Development and dolomitization of Anisian isolated carbonate platforms in the Transdanubian Range, Hungary

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Received: April 26, 2021 ● Accepted: November 10, 2021

ABSTRACT
In the Middle Anisian, extensional tectonic movements led to the development of isolated carbonate platforms in the area of the southwestern part of the Transdanubian Range. The platforms are made up of meter-scale peritidal–lagoonal cycles bounded by subaerial exposure surfaces. One of the platform successions (Tagyon Platform) consists predominantly of limestone that contains partially and completely dolomitized intervals, whereas the other one (Kádárta Platform) is completely dolomitized. Drowning of the platforms took place in the latest Pelsonian to the early Illyrian interval when submarine highs came into existence and then condensed pelagic carbonate successions with volcanic tuff interbeds were deposited on the top of the drowned platforms from the late Illyrian up to the late Ladinian. The comparative study of dolomitization of the coeval platforms, affected by different diagenetic histories, is discussed in the current paper. Traces of probably microbially-mediated early dolomitization were preserved in the slightly dolomitized successions of the Tagyon Platform. This might also have been present in the successions of the Kádárta Platform, but was overprinted by geothermal dolomitization along the basinward platform margin and by pervasive reflux dolomitization in the internal parts of the platform. The Carnian evolution of the two submarine highs was different, and this may have significantly influenced the grade of the shallow to deeper burial dolomitization.

KEYWORDS
carbonate platform, dolomitization, Middle Triassic, Transdanubian Range

INTRODUCTION
In spite of the efforts of generations of researchers, the main controlling factors and the mechanism of dolomite-forming processes are still rather enigmatic. Petrographic features and geochemical characteristics of a predominant part of the dolomite rocks suggest that they were formed via the replacement of precursor carbonates during various diagenetic settings (e.g., Tucker & Wright, 1990; Budd, 1997; Machel, 2004; Pearce et al., 2013). However, there is no general model for the explanation of the large-scale dolomitization of marine carbonate rocks. Although laboratory experiments yielded valuable results on dolomite-forming processes (e.g., Bontognali et al., 2008; Kaczmarek & Sibley, 2014; Zhang et al., 2012; Roberts et al., 2013; Xu et al., 2013; Kaczmarek et al., 2017), case studies on various dolomite formations are indispensable to understand the usually complex dolomitization history (e.g., Budd, 1997; Nader et al., 2004; Di Cuia et al., 2011; Fu & Quing, 2011; Meister et al., 2013; Haas et al., 2017).
A prominent problem of the interpretation of the complete series of dolomite-forming processes is rooted in the later diagenetic alterations (recrystallization, dissolution and reprecipitation, fracturation, etc.) which commonly destroy the sedimentary characteristics of the precursor carbonates and the earlier dolomite phases. Fortunately, in the Triassic succession of the Transdanubian Range (TR), detailed geologic mapping revealed that in several cases, the carbonate formations were completely dolomitized, while certain parts of the unit were affected only by partial dolomitization or remained undolomitized in other parts. The Middle Anisian Tagyon Formation is the best example of this phenomenon. This platform carbonate succession is generally subjected to complete dolomitization but in a smaller area of the Balaton Highland, the formation is made up predominantly of limestone, although it contains partially or completely dolomitized intervals. In our previous studies, a section exposed in the Szentkirályszabadja Quarry was investigated for the characterization of the totally dolomitized successions, and the core section Dörgicse (Drt)-1 for demonstration of the partially dolomitized Tagyon Formation (Haas et al., 2014, 2017). In the past years, a more complete Middle Triassic section was exposed in a large active quarry at Kádárta, near Veszprém. The study of this section revealed that, although the sedimentological characteristics of the exposed upper part of the completely dolomitized Tagyon Formations are similar to that of the Szentkirályszabadja Quarry, the stable O and C isotope values are remarkably different. This means that a reconsideration and modification of the previous dolomitization are necessary; the story is probably more complex than was previously supposed. These results inspired the compilation of the current paper containing the results of our petrographic and isotope-geochemical studies of the recently exposed section of the Kádárta Quarry. The new data were compared to and combined with the results of the previous studies, providing the basis for the reconstruction of the history of platform evolution and for the evaluation of controlling factors and processes of dolomitization of the platform carbonates.

GEOLoGIC SETTING

The Balaton Highland is located in the southwestern part of the Transdanubian Range Unit (TR) in the western part of Hungary. Forming the southeastern limb of the SW–NE-directed syncline structure of the TR, the Balaton Highland is made up of low-grade metamorphosed Lower Paleozoic and unmetamorphosed Permian to Triassic formations. The Alpine compressions led to folding and significant southeast-vergent overthrusting of the Paleozoic–Triassic rock units (Fig. 1).

In the Middle Triassic, the TR was a segment of the passive margin of the western Neotethys Ocean (Fig. 2). Westward opening of the ocean reached this region in the
middle Anisian and led to the disintegration of the previously existing carbonate ramp along normal faults (Budai & Vörös, 1992, 1993).

At the beginning of the Pelsonian, halfgraben-type basins developed on the downfaulted blocks, whereas the shallow-marine carbonate factories survived on the relatively elevated ones. As a result, smaller and larger isolated carbonate platforms came into existence (Fig. 3). Acceleration of the relative sea-level rise may have resulted in the drowning of the small Tagyon Platform and parts of the

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**Fig. 2.** Paleogeographic reconstruction for the Middle Triassic of the western part of the Neotethys with the position of the Transdanubian Range Unit (TR, more details in Fig. 3) (after Budai et al., 2017, modified). Abbreviations: A-R – Aggtelek–Rudabánya Units; Bût – Bükk Unit; DR – Drau Range; Ju – Julian Unit; KP – Kádárta Platform (TR); MT – Mid-Transdanubian Unit; OD – Outer Dinarids; SA – South-Alpine Units; ST – Slovenian Trough; TP – Tagyon Platform (TR)

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**Fig. 3.** Middle Anisian paleogeographic map of the Balaton Highland and the Veszprém Plateau showing the extension of the Pelsonian platforms and the Felsőörs Basin (after Budai & Vörös, 2006, modified). Abbreviations: Af – Aszöfő; B – Barnag; Drt – Dörgicse; Fő – Felsőörs, HS – Hajmáskér–Sóly; Kdt – Kádárta; Sza – Szentantalfa; Szk – Szentkirályszabadja; Vsz – Vászoly
larger Kádárta Platform in the late Illyrian (Budai & Haas, 1997; Budai & Vörös, 2006).

Reflecting the paleogeographic setting and the structural evolution (onset of extensional tectonics) of the study area, remarkable lateral facies changes were pointed out in the middle Anisian (Pelsonian) interval (Fig. 4). In most of the area this is represented by a hemipelagic basinal sequence (Felsőörs Formation) that is made up of medium to thin-bedded and locally laminated limestones containing characteristic ammonite and pelagic bivalve assemblages. This formation continues in the Upper Anisian and is covered by the uppermost Anisian Vászolgy Formation that is characterized by the appearance of volcanic tuff interlayers. In contrast, in the middle part of the Balaton Highland and on the eastward located Veszprém Plateau, the Pelsonian substage is represented by shallow marine platform carbonates (Tagyon Formation) that are characterized by a cyclic alternation of shallow subtidal and peritidal bed-sets (stromatolites and vadose calcrites). Above a sharp surface (drowning unconformity), this platform carbonate succession is directly overlain by basinal carbonate beds of the uppermost Anisian Vászolgy Formation. The lack of four ammonite subzones indicates the duration of the gap at the drowning unconformity (Vörös et al., 1997; Budai & Haas, 1997). The Pelsonian platform carbonates have been subjected to various degrees of dolomitization (Fig. 4).

Basinal successions were formed in the late Illyrian to Ladinian interval in the area of the Balaton Highland, although the lateral differences in the facies pattern did not disappear completely (Fig. 4). Northeast of the Balaton Highland, in the central and northeastern part of the TR, thick platform carbonates (Budaörs Dolomite) were formed during the late Anisian and the Ladinian. The facies differences between the two areas are even more definite in the Carnian. In the area of the Balaton Highland, hemipelagic limestones (Fured Fm) occur in the basal part of the Carnian succession, overlain by a hundreds of meters-thick basinal marl unit (Veszprémid Formation), whereas in the area of the Veszprémid Plateau this time range is represented by shallow marine carbonates (Sédvölgy Dolomite) formed on the Sédvölgy Platform (Budai & Haas, 1997; Haas & Budai, 1999). Near the Ladinian–Carnian boundary the westward progradation of the Sédvölgy Platform led to a remarkable increase in the extension of the carbonate platform (Fig. 4). Carbonate turbidites were deposited along the toe of the platform foreslope (Berekhegy Limestone). Increasing humidity in the Early Carnian led to an enhanced influx of fine-grained siliciclastics, which resulted in the gradual upfilling of the basin of the Balaton Highland by the Late Carnian, whereas the evolution of the coeval Sédvölgy Platform continued. From the Late Carnian up to the Middle Norian extremely shallow marine conditions became prevailing over a predominant part of the area of the Transdanubian Range, leading to the deposition and early diagenetic dolomitization of a more than 1 km-thick platform carbonate succession defined as the Fődolomit Formation.

