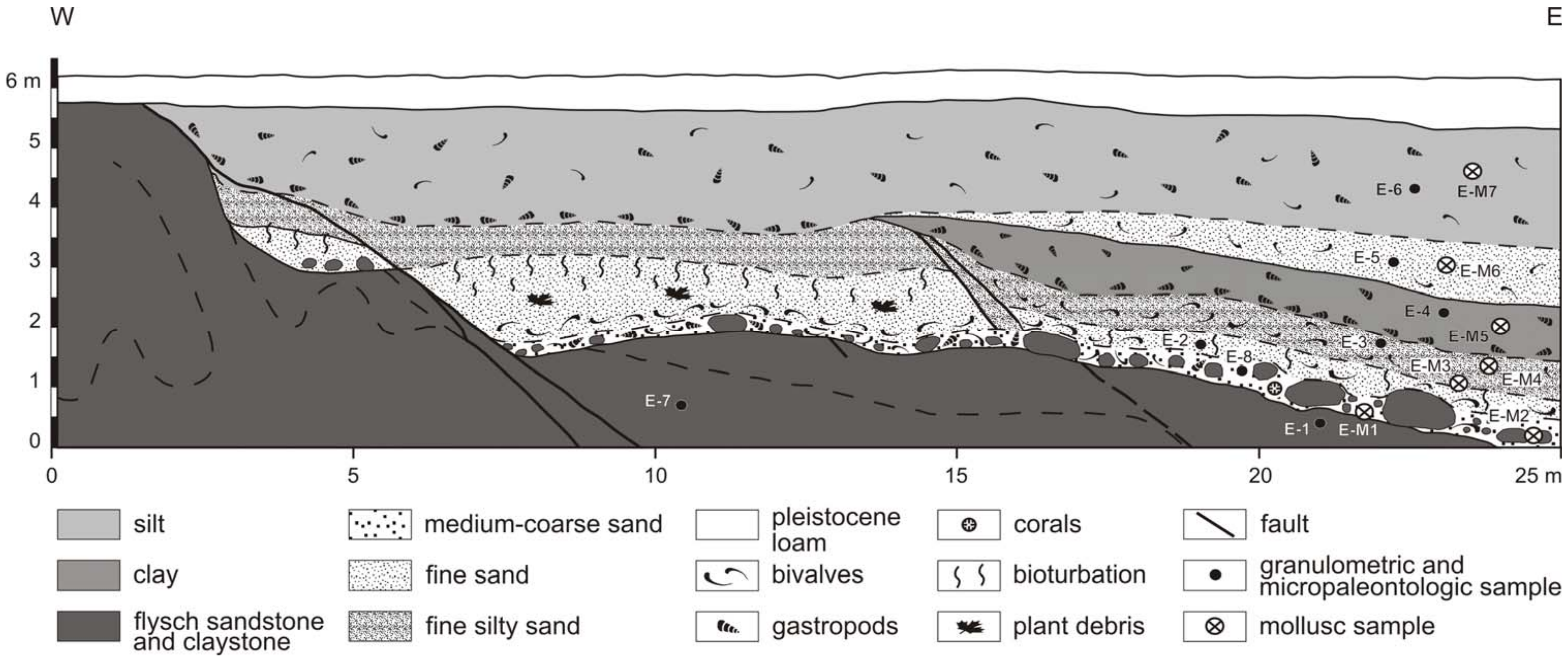
A-M2
A-M3
A-M4a, 4b
A-M5
A-M7
A-M8
A-M9
A-M10
A-M11
A-M12
A-M13a
A-M13b
A-M14
A-M15
A-M16
A-M17
A-M18
A-M19
A-M20
F-1
F-2
F-3
F-4
F-5
F-6
F-7
F-8
F-9
F-10
F-11
F-12
F-13
F-14
F-15
F-M1
F-M2
F-M3

Profile E


W
E
6 m
5
4
3
2
1
0
0
5
10
15
20
25 m
E-6
E-M7
E-5
E-M6
E-4
E-M5
E-2
E-3
E-8
E-M3
E-M4
E-7
E-M2
E-1
E-M1
silt
clay
flysch sandstone and claystone
medium-coarse sand
fine sand
fine silty sand
pleistocene loam
bivalves
gastropods
corals
bioturbation
plant debris
fault
granulometric and micropaleontologic sample
mollusc sample

.

Appendix ii.: Individuals per section

Probe	Ammobaculites agglutinans	Ammonia sp.	Ammonia beccarii	Ammonia pseudobeccarii	Ammonia tepida	Ammonia viennensis	Amphicoryna hispida	Astrononion stelligerium	Aubignyana perlucida	Bolivina sp.	Bolivina dilatata	Bolivina hebes	Bolivina pokornyi	Bolivina sagittula	Bolivina scalprata retiformis	Cassidulina crassa	Cassidulina laevigata	Cassidulina oblonga	Cassidulina subglobosa	Cassigerinella boudecensis	Cassigerinella spinosa	Caucasina sp.	Caucasina elongata	Caucasina schischkinskayae	Caucasina subulata	Cibicides. sp.	Cibicides lopjanicus	Cibicidoides lobatulus	Cibicidoides pseudoungariensis	Cibicides refulgens	Cycloforina badensis	Cycloforins gracilis	Dentalina sp.	Elphidiella heteropora	Elphidiella semiincisa	Elphidiella subnodosa	Elphidium sp.	Elphidium reussi	Elphidium ungeri	Elphidium subtypicum
B5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B6	0	0	10880	5888	0	4608	0	0	768	0	0	0	0	0	0	0	0	0	0	2176	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0
B8	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B11	0	0	128	64	32	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	32	0	0	0	0	0	0	32	0	0	0	0
B15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B16	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B17	0	0	38912	42496	0	8192	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1536	0	0	0	0
B19	0	0	128	320	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	1216	0	32	0	0	0	32	0	0	64	0	0	0	0	0	0	0	0	0	0	0
B25	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B28	0	0	16640	34432	0	9088	0	0	2048	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	0	0	3584	0	0	0	0	0	0	7808	0	0	0	640
B31	0	0	384	256	0	64	0	0	32	0	32	0	0	32	0	0	0	0	0	2272	0	32	64	0	32	32	0	0	32	0	0	0	0	0	0	0	0	0	0	0
B35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B38	0	0	12416	47168	448	704	0	320	832	0	0	192	0	704	0	0	0	0	128	256	0	0	192	64	0	1216	0	0	1280	0	0	0	0	0	0	704	0	0	256	0
B40	0	0	768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	768	0	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0
B42	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B47	0	0	5632	0	12544	2560	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0
B48	0	0	784	1320	72	216	0	0	16	0	0	0	0	8	0	0	0	0	0	0	0	0	8	0	0	8	0	0	24	0	0	0	0	0	0	0	0	0	8	0
B50	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/4	0	0	128	128	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/5	0	0	21504	11264	9984	7936	0	0	1280	0	0	0	0	0	0	0	0	0	512	0	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	1792	0	0	0	0
C1/7	0	0	6912	4768	352	1408	0	0	576	0	64	64	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	320	0	0	0	0	0	0	928	0	0	320	0
C1/8	0	0	12288	1792	768	2816	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0
C1/9	0	0	6656	2560	512	4608	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1536	0	0	0	0
C1/10	0	0	1024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1 /11	0	0	1536	2048	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/12	0	0	4480	384	0	1152	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/14	0	0	0	10240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1024	0	0
C1/16	0	0	464	272	16	64	0	0	32	0	32	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	32	0
C1/18	0	0	0	352	64	16	0	0	0	0	32	48	0	32	0	0	16	0	48	2368	0	0	80	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/19	0	0	320	544	32	32	0	0	32	0	160	0	0	0	0	0	32	0	0	864	0	0	32	0	0	64	0	0	96	0	0	0	0	0	0	0	0	0	0	0
C1/20	0	96	16	0	0	64	0	0	144	0	32	16	0	0	16	0	16	64	0	48	0	0	32	0	16	0	16	0	0	0	0	0	0	0	0	16	0	0	0	0
C1/21	0	0	1312	896	0	416	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/22	0	0	0	0	0	0	0	0	0	0	256	128	0	128	0	0	0	0	256	512	0	0	128	0	0	0	0	0	640	0	0	0	0	0	0	0	0	0	128	0
C1/23	0	0	5888	768	0	0	0	0	0	0	0	256	0	0	0	0	0	0	768	256	0	0	0	0	0	256	0	0	256	0	0	0	0	0	0	0	0	0	512	0
C1/25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Probe	Ammobaculites agglutinans	Ammonia sp.	Ammonia beccarii	Ammonia pseudobeccarii	Ammonia tepida	Ammonia viennensis	Amphicoryna hispida	Astrononion stelligerium	Aubignyana perlucida	Bolivina sp.	Bolivina dilatata	Bolivina hebes	Bolivina pokornyi	Bolivina sagittula	Bolivina scalprata retiformis	Cassidulina crassa	Cassidulina laevigata	Cassidulina oblonga	Cassidulina subglobosa	Cassigerinella boudecensis	Cassigerinella spinosa	Caucasina sp.	Caucasina elongata	Caucasina schischkinskayae	Caucasina subulata	Cibicides. sp.	Cibicides lopjanicus	Cibicidoides lobatulus	Cibicidoides pseudoungariensis	Cibicides refulgens	Cycloforina badensis	Cycloforins gracilis	Dentalina sp.	Elphidiella heteropora	Elphidiella semiincisa	Elphidiella subnodosa	Elphidium sp.	Elphidium reussi	Elphidium ungeri	Elphidium subtypicum
C/1	512	0	512	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C/2	0	0	10240	0	256	2816	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C/4	0	0	18944	0	512	5632	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	1536	0	0	0	0
C/5	0	0	3200	6336	192	1088	0	0	256	0	320	128	0	0	0	0	0	0	64	576	0	0	128	0	0	192	0	0	128	0	0	0	0	0	0	256	0	0	192	0
C/8	0	0	2432	4544	256	640	0	0	0	0	64	0	0	320	0	0	0	0	128	320	0	0	192	0	0	128	0	0	0	0	0	0	0	0	0	128	0	0	0	0
C/10	0	0	256	0	32	192	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	32	0	0	0	0
C/12	0	0	512	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C/15	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C/19	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0
C/20	0	0	6144	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D1/05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D1/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D1/13	0	0	2816	4352	1408	5376	0	0	1280	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	256	0	128
D1/14	0	0	1280	960	1024	6208	0	0	1920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	64	0	0	0	0	0	0	0	0	0	64	0	0
D1/17	0	0	128	3200	384	3328	0	0	2176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0
D1/18	40	0	0	72	248	848	0	0	0	32	0	0	0	8	0	0	0	0	0	40	0	0	8	0	0	0	0	0	0	0	80	120	0	0	0	0	0	0	0	0
D1/19	0	0	6528	19456	640	1792	0	0	128	0	0	0	0	0	0	0	0	0	0	512	0	256	128	0	0	128	0	0	1408	0	0	0	0	0	0	128	0	0	256	0
D1/22	0	0	1408	6400	0	192	0	64	192	0	0	0	0	256	0	0	0	0	128	704	0	0	64	0	0	192	0	0	1216	0	0	0	0	0	0	320	0	0	0	0
D1/24	0	0	128	512	384	2432	0	0	1024	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/1	0	0	6336	3200	0	896	0	0	704	0	256	0	0	128	0	0	0	0	128	832	0	0	28800	0	128	960	0	0	704	384	0	0	0	0	0	0	0	0	0	0
D/5	0	0	170	680	0	6460	0	0	340	0	425	0	85	0	0	0	0	0	0	0	0	0	7395	170	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/7	0	0	0	64	0	416	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	576	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0
D/10	0	0	5.3	0	0	26.5	0	0	0	5.3	79.5	0	10.6	0	5.3	0	0	0	0	10.6	0	0	863.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/13	0	0	0	2304	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	8960	0	0	0	0	0	1024	0	0	256	0	0	0	0	0	0	0	0	0	0	0
D/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/20	0	10.6	0	0	0	0	0	0	922.2	0	0	0	0	0	0	0	0	0	0	5.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/27	0	0	2394	4959	0	6840	0	0	6327	0	0	0	0	0	0	0	0	342	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/28	0	0	0	3584	0	9984	0	0	0	256	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1024	0	0	256	0	0	0	0	0	1024	0
D/29	0	0	2560	1792	0	768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	512	0	0
D/31	0	0	512	1536	64	0	0	0	384	0	1280	64	0	128	0	0	0	0	192	10880	0	0	384	64	128	512	0	0	320	448	0	0	0	0	0	0	0	0	0	0
D/35	0	0	0	1280	0	2560	0	0	384	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/37	0	0	416	416	0	0	32	0	0	0	0	0	0	0	0	0	0	0	96	960	0	0	0	0	32	96	0	0	96	96	0	0	0	0	0	0	0	0	0	0
D/38	0	0	256	2048	0	0	0	0	256	0	0	256	0	768	0	0	0	0	512	14336	0	0	0	0	0	768	0	0	0	1792	0	0	256	0	0	1536	0	0	0	0
D/40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
D/41	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	8	0	24	0	496	40	0	8	0	0	16	0	0	24	0	0	0	0	0	0	0	0	0	0	0
D/43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G/7	0	0	256	2176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	256	0	0	0	0	0	0	0	0	0	0

Probe	Ammobaculites agglutinans	Ammonia sp.	Ammonia beccarii	Ammonia pseudobeccarii	Ammonia tepida	Ammonia viennensis	Amphicoryna hispida	Astrononion stelligerium	Aubignyana perlucida	Bolivina sp.	Bolivina dilatata	Bolivina hebes	Bolivina pokornyi	Bolivina sagittula	Bolivina scalprata retiformis	Cassidulina crassa	Cassidulina laevigata	Cassidulina oblonga	Cassidulina subglobosa	Cassigerinella boudecensis	Cassigerinella spinosa	Caucasina sp.	Caucasina elongata	Caucasina schischkinskayae	Caucasina subulata	Cibicides. sp.	Cibicides lopjanicus	Cibicidoides lobatulus	Cibicidoides pseudoungariensis	Cibicides refulgens	Cycloforina badensis	Cycloforins gracilis	Dentalina sp.	Elphidiella heteropora	Elphidiella semiincisa	Elphidiella subnodosa	Elphidium sp.	Elphidium reussi	Elphidium ungeri	Elphidium subtypicum
G/11	0	0	33280	30720	768	0	0	0	768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2816	0	0	2560	768	0	0	0	512	0	1024	0	0	1024	0
G/14	0	0	125824	113152	1408	3072	0	256	6016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2560	0	0	6144	3200	0	0	0	256	0	896	0	0	128	768
G/22	0	0	4608	10176	0	0	0	0	384	0	0	0	0	64	0	0	0	0	0	64	0	0	256	0	0	256	0	0	192	64	0	0	0	64	0	512	0	0	0	64
G/29	0	0	192	160	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	64	32	0	0	0	0	0	0	0	0	0	0
G/31	0	0	0	1024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0
G/34	0	0	8384	15104	0	128	0	0	320	0	256	64	0	0	0	0	0	0	0	64	0	0	512	0	64	192	0	0	128	192	0	0	0	320	0	0	0	0	0	64
G/35	0	0	1024	3072	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	256	0	0	0	0	0	256	0	0	0	0
G/38	0	0	224	1504	0	0	0	0	384	0	0	0	0	64	0	0	0	0	0	0	0	0	96	0	0	0	0	0	192	64	0	0	0	0	0	32	0	0	32	0
G/40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G/45	0	0	3264	2184	0	8	0	0	216	0	0	0	0	8	0	0	0	0	8	0	0	0	0	0	0	32	0	0	96	72	0	0	0	56	0	40	0	0	24	0
G/46	0	0	1216	1600	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	64	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0
G/53	0	0	0	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	24	0	0	0	0	0	0	0	0	0	0
G/56	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0
G/59	0	0	512	256	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	128	0	0	0	0	0	0	0	0	0	0
G/60	0	0	1312	2592	0	32	0	0	160	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	128	0	0	64	96	0	0	0	32	0	32	0	0	0	0
G/61	0	0	80	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	8	0	0	0	0	0	0	8	0	0	0	0
G/63	0	0	22400	16512	0	512	0	0	512	0	1024	128	0	256	0	0	0	0	128	256	0	0	512	256	0	512	0	0	2688	128	0	0	0	0	0	640	0	0	128	256
G/65	0	0	4384	2528	32	96	0	0	64	0	512	32	0	64	0	0	0	0	64	32	0	0	320	64	0	64	0	0	160	32	0	0	0	0	0	0	0	0	0	0
A/35	0	0	512	768	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0
A/36	128	0	768	512	1280	3712	0	0	0	128	0	0	0	128	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	384	0	0	0	0	0
A/37	0	0	2432	2688	256	384	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	5504	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/38	0	0	1664	2944	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6272	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/39	0	0	4352	256	192	192	0	0	0	0	320	0	0	0	0	0	0	0	0	0	0	0	2368	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/40	0	0	0	256	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	1536	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/41	0	0	0	896	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1664	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/44	0	0	32	128	32	0	0	0	0	0	64	0	0	0	0	0	0	0	32	128	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/3	0	0	384	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/4	0	0	576	0	0	192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/5	0	0	0	256	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/6	0	0	0	256	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Probe	Ammobaculites agglutinans	Ammonia sp.	Ammonia beccarii	Ammonia pseudobeccarii	Ammonia tepida	Ammonia viennensis	Amphicoryna hispida	Astrononion stelligerium	Aubignyana perlucida	Bolivina sp.	Bolivina dilatata	Bolivina hebes	Bolivina pokornyi	Bolivina sagittula	Bolivina scalprata retiformis	Cassidulina crassa	Cassidulina laevigata	Cassidulina oblonga	Cassidulina subglobosa	Cassigerinella boudecensis	Cassigerinella spinosa	Caucasina sp.	Caucasina elongata	Caucasina schischkinskayae	Caucasina subulata	Cibicides. sp.	Cibicides lopjanicus	Cibicidoides lobatulus	Cibicidoides pseudoungariensis	Cibicides refulgens	Cycloforina badensis	Cycloforins gracilis	Dentalina sp.	Elphidiella heteropora	Elphidiella semiincisa	Elphidiella subnodosa	Elphidium sp.	Elphidium reussi	Elphidium ungeri	Elphidium subtypicum
F/11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E/2	0	0	512	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E/3	0	0	3584	4096	256	3328	0	0	768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E/4	0	0	8960	1920	512	5504	0	0	4992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0
E/5	0	0	14336	5376	1024	11008	0	0	2304	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0
E/6	0	0	6720	6976	832	8512	0	0	384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E/8	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Probe	Eponides sp.1	Eponides sp2.	Eponides pusillus	Fissurina aequabilis	Fissurina obtusa	Flavulina hexagona	Fursenkoina acuta	Fusenkoina capreclata	Globigerina sp.	Globigerina lentiana	Globigerina ottnangiensis	Globigerina praebulloides	Globigerina pseudociperoensis	Globigerina tarchanensis	Globigerinella obesa	Globorotalia bykovae	Gyroidina parva	Gyroidinoides umbonatus	Heterolepa eoceana	Heterolepa praecincta	Hyalinonetrion clavatum	Lagena striata	Lenticulina sp.	Lenticulina inornata	Lenticulina melvilli	Melonis pompilioides	Myllostomella recta	Nonion commune	Nonion demens	Nonion tumidulus	Paragloborotalia acrostoma	Plectofrondicularia sp.	Porosononion granosum	Praeglobobulimina pupoides	Protelphidium roemeri	Psammosphaera sp.	Pullenia bulloides	Pyrgo sp.	Rosalina obtusa	Sigmoilinita tenuis	Siphotextularia sp.	Spiroloxostoma czechoviczi	Stilostomella sp.
B5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B6	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	1920	0	1920	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B11	0	0	0	0	0	0	0	0	0	0	192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0
B15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B17	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	2816	0	18944	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	160	0	0	0	0	0	0	0	0	0	32	0	0	64	0	0	0	0	0	0	0	0	0	0
B25	0	0	0	0	0	0	0	0	0	64	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B28	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	12800	0	11648	0	0	0	0	0	0	0	768	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0
B31	0	0	0	0	32	0	32	0	0	608	0	0	416	0	0	0	0	224	0	32	0	0	0	0	0	0	0	128	0	96	0	0	0	160	0	0	32	0	0	0	0	0	0
B35	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B38	0	0	64	64	64	0	64	0	0	128	64	0	0	0	0	0	0	19456	0	12352	0	0	0	0	0	0	0	1216	128	256	0	0	320	64	0	0	0	0	64	64	0	0	0
B40	0	0	0	0	0	0	0	0	0	0	7424	0	0	0	0	0	0	768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	768	0	5376	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B48	0	0	0	0	8	0	0	0	0	56	0	0	0	0	0	0	0	40	0	488	0	0	0	0	0	0	0	8	0	0	0	0	16	8	0	0	0	0	0	8	0	0	0
B50	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7168	0	4352	0	0	0	0	0	0	0	512	0	0	0	0	1280	256	0	0	0	0	0	768	0	0	0
C1/7	0	0	0	0	0	0	0	0	0	96	0	0	0	0	0	0	0	1472	0	2400	0	0	0	0	0	0	0	384	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0
C1/8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	2304	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	256	0	0	0
C1/9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2048	0	3072	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1 /11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	384	0	256	0	0	0	0	0	0	0	128	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0
C1/14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/16	0	0	0	0	0	0	16	0	0	96	16	0	0	0	0	0	0	112	0	80	16	0	0	0	0	0	0	64	0	32	0	0	192	0	0	0	0	0	0	16	0	0	0
C1/18	0	0	0	0	0	0	16	0	0	320	0	0	128	0	0	0	0	32	0	80	16	0	0	0	0	0	0	48	0	16	0	0	16	0	0	0	0	0	0	0	0	0	0
C1/19	0	0	0	0	0	0	0	0	0	544	0	0	32	0	0	0	0	0	0	64	0	0	0	0	0	0	32	128	0	32	0	0	32	32	0	0	0	0	0	0	0	0	0
C1/20	0	0	0	0	0	0	0	0	0	0	0	144	0	240	0	0	16	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/21	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	64	0	256	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/22	0	0	0	0	0	0	0	0	0	640	0	0	128	0	0	0	0	384	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/23	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	256	0	1024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C1/25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Probe	Eponides sp.1	Eponides sp2.	Eponides pusillus	Fissurina aequabilis	Fissurina obtusa	Flavulina hexagona	Fursenkoina acuta	Fusenkoina capreclata	Globigerina sp.	Globigerina lentiana	Globigerina ottnangiensis	Globigerina praebulloides	Globigerina pseudociperoensis	Globigerina tarchanensis	Globigerinella obesa	Globorotalia bykovae	Gyroidina parva	Gyroidinoides umbonatus	Heterolepa eoceana	Heterolepa praecincta	Hyalinonetrion clavatum	Lagena striata	Lenticulina sp.	Lenticulina inornata	Lenticulina melvilli	Melonis pompilioides	Myllostomella recta	Nonion commune	Nonion demens	Nonion tumidulus	Paragloborotalia acrostoma	Plectofrondicularia sp.	Porosononion granosum	Praeglobobulimina pupoides	Protelphidium roemeri	Psammosphaera sp.	Pullenia bulloides	Pyrgo sp.	Rosalina obtusa	Sigmoilinita tenuis	Siphotextularia sp.	Spiroloxostoma czechoviczi	Stilostomella sp.
C/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	2304	0	0	0	0	0	0	0	256	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0
C/4	0	0	0	0	0	0	0	0	0	1024	0	0	0	0	0	0	0	512	0	2048	0	0	0	0	0	512	0	1024	0	0	0	512	0	512	0	0	512	0	0	0	0	0	0
C/5	64	0	0	0	0	64	0	0	0	448	0	0	0	0	0	0	0	704	0	2688	0	0	0	0	0	0	0	512	0	192	0	0	0	192	0	0	0	0	0	0	0	0	0
C/8	0	0	0	0	0	0	0	0	0	448	0	0	192	0	0	0	0	576	0	1344	0	0	0	0	0	0	0	384	0	192	0	0	0	0	0	0	0	0	0	0	64	0	0
C/10	0	0	0	0	0	0	0	0	0	112	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	0
C/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C/15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C/19	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0
D1/05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D1/10	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D1/13	0	0	0	0	0	0	0	0	0	0	0	128	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	384	0	0	0	0	0	0	0	0	0	0
D1/14	0	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0
D1/17	0	0	0	0	0	0	0	0	0	0	256	0	0	0	128	0	0	128	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D1/18	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	40	0	0	0	0	0	24	0
D1/19	0	0	0	0	128	0	0	128	0	256	128	0	0	0	0	0	0	5376	0	7680	0	0	0	0	0	0	0	128	0	128	0	0	128	0	0	0	0	0	0	0	0	0	0
D1/22	0	0	0	0	128	0	0	0	0	384	0	0	0	0	0	0	0	1536	0	4288	0	0	0	0	0	0	0	0	0	512	0	0	256	0	0	0	0	0	0	0	0	0	0
D1/24	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/1	0	0	0	0	128	0	960	0	0	0	0	0	0	0	0	0	0	832	0	3136	0	0	0	0	0	0	0	768	0	1152	0	0	0	1216	0	0	0	0	0	0	0	128	0
D/5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3995	0	0	0	0	0	0	0	0	0	0	0	0	85	85	0
D/7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	64	16	0	0	1200	0	0	0	0	0	0	0	0	0	0	0	48	0	0	48
D/10	0	0	0	0	0	0	0	0	0	0	0	5.3	0	0	0	0	5.3	0	0	0	0	0	0	0	0	0	0	116.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/13	0	0	0	0	0	0	0	0	0	4864	0	0	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0
D/18	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/20	0	0	0	0	0	0	0	0	0	0	0	15.9	0	10.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/27	0	0	0	0	0	0	0	0	0	171	0	0	0	342	0	0	0	0	0	0	0	0	0	0	0	0	0	342	0	0	171	0	342	0	0	0	0	0	0	0	0	0	0
D/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/31	0	0	0	0	0	0	128	0	0	2304	128	0	0	0	0	0	0	640	0	512	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	64	0
D/35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/37	0	0	0	0	0	0	0	0	0	320	0	0	0	0	0	0	0	288	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/38	0	0	0	0	256	0	0	0	0	7168	0	0	0	0	0	0	0	768	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	256	0	0
D/40	0	0	0	0	0	0	0	0	0	12	0	0	4	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D/41	0	0	0	0	0	0	0	0	0	0	0	40	0	96	0	0	16	0	0	8	0	0	0	0	0	0	0	8	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0
D/43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G/7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Probe	Eponides sp.1	Eponides sp2.	Eponides pusillus	Fissurina aequabilis	Fissurina obtusa	Flavulina hexagona	Fursenkoina acuta	Fusenkoina capreclata	Globigerina sp.	Globigerina lentiana	Globigerina ottnangiensis	Globigerina praebulloides	Globigerina pseudociperoensis	Globigerina tarchanensis	Globigerinella obesa	Globorotalia bykovae	Gyroidina parva	Gyroidinoides umbonatus	Heterolepa eoceana	Heterolepa praecincta	Hyalinonetrion clavatum	Lagena striata	Lenticulina sp.	Lenticulina inornata	Lenticulina melvilli	Melonis pompilioides	Myllostomella recta	Nonion commune	Nonion demens	Nonion tumidulus	Paragloborotalia acrostoma	Plectofrondicularia sp.	Porosononion granosum	Praeglobobulimina pupoides	Protelphidium roemeri	Psammosphaera sp.	Pullenia bulloides	Pyrgo sp.	Rosalina obtusa	Sigmoilinita tenuis	Siphotextularia sp.	Spiroloxostoma czechoviczi	Stilostomella sp.
G/11	0	1536	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	11264	0	27392	0	0	0	0	0	0	0	256	0	0	0	0	2304	0	512	0	0	0	0	0	0	0	0
G/14	0	384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2432	256	31232	0	0	0	0	0	0	0	0	640	384	0	0	2304	0	0	0	0	0	0	0	0	0	0
G/22	0	0	0	192	64	0	64	0	0	0	0	0	0	0	0	0	0	3072	0	3584	128	0	0	0	0	0	0	64	0	256	0	0	256	0	0	0	0	0	0	128	0	0	0
G/29	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	96	0	96	0	0	0	0	0	0	0	0	0	32	0	0	32	0	0	0	0	0	0	0	0	0	0
G/31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0
G/34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1024	0	896	0	64	0	0	0	0	0	448	128	192	0	0	768	0	0	0	0	0	0	128	0	0	0
G/35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	768	0	0	0	0	0	0	0	768	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0
G/38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	352	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	32	0	0	0
G/40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G/45	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	792	0	1384	16	0	0	0	0	0	0	40	56	32	0	0	160	0	0	0	0	8	0	0	0	0	0
G/46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0
G/53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G/56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	0	192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	0
G/59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G/60	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	544	0	928	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0
G/61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0
G/63	0	128	0	0	0	0	128	0	0	128	0	0	0	0	0	0	0	2560	0	5248	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	256	0
G/65	0	32	0	0	0	0	128	64	0	128	96	0	32	0	0	0	0	0	0	672	160	0	0	0	0	0	0	0	0	256	0	0	32	0	0	0	0	0	0	0	0	64	0
A/35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	384	0	0	128	0	0	0	0	0	0	0
A/37	0	0	0	0	0	0	0	256	0	640	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	640	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	1536	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	192	0	0	0	0	2368	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/40	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	640	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/41	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/43	0	0	0	0	0	0	0	0	0	2048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A/44	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/6	0	0	0	0	0	0	0	0	0	896	896	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0
F/7	0	0	0	0	0	0	0	0	0	384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/8	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/10	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Probe	Eponides sp.1	Eponides sp2.	Eponides pusillus	Fissurina aequabilis	Fissurina obtusa	Flavulina hexagona	Fursenkoina acuta	Fusenkoina capreclata	Globigerina sp.	Globigerina lentiana	Globigerina ottnangiensis	Globigerina praebulloides	Globigerina pseudociperoensis	Globigerina tarchanensis	Globigerinella obesa	Globorotalia bykovae	Gyroidina parva	Gyroidinoides umbonatus	Heterolepa eoceana	Heterolepa praecincta	Hyalinonetrion clavatum	Lagena striata	Lenticulina sp.	Lenticulina inornata	Lenticulina melvilli	Melonis pompilioides	Myllostomella recta	Nonion commune	Nonion demens	Nonion tumidulus	Paragloborotalia acrostoma	Plectofrondicularia sp.	Porosononion granosum	Praeglobobulimina pupoides	Protelphidium roemeri	Psammosphaera sp.	Pullenia bulloides	Pyrgo sp.	Rosalina obtusa	Sigmoilinita tenuis	Siphotextularia sp.	Spiroloxostoma czechoviczi	Stilostomella sp.
F/11	0	0	0	0	0	0	0	0	0	0	192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F/14	0	0	0	0	0	0	0	0	0	192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E/3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E/5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	256	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E/6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E/8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Probe	Stilostomella adolphina	Tenuitellinata angustiumbilikata	Textularia sp.	Triloculina inflata	Trochammina sp.	Uvigerina accuminata	Summe Split	Split
B5	0	0	0	0	0	0	0	1/64
B6	0	0	0	0	0	0	29056	1/128
B8	0	0	0	0	0	0	64	1/32
B11	0	0	0	0	0	0	640	1/32
B15	0	0	0	0	0	0	0	1/64
B16	0	0	0	0	0	0	32	1/32
B17	0	0	0	256	0	0	113920	1/256
B19	0	0	0	0	0	0	2336	1/32
B25	0	0	0	0	0	0	192	1/64
B28	0	0	0	0	0	0	99968	1/128
B31	0	0	0	0	0	0	5024	1/32
B35	0	0	0	0	0	0	32	1/32
B38	0	0	0	512	0	0	101760	1/64
B40	0	0	0	0	0	0	10240	1/256
B42	0	0	0	0	0	0	16	1/16
B44	0	0	0	0	0	0	32	1/32
B45	0	0	0	0	0	0	0	1/64
B47	0	0	0	0	0	0	27392	1/256
B48	0	0	0	64	0	0	3160	1/8
B50	0	0	0	0	0	0	1536	1/256
C1/1	0	0	0	0	0	0	0	1/16
C1/3	0	0	0	0	0	0	8	1/8
C1/4	0	0	0	0	0	0	384	1/128
C1/5	0	0	0	0	0	0	69120	1/256
C1/7	0	0	0	0	0	0	20128	1/32
C1/8	0	0	0	0	0	0	21248	1/256
C1/9	0	0	0	0	0	0	21504	1/512
C1/10	0	0	0	0	0	0	1024	1/512
C1 /11	0	0	0	0	0	0	4608	1/512
C1/12	0	0	0	0	0	0	7040	1/128
C1/14	0	0	0	0	0	0	13312	1/1024
C1/16	0	0	0	80	0	0	1776	1/16
C1/18	0	0	0	0	0	0	3760	1/16
C1/19	0	0	0	0	0	0	3104	1/32
C1/20	0	0	0	0	0	32	1072	1/16
C1/21	0	0	0	0	0	0	3072	1/32
C1/22	0	0	0	0	0	0	3456	1/128
C1/23	0	0	0	0	0	0	10496	1/256
C1/25	0	0	0	0	0	0	0	1/512

Probe	Stilostomella adolphina	Tenuitellinata angustiumbilikata	Textularia sp.	Triloculina inflata	Trochammina sp.	Uvigerina accuminata	Summe Split	Split
C/1	0	0	0	0	0	0	1536	1/512
C/2	0	0	0	256	0	0	17920	1/256
C/4	0	0	0	0	0	0	33792	1/512
C/5	0	0	0	0	0	0	17920	1/64
C/8	0	0	0	0	0	0	12352	1/64
C/10	0	0	0	0	0	0	720	1/16
C/12	0	0	0	0	0	0	1280	1/256
C/13	0	0	0	0	0	0	0	1/16
C/15	0	0	0	0	0	0	256	1/256
C/19	0	0	0	0	0	0	1536	1/512
C/20	0	0	0	0	0	0	7168	1/512
D1/05	0	0	0	0	0	0	0	1/16
D1/10	0	0	0	8	0	0	16	1/8
D1/13	0	0	0	0	0	0	16384	1/128
D1/14	0	0	0	0	0	0	11712	1/64
D1/17	0	0	0	0	0	0	9984	1/128
D1/18	0	0	0	0	0	0	1600	1/8
D1/19	0	0	0	0	0	0	45440	1/128
D1/22	0	0	0	320	0	0	18560	1/64
D1/24	0	128	0	0	0	0	4992	1/128
D/1	0	0	0	64	0	0	51840	1/64
D/5	0	0	0	0	0	0	19975	1/85
D/7	16	0	0	0	0	0	2512	1/16
D/10	0	0	0	0	0	0	1134.2	1/5,3
D/13	0	0	0	0	0	0	19200	1/256
D/18	0	0	0	0	0	0	16	1/8
D/20	0	0	0	0	0	0	964.6	1/5,3
D/27	0	0	0	0	0	0	22230	1/171
D/28	0	0	0	0	0	0	16640	1/256
D/29	0	0	0	0	0	0	6144	1/256
D/31	0	0	0	0	0	0	20736	1/64
D/35	0	0	0	0	0	0	4480	1/128
D/37	0	0	0	0	0	0	2976	1/32
D/38	0	0	0	0	0	0	31744	1/256
D/40	0	0	0	0	0	0	40	1/4
D/41	0	96	0	0	0	0	896	1/8
D/43	0	0	0	0	0	0	0	1/4
G/2	0	0	0	0	0	0	0	1/128
G/7	0	0	0	0	0	0	2944	1/128

Probe	Stilostomella adolphina	Tenuitellinata angustiumbilikata	Textularia sp.	Triloculina inflata	Trochammina sp.	Uvigerina accuminata	Summe Split	Split
G/11	0	0	0	0	0	0	117760	1/256
G/14	0	0	0	384	0	0	301696	1/128
G/22	0	0	0	0	0	0	24512	1/64
G/29	0	0	0	128	0	0	928	1/32
G/31	0	0	0	0	0	0	1536	1/128
G/34	0	0	0	0	0	0	29440	1/64
G/35	0	0	0	0	0	0	7168	1/256
G/38	0	0	0	32	0	0	3328	1/32
G/40	0	0	0	0	0	0	0	1/512
G/45	0	0	0	8	0	0	8544	1/8
G/46	0	0	0	0	0	0	3520	1/64
G/53	0	0	0	0	0	0	104	1/8
G/56	0	0	0	0	0	0	512	1/64
G/59	0	0	0	0	0	0	1152	1/128
G/60	0	0	0	0	0	0	6240	1/32
G/61	0	0	0	0	0	0	296	1/8
G/63	0	0	0	0	0	0	55424	1/128
G/65	0	0	0	0	0	0	10112	1/32
A/35	0	0	0	0	0	0	1792	1/256
A/36	0	0	0	0	256	0	8192	1/128
A/37	0	0	0	0	0	0	13056	1/128
A/38	0	0	0	0	0	0	13056	1/128
A/39	0	0	0	0	0	0	10496	1/64
A/40	0	0	0	0	0	0	2688	1/128
A/41	0	0	0	0	0	0	3072	1/128
A/42	0	0	0	0	0	0	0	1/256
A/43	0	0	0	0	0	0	2048	1/2048
A/44	0	0	0	0	0	0	544	1/32
F/1	0	0	0	0	0	0	0	1/2048
F/2	0	0	0	0	0	0	0	1/128
F/3	0	0	0	0	0	0	640	1/128
F/4	0	0	0	0	0	0	768	1/64
F/5	0	0	0	0	0	0	768	1/256
F/6	0	0	0	0	0	0	2560	1/128
F/7	0	0	0	0	0	0	384	1/64
F/8	0	0	0	0	0	0	128	1/128
F/9	0	0	0	0	0	0	0	1/64
F/10	0	0	0	0	0	0	128	1/128

Probe	Stilostomella adolphina	Tenuitellinata angustiumbilikata	Textularia sp.	Triloculina inflata	Trochammina sp.	Uvigerina accuminata	Summe Split	Split
F/11	0	0	0	0	0	0	256	1/64
F/12	0	0	0	0	0	0	0	1/64
F/13	0	0	0	0	0	0	0	1/64
F/14	0	0	0	0	0	0	192	1/64
E/2	0	0	0	0	0	0	1536	1/512
E/3	0	0	0	0	0	0	12032	1/256
E/4	0	0	0	0	0	0	22272	1/128
E/5	0	0	0	0	0	0	35072	1/256
E/6	0	0	0	0	0	0	23424	1/64
E/8	0	0	0	0	0	0	256	1/256

Appendix iii: Depth ranges of benthic foraminifera in metres

Species	upper limit	lower limit
Ammobaculites agglutinans	1	5
Ammonia beccarii	1	40
Ammonia pseudobeccarii	1	40
Ammonia spp.	1	40
Ammonia tepida	1	40
Ammonia vienensis	1	40
Amphicoryna hispida	50	2000
Astrononion stelligerum	10	120
Aubignyna perlucida	10	150
Bolivina dilatata	10	2000
Bolivina hebes	10	2000
Bolivina pokornyi	10	2000
Bolivina sagittula	10	2000
Bolivina scalprata retiformis	10	2000
Bolivina sp. Rögl	10	2000
Cassidulina crassa	40	2000
Cassidulina laevigata	40	2000
Cassidulina oblonga	40	2000
Cassidulina subglobosa	40	2000
Bulimina elongata	40	2000
Bulimina schischkinskayae	40	2000
Bulimina sp.	40	2000
Caucasina subulata	40	2000
Cibicides lobatula	1	120
Cibicides refulgens	5	2000
Cibicides sp.	10	2000
Cibicidoides lopjanicus	10	2000
Cibicidoides pseudoungerianus	10	2000
Cycloforina badensis	1	200
Cycloforina gracilis	1	200
Dentalina sp.	50	2000
Elphidiella heteropora	1	100
Elphidiella semiincisa	1	100
Elphidiella subnodosa	1	100
Elphidium reussi	1	50
Elphidium sp.	1	50
Elphidium subtypicum	1	50
Elphidium ungeri	1	50
Eponides pusillus	10	100
Eponides sp.1	10	100
Eponides sp2.	10	100
Fissurina aequabilis	30	1000
Fissurina obtusa	30	1000
Favulina hexagona	40	1500
Fursenkoina acuta	20	700
Fursenkoina capreclata	20	700
Gyroidina parva	40	2000
Gyroidinoides umbonatus	40	2000
Heterolepa eoceana	40	2000
Heterolepa praecincta	40	2000
Hyalinonetrion clavatum	30	500
Lagena striata	30	500

Lenticulina inornata	100	2000
Lenticulina melvilli	100	2000
Lenticulina sp.	100	2000
Melonis pompilioides	40	2000
Mylostomella recta	100	1000
Nonion commune	1	180
Nonion demens	1	180
Nonion tumidulus	1	180
Plectofrondicularia sp.	50	2000
Porosononion granosum	1	180
Praeglobobulimina pupoides	40	2000
Protelphidium roemeri	1	50
Pullenia bulloides	100	2000
Pyrgo sp.	1	2000
Rosalina obtusa	1	100
Sigmoilinita tenuis	50	2000
Siphotextularia sp.	30	1000
Spiroloxostoma czechoviczi	10	2000
Stilostomella adolphina	50	2000
Stilostomella sp	50	2000
Textularia sp.	20	600
Triloculina inflata	1	50
Trochammina (?) sp.	1	5
Uvigerina_accuminata	90	2000

Appendix iv.: Curriculum vitae

Erik Wolfgring

Data of Birth : January 18, 1984
Place of Birth : Vienna
Nationality : Austrian

Education:

1994-1998 : Secondary School (Gymnasium der Dominikanerinnen, Vienna)
1998-2003 : Commercial Highscool (Vienna Business School, Hak 1, Vienna)
2004-2012 : Study of Biology/Palaeontology at the University of Vienna
2008 : Study of Palaeontology at Rheinische Friedrich-Willhelms-Universität Bonn (Erasmus - funded term abroad)

Work experience:

1999-2003 : Several internships at S-Bausparkasse in Controlling and Marketing departments
2003 : Internship at the Austrian Academy of Sciences
2003-2004 : Community service at the Austrian Red Cross
2004-2006 : Several employments in Marketing and Promotion
2007-2010 : Part-time employment at the Vienna City Library
2009-2012 : Several contract for work engagements with the University of Vienna and the Austrian Geological Survey
2010-2012 : Several tutorials at the University of Vienna

Publications:

2012:

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