

The Perczel Project (2007–2019)

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Abstract: Hungarian presenters gave several papers on this project at cartographic conferences and published articles on the state of the work in the past decade. The project undertaken by the Department of Cartography and Geoinformatics at Eötvös Loránd University (ELTE) serves the saving of cultural heritage, namely a globe, a significant work of art. The project is named after its maker, Perczel. The work, which lasted for more than ten years with interruptions, was crowned by the birth of three imposing artistic copies of the globe. This part of the project completed in half a year was organized by the Archiflex Studio and led by Zsuzsanna Lente, restorer artist. The first copy decorates the office of the Hungarian prime minister in the former Carmelite cloister in the Buda Castle. The second copy is placed in the National Széchényi Library, where the original globe is kept. The third copy went to the University Library of ELTE. The physical embodiment of the globe makes it a real public property: Perczel's globe is a work of art that represents great scientific and cultural values.

The present paper reviews shortly the manuscript globe made by Perczel in 1862, and presents the stages of the digital re-creation and restoration of the globe map carried out at the Department of Cartography and Geoinformatics at ELTE, which led to its physical reconstruction, the birth of its artistic copies. Finally, some cartographic “juicy bits” follow: the representation of non-existent “ghost” islands on the globe and some interesting graphical solutions that are unusual today.

Keywords: digital restoration, digital reconstruction, virtual globe, artistic globe copy, history of cartography

1. About the globe of Perczel

László Perczel (1827–1897) completed his large manuscript globe in a small village in 1862 with a diameter of 127.5 cm and at scale 1:10,000,000. This coloured globe, made in one copy with a map area of 5.1 m², was a unique product even on world scale in its time. The high standard of execution, the geographically accurate and detailed representation of the Earth and its richness of data deserved outstanding international recognition, *lettera di distinzione* at the Third International Geographical Congress held in Venice in 1881. This is an appreciation presented to institutional exhibitors, which award is equal to the rank of the gold medal given to individual exhibitors. Unfortunately, its values can only be guessed looking at its present state. Due to its fairly poor condition (several areas are seriously damaged, lots of names are faded illegible), the globe cannot be exhibited either in public or for the professionals.



Figure 1. Globe map of Perczel's globe in Mercator projection highlighting the damaged areas

In World War II, probably a bomb explosion generated excess pressure that destroyed the graphical content in a 5–10° wide band along the Equator, further it caused damage on many other parts, which became illegible (Figure 1).

A kind of “restoration” in the 1970s made the condition of the globe even worse. The damaged parts were covered by blank surfaces, on which only the coordinate grid was drawn, and which blocked out even legible letters and graphics. The example below gives an impression of the “quality” of the restoration: the northern fraction of the drawing of Banca island was mounted on a wrong place (Figure 2).

The choice of the lacquer cover to defend the globe was also unfortunate. It has turned yellow and brown by now and it completely blocks out the original colours (e.g. the blue of seas); the symbols and lettering of settlements in red have almost disappeared or became illegible at several places.

However, we are fortunate to have a description of the beauty of the original globe written by Zoltán Ambrus-Fallenbüchl (Ambrus-Fallenbüchl, 1963). His study was of major importance for making the artistic copies of the globe.

2. Major steps of the project

Mátyás Márton already came up with the idea of the Perczel Project in 2007, when the Virtual Globes Museum (VGM) was established (<http://terkeptar.elte.hu/vgm>). The first four points were formed at that time:



Figure 2. Restoration mistake in the 1970s: **a**) the present content of Perczel's globe; **b**) the state of graphics in 2012; **c**) the state of graphics in the reconstruction in 2019

1. In 2008: Making a virtual digital facsimile copy using high-resolution photos (registering the present condition of the globe for the VGM) – VGM ID 76 (Márton, 2008; Gercsák et al, 2010).

2. To 2012: Digital re-creation of the globe (making 10°-wide gores in the original size of the globe from the high-resolution photos; then redrawing, surface colouring, hill shading and preparing the cartographic labels). Assembling the digital virtual contentual facsimile of the globe from the re-created gores (3D model for the VGM) – VGM ID 110. However, no doubt, a virtual globe of the original cannot show the real value of the globe. (Gede et al, 2011).