Fig. 4. Geologic profile of the Anisian–lowermost Carnian formations of the Balaton Highland and the Veszprémid Plateau, showing the stratigraphic position of the studied sections (after Budai & Vörös, 2006; Haas et al., 2014, modified). For abbreviations see Figs 1 and 3
MATERIALS AND METHODS

An active quarry exposed the Middle Anisian–Ladinian succession of the Veszprém Plateau south of Kádárta (Kd), near Veszprém. Along the wall of the quarry a continuous section was documented and sampled (Fig. 5). The samples that were taken for microfacies studies and stable isotope analyzes from the Tagyon Formation and the overlying dolomite breccia beds are presented in Fig. 5.

Stable carbon and oxygen isotope analyses were performed at the Institute for Geological and Geochemical Research (Budapest, Hungary) using a Finnigan delta plus XP mass spectrometer (Thermo Fisher Scientific, Bath, UK). The dolomite samples were prepared by a hand-held dental drill. The stable carbon and oxygen isotope compositions of micro-drilled powders of dolomite samples were determined using a continuous flow technique (Spöt & Vennemann, 2003), and dolomite reaction conditions described by Rosenbaum & Sheppard (1986). All samples were measured at least in duplicate, and the mean values are in the traditional δ notation in parts per thousand (‰) relative to Vienna Pee Dee Belemnite (VPDB). Reproducibility is better than ±0.1 ‰ for δ¹³C and ±0.1 ‰ for δ¹⁸O. More details of sample measurements can be found in Győri et al. (2020).

RESULTS

Petrography

The studied uppermost 10 m-thick interval of the Tagyon Formation is made up of a cyclic alternation of thick-bedded subtidal and medium to thin-bedded–laminated dolomite (Figs 5 and 6a). The thick beds consist of fabric destructive or poorly fabric-retentive, very finely crystalline dolomite. In contrast, well preserved sedimentary fabric was found in some thin interbeds between the thick beds.

In the 5 to 15 cm-thick basal part of a thick bed (Kd-2 sample on Figs 5 and 6b) excellently preserved oncolidal bindstone fabric was encountered (Fig. 7a). The 1 to 5 mm-sized oncods (Fig. 7b) are surrounded by microbial micrite-microsparite (Fig. 7c). Five to eight mm-sized bedding-parallel elongated cavities and tiny fenestral pores occur among the grains. A complex infilling could be observed in the cavities (Fig. 7a). They are lined by very finely crystalline, inclusion-rich dolomite. This is overlain by brownish, fibrous dolomite cement crust but only along the upper cavity wall, whereas the central part of the cavity is occluded by coarsely crystalline dolomite cement. Above a few mm-thick stromatolitic crust an inversely graded oncolidal grainstone microlayer was found (Fig. 7d).

Below another thick bed (Kd-3 sample on Fig. 5) bioclastic, peloidal bindstone fabric was observed in a 10 cm-thick darker grey layer. Along with fine calcarenite grains, fragments of relatively well-preserved dasycladalean algae (Fig. 8a) and bivalves were recognized. The biomoulds and vugs are filled with fine to medium crystalline dolomite. Stromatactoid cavities with basal dolomitized intrasediment, finely crystalline lining, and medium crystalline dolosparite cement were also encountered. In a dm-thick interbed (Kd-4 sample on Fig. 5) found between two thick beds, bioclastic grainstone with mm-sized fragments of dasycladalean algae was observed (Fig. 8b).

In the uppermost thick bed of the Tagyon Formation (Kd-8 sample on Figs 5 and 9a) cm-sized oncods could be

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Fig. 5. Middle Anisian–Lower Ladinian sequence of the Kádárta Quarry (near Veszprém) showing the sites of the taken samples.
macroscopically observed. This bed is characterized by a medium to poorly preserved oncoidal grainstone texture. Only ghosts of globular grains are visible in the finely to medium crystalline dolomite. In the uppermost few dm-thick parts of the bed (Kd-10 sample on Fig. 5) a fenestral laminated stromatolite crust was observed, which is overlain by a few mm-thick oncoidal grainstone (Fig. 9b) lamina just below the slightly uneven drowning unconformity surface.

The basal volcanic tuff and tuffaceous dolomite beds of the Vászoly Formation are overlain by thick beds of matrix-supported dolomite breccia-conglomerate (Figs. 10a and 10b); darker grey clasts are visible in a light beige matrix (Kd-11 and Kd-12 samples in Fig. 5). In the lower part of the succession a Lower Ladinian ammonite (*Eoprotrachyceras* cf. *gervasutii*, Fig. 10c) was found (Vörös A. pers. com.). The microscopic investigation revealed that the cm-sized clasts (intralasts, Fig. 10b) consist of aphanocrystalline to very finely crystalline (1–10 µm) dolomite while the matrix is finely crystalline and both are rich in 100–200 µm-sized peloids. The boundary between them is typically definite but locally rather faint (Fig. 10d). Centimeter-sized dissolution cavities and mm-sized biomouldic and vug pores are also common. The beds are intersected by a fracture network. Two fracture generations could be distinguished. The older fractures are filled by very finely crystalline dolomite cement, whereas the younger fractures that commonly crosscut the former ones are filled by medium crystalline dolomite cement. Upsection the thickness of the beds decreases, and marl intercalations appear. Slump folds were observed in the upper part of this unit. The sedimentary breccia–conglomerate bed-set has a tectonically slightly disturbed contact with the upper part of the Vászoly Formation that is made up of bedded dolomite and volcanic tuff (Fig. 5).

**DISCUSSION**

Petrographic features of the Pelsonian platform carbonate successions were studied in several sections in the area of the Balaton Highland (Budai et al., 1993; Budai & Haas, 1997; Vörös et al., 1997, 2003; Haas et al., 2014). However, the investigation of the recently exposed Kádárta section yielded remarkable new data and provided a good opportunity to correlate and compare them with those of the previously documented sections. In addition to understanding the controlling factors of the drowning, this comparative analysis may also serve as a basis for deciphering the complex history of the multi-stage dolomitization of these platform carbonates.

In the area of the central part of the Balaton Highland, representing the internal part of the small Tagyon Platform, the Tagyon Formation is made up predominantly of limestone or partially dolomitized limestone (see Figs 2 and 4). It was intersected by the well Dürgeics Drt-1, exposing a cyclic succession of alternating thick subtidal beds and thin peritidal interbeds of stromatolite and/or pizolitic calcrete facies (Budai et al., 1993, 1999; Haas et al., 2014). In the succession, various fabric selective dolomite types were encountered. In the pizolitic pedogenic crusts nodules, glebules and coated grains occur, which are composed of very finely to finely crystalline dolomite, although their micropores are occluded by very finely crystalline calcite, and rarely dolomite. Clotted micrite fabric characterizes the dolomititic stromatolites. Irregular aggregates of very finely crystalline dolomite and individual dolomite crystals or crystal clusters (15–200 µm-sized) occur in the micritic components (peloids, nodules, cortex of oncoids) in the subtidal beds. Mostly in the upper part of the formation, there are completely dolomitized intervals where the sedimentary fabric is usually totally
destroyed, although ghosts of some grains are locally recognizable in the fine-to-medium crystalline rock (Haas et al., 2014, 2017). Above the drowning unconformity surface, the basal layers of the overlying Vászoly Formation consist of reddish-brown crinoidal limestone (Vörös, 1998, 2018).

Both the Kádárta (Kd) section and the previously investigated Szentkirályszabadja (Szk) section belong to the Kádárta Platform, but as far as their paleogeographic setting is concerned, the latter was located in the basinward marginal zone of this large carbonate platform (Figs 3 and 4). In the abandoned Szk quarry the uppermost 20 m of the entirely dolomitized Tagyon Formation is exposed. The rich calcareous algae flora and the presence of the ammonite Balatonites balatonicus prove the Pelsonian age of the succession (Budai & Haas, 1997; Vörös et al., 1997, 2003). In the thicker beds of the cyclic succession, as a rule the dolomitization did not destroy the sedimentary fabric and the
crystal morphology of the precursor early diagenetic cement, although in many cases, only ghosts of the grains are visible. In some beds, dolomite cement-filled biomolds after dasycladalean algae are abundant. The pedogenic and microbial fabric in the topmost part of the cycles is well-preserved (Haas et al., 2014). Above a sharp boundary, the platform carbonate succession is overlain by brownish-grey dolomite representing the base of the Vászoly Formation (Budai & Haas, 1997; Budai et al., 1999, 2001).

The basic lithologic features of the upper part of the Tagyon Formation are similar in the Szk and Kd sections; they are made up of thick-bedded dolomite showing excellent or relatively good fabric preservation. However, there is a remarkable difference between the two successions. In the Szk section pedogenic crusts or stromatolitic horizons (akin to those in the core Drt-1) occur between the thick beds, which contain a rich shallow marine fossil assemblage. Accordingly, this succession reflects periodically-changing depositional conditions. The shallow marine conditions were interrupted by peritidal, and occasionally subaerial deposition. However, in the internal part of the platform, the shallow subtidal conditions were prolonged during the early Illyrian. This means that the different paleogeographic settings of the two studied sections is manifested in the observed lithological differences.

Based on previous and recent studies we conclude that platform carbonates of the Tagyon Formation were commonly subject to multistage dolomitization. The Tagyon Platform (Drt-1) was not affected by pervasive dolomitization either before drowning or in it after shallow to deep burial settings. That is why traces of penecontemporaneous fabric-selective partial dolomitization were preserved and could be locally recognized in the rocks (Haas et al., 2014). The pedogenic cap in the topmost part of the cycles, the peritidal stromatolite bed and the micritic fabric elements (micritic nodules, coatings, cortex of oncocysts) of the subtidal beds were typically affected by dolomitization, which can be bound to the earliest, probably microbially-mediated dolomitization phase (for the pedogenic crusts: Wright, 2007; Alonso-Zarza et al., 2010; for the peritidal settings: Wright, 2000; Wright & Wacey, 2005; Bontognali et al., 2008; Spadafora et al., 2010). Unfortunately, only a few stable isotope data are available from separated dolomite samples of the partially dolomitized limestone, due to the very small size of the crystals. The majority of the samples were taken from slightly to moderately dolomitized limestone and fabric-retentive dolomite and calcite and dolomite cement. The negative δ18O values (down to -7.4‰; Fig. 11) clearly indicate higher temperature recrystallization of the selectively dolomitized limestone succession which likely, therefore, took place in an intermediate to deep burial diagenetic setting. This higher temperature recrystallization was accompanied by precipitation of calcite and dolomite cement in the fractures and pores.

The very early selective dolomitization and the precipitation of early diagenetic marine and meteoric cement may have also taken place on the Kádárta Platform. However, in this area, it was followed by pervasive dolomitization in near-surface shallow burial settings, as the δ18O values (majority of the data range between -2 and 0‰) do not indicate the condition of elevated temperature which would imply greater depth. Moreover, the current investigation revealed some differences in the δ18O values between the samples of the Kádárta and those of the Szentkirályszabadja sections (Fig. 11). The values of the former locality (-0.6 to +1.8‰) suggest dolomitization via reflux of mesohaline fluids produced by evaporation of sea-water in tidal flat pools (Meister et al., 2013; Gabelon & Withaker, 2015). The values of the latter section show a wider range (-2.0 to +1.4‰) but a dominant part of the values is in the negative field (between -1.7 and -0.4‰), suggesting dolomitization via marine water circulation driven by thermal convection constraints the age of the basal part of the post-drowning succession is late Illyrian in both sections; however, this does not mean that the drowning took place at the same time. It is more probable that due to downfaulting of the platform margin zone the drowning occurred earlier in the Szk area, although the intense winnowing did not allow for sediment deposition. However, in the internal part of the platform, the shallow subtidal conditions were prolonged during the early Illyrian. This means that the different paleogeographic settings of the two studied sections is manifested in the observed lithological differences.

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The significant differences in the grade and mechanism of dolomitization can be attributed to differences in the paleogeographic setting of the localities. The early diagenetic processes of the isolated carbonate platforms/islands are mostly governed by the climatic conditions and the related effective recharge (precipitation/evaporation), and also determined by the size and the shape of the platforms/islands and the permeability of the carbonate deposits (Allen & Matthews, 1982; Vacher, 1988; Budd, 1988; Christ et al., 2012). On the small Tagyon Platform, the extension of the tidal flat pools may have been rather limited and this resulted in the absence of the pervasive reflux dolomitization. In addition to this, the post-drowning burial of the platform carbonates by a tuffaceous and cherty pelagic limestone succession, and a thick argillaceous sequence (Veszprém Marl; Fig. 4) also hampered the extensive dolomitization in the course of the deeper burial setting. As far as the Kádárta Platform is concerned, in the internal part of this large platform intense reflux dolomitization may have taken place during the subaerial exposure.

Fig. 10. a – Thick-bedded dolomite breccia–conglomerate above the lower part of the Vászoly Fm; b – rounded cm-sized clasts; c – ammonite (Eoprotrachyceras cf. gervasutti) in the lowermost bed of the breccia–conglomerate (det. A. Vörös); d – photomicrograph showing the transition between a very finely crystalline clast and the finely crystalline matrix; peloids are abundant both in the clast and the matrix.
episodes, leading to high-grade dolomitization of the previously-deposited and still unconsolidated deposits. Near-surface very early dolomitization may explain the excellent to relatively good fabric preservation found in the oncoid-rich and locally stromatolitic bindstone interbeds between the thick beds of poorly-preserved depositional fabric. However, in this area, the deep reflux-related dolomitization may have continued later when the thin post-drowning deep marine succession was covered by the prograding Budaoros Platform (Fig. 4). The succession exposed in the Szentkirályszabadja Quarry was formed near the tectonically-controlled basin-ward slope of the platform; taking into account the relatively low $\delta^{18}$O values (Fig. 11), thermal convection of the sea-water may have been the dolomitizing agent in this case (Kohout et al., 1977; Withaker et al., 1994; Hughes et al., 2007).

The dolomite conglomerate-breccia bed-set encountered in the Kádárta section within the Vászoly Formation can be interpreted as a proximal gravity mass flow deposit accumulated at the toe of the foreslope of the prograding Budaors Platform. A similar interfingering dolomite breccia body in the basinal succession was also documented in the Litér Quarry and the surroundings of Sóly and Hajmaskér in the area of the Veszprém Plateau (Budai et al., 2001; Budai & Vörös, 2006). This early Ladinian progradation episode of the Budaors Platform (Budai & Haas, 1997; Budai & Vörös, 2006) can be correlated with the first progradation of the Sciliar (Schlern) Platforms pointed out in the Southern Alps (De Zanche et al., 1993; Gianolla et al., 1998). Since the $\delta^{13}$C and $\delta^{18}$O values measured in the dolomite conglomerate-breccia bed-set of the Kádárta section do not show a significant difference from those of the samples of the Tagyon Formation in the same section, the dolomitization of these beds can also be attributed to deep reflux, i.e., the same process that led to pervasive dolomitization of the underlying platform carbonate succession.

**CONCLUSIONS**

In a predominant part of the southwestern part of the Transdanubian Range, platform carbonates of the Tagyon Formation were subjected to complete pervasive dolomitization, whereas in a smaller area it was affected only low-grade and commonly partial dolomitization. The grade of dolomitization and the characteristics of the partially or completely dolomitized successions are mostly controlled by the paleogeographic conditions that prevailed during the deposition and in the course of burial.

Traces of probably microbially-mediated syndiagenetic dolomitization were encountered in the slightly dolomitized successions of the Tagyon Platform. Similar dolomitization processes may have also taken place in the successions of the Kádárta Platform, but it was overprinted and usually totally destroyed by the subsequent shallow burial pervasive dolomitization.

On the small Tagyon Platform the syndiagenetic and low-intensity shallow reflux dolomitization resulted only in low-grade and fabric-selective partial dolomitization prior to drowning. After the drowning, the lithological properties of the overlying tuffaceous and cherty pelagic limestone and thick argillaceous sequences hampered extensive dolomitization in a deeper burial diagenetic setting.
Reflux of sea-water-derived mesohaline fluids already led to high-grade dolomitization during the early diagenesis in the internal part of the large Kádárta Platform, whereas near the margin of the basinward foreslope of the platform, thermal convection of the sea-water may have been the prominent dolomitizing agent.

In the studied area of the Kádárta Platform, dolomitization may have resumed during the next platform progradation after the incipient drowning episode via deep reflux. The dolomitization of the conglomerate-breccia bed-set occurring above the drowning surface in the basal part of the overlying Vászoly Formation can also be attributed to the same process.

ACKNOWLEDGMENTS

The research was partly supported by the Hungarian Scientific Research Fund (OTKA 124313). The authors are indebted to Olga Piros (Mining and Geological Survey of Hungary) and Attila Vörös (Hungarian Natural History Museum, Research Group for Paleontlogy) for the determination of the fossils of the Kádárta section. We are grateful to the reviewers for their comments and suggestions which improved the manuscript considerably. The authors also thank Prof. János Kovács for the constructive editorial handling.

SUPPLEMENTARY MATERIAL

Supplementary data to this article can be found online at https://doi.org/10.1556/24.2021.00110.

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