3. In 2012: The greatest dream, a “great vision” was to make a physically true copy of the restored and reconstructed content of the globe (that is, mounting the completed gores on a supporting globe and its assembling on a stand). However, this could not be completed in the absence of a supporting globe and a stand) (Márton et al, 2011).

4. In 2019: Completing the digital virtual restoration, that is restoring the illegible parts of the labels marked by question marks (“?”) on the re-created gores using reliable and contemporaneous sources as much as possible, as well as restoration of the faded though suspectable lines over the worn surfaces (coastline, hydrography, borders). Completion of the digital virtual restoration by adding the

missing graphics, such as linear and areal elements and hill shading on the completely destroyed parts using contemporaneous sources such as maps and atlases in major world languages. Making a restored and reconstructed digital virtual contentual copy from the gores prepared in this way (3D model for the VGM) – VGM ID 153. A digitally restored map (contentual facsimile) can present the beauty of the maps.

5. In 2019: Three reconstructed artistic facsimiles were made using the digital processed globe according to point 4. This part of the project was led by Zsuzsanna Lente, restorer artist, who followed the issues she raised and supported by western examples in her presentation at a conference on Perczel's globe in the National Széchényi Library in 2012. This theoretical opportunity sketched in 2012 took shape in 2019 – VGM ID 159 (Figure 3).

To demonstrate the size of the work, here are some statistics. Altogether, geographical names and linear features had to be processed in general vector graphic software on 72 pieces of half-gores. Almost 3,000 graphical elements and more than 3,000 place names had to be completed by restoration or reconstruction. The hill shading for the northern and the southern hemispheres in grey colour was stored on 60 files. Hill shading had to be added or completed on more than 300 parts, mostly on the damaged places of the globe.



Figure 3. The original globe of Perczel (A); the “great vision” in 2012 (B); the reality of today (C)

3. On the making of the artistic copies

A precondition of making the artistic copies was the completion of cartographic tasks described above (points 1 and 2), especially the finishing of the digital restoration and reconstruction in 2019 (point 4). Due to the limited time, all these tasks had to be carried out simultaneously with the preparation of the final copy (point 5) supervised by András Lente, a member of the Archiflex Studio. The project could only be completed by the cooperation of cartographers, graphics designers, object-restorer artists, model-makers, a professional cabinet-maker (wood-restorer artist), copper-smith and engraver masters. Thanks to this collaboration, such facsimile globes were born that resemble the original, almost 160-year old manuscript globe of Perczel.

The final product is considered authentic, a real “copy”, if the map of the globe recalls the image of hand-drawn map elements and the freehand drawing of the letters of labels.

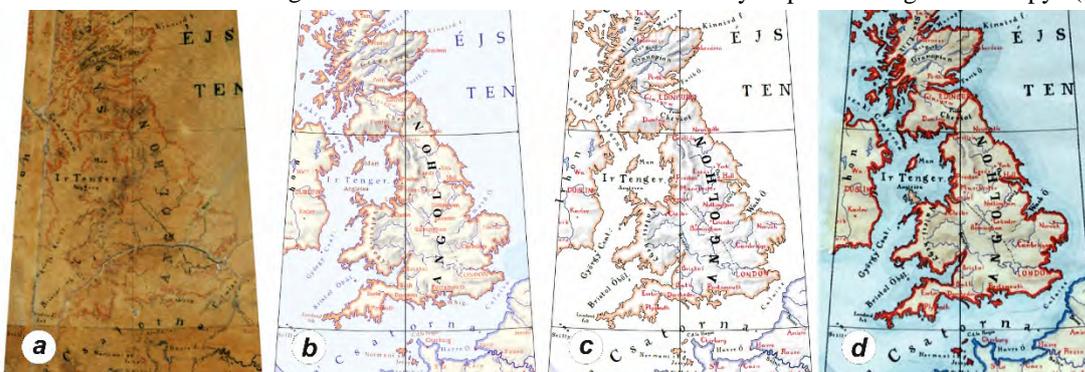


Figure 5. Steps of making the globe map: **a)** an extract of the original globe; **b)** the contentual facsimile made at ELTE; **c)** the print after typographic and graphic revising; **d)** after manual colouring



Figure 6. The stand with its calendar ring in preparation, mounting the globe map, and part of the calendar ring with the globe

4. Final digital preparation of the artistic copy: digital restoration, digital reconstruction

This phase of the project was fully executed by Mátyás Márton, the cartographic director of the whole project, with the contribution of Judit Paksi, because there was no chance of involving students due to the short of time. Actually, the digital restoration was not complete by 2012, because many of the geographical names were not reliably identified.

Formerly, the digital restoration, in its narrow sense, meant the registration of those map elements that were unambiguously identified. In a broader sense, however, digital restoration means much more: the guessable, badly

Therefore, the first step was to plan and to prepare the fonts according to the handwriting of Perczel, and to replace the letters of names with these newly formed characters (Figure 4).

The map print, made after this typographic and graphic revising, was completed by manual colouring by the artists (Figure 5).



Figure 4. The first step of making the artistic copy was to convert the names look like “manuscript” labels

The tool of ensuring authenticity is the manual work of artists at every step of making a true “copy” (Figure 6).

faded geographic (cartographic) content has to be redrawn and coloured, even some names have to be rewritten according to the style of the time.

It is enough to compare and examine differences between the 2012 and 2019 processed maps of the area of Maracaibo Bay in South America: the large number of corrected name labels and completion of border lines justifies this statement. What is more, the drawing of the missing hydrographic elements in the southeastern corner of the map is already considered an example of digital restoration, as the rivers were added on the destroyed part of the original globe by using contemporary maps (Figure 7) (Márton et al, 2020).

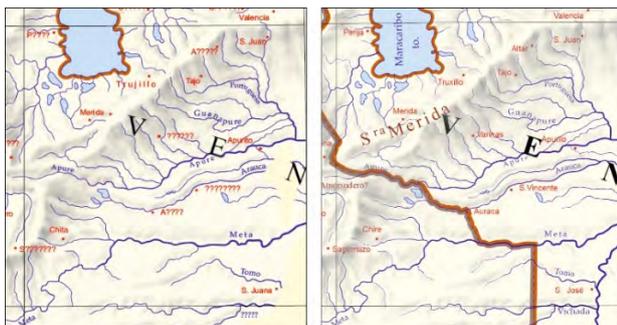


Figure 7. Digital restoration in broader sense and digital reconstruction

In this phase, the greatest difficulty was adding the hill shading on areas that was not done earlier during the processing and also on areas that were destroyed and not yet reconstructed. József Sziládi, a retired cartographer of the Cartographia Enterprise, who made the hill shading unselfishly without any payment (!) and at very high level between 2008 and 2012, could not undertake the job any longer because of his weakening sight. In this situation, Mátyás Márton did this task too: he followed Sziládi's – that is Perczel's – style to finish the work. The additions were made in mosaics over the larger areas (Figure 8) (Lente et al, 2020).

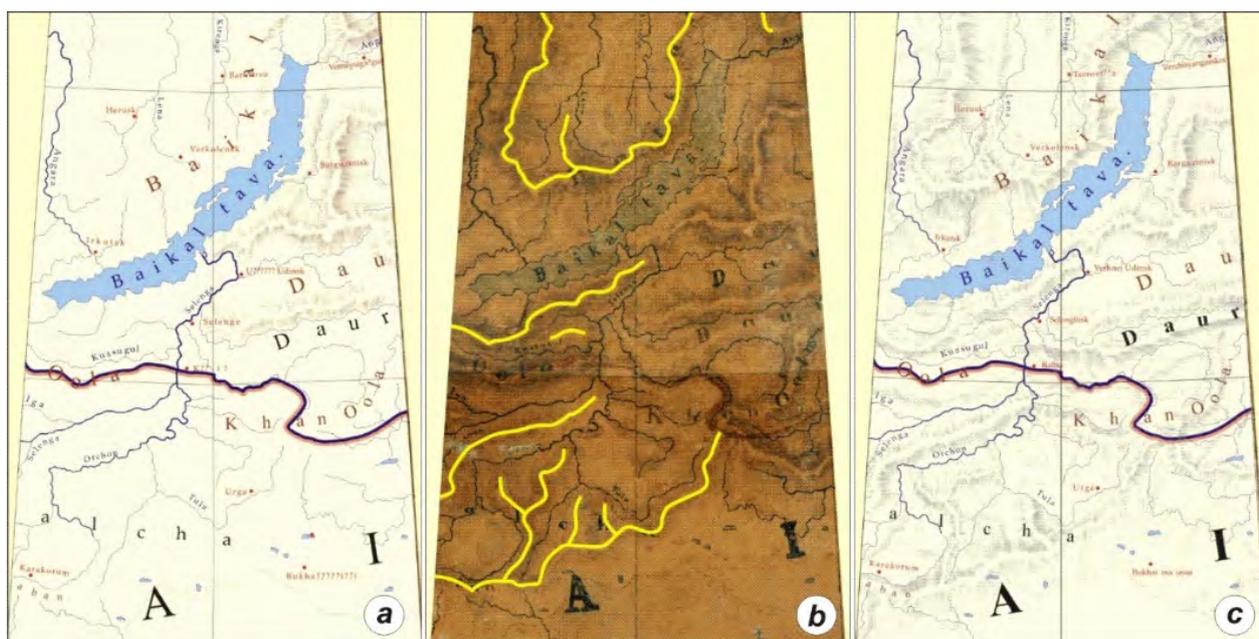


Figure 8. Completion of the hill shading in the area of Lake Baikal: **a**) incomplete hill shading in 2012; **b**) marking the mountain crests on missing areas; **c**) graphical content after adding the hill shading

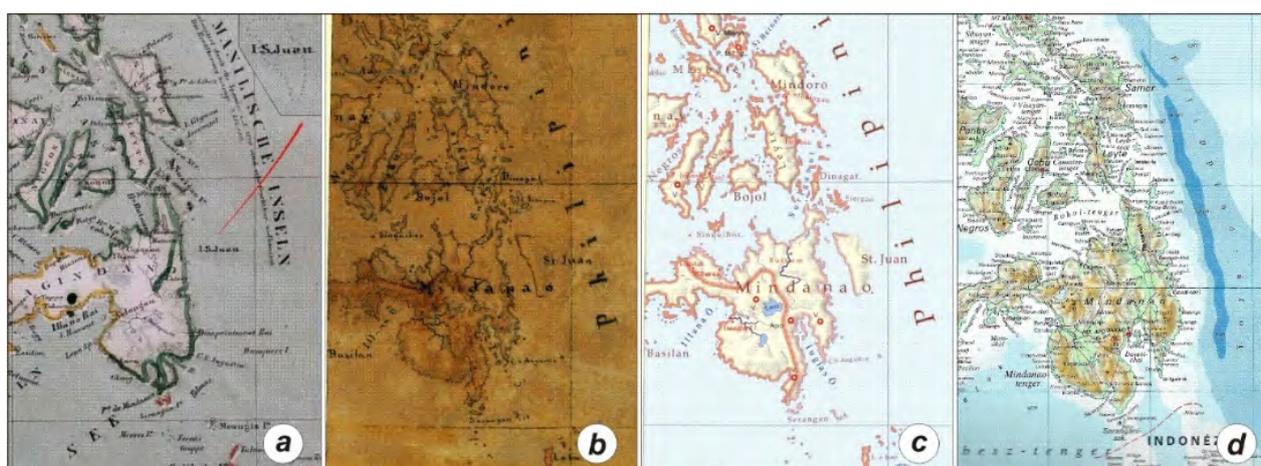


Figure 9. St Juan island east of the Philippine Islands: **a**) on the suspected source map; **b**) on Perczel's globe; **c**) on the 2019 drawing; **d**) in the world atlas of the Cartographia Enterprise



Figure 10. The drawing of the coast line of Severnaya Zemlya: **a)** not shown on the source map; **b)** coast line shown roughly on Perczel's globe; **c)** in the world atlas of the Cartographia Enterprise

5. Cartographic “case studies”

There so-called ghost islands on the globe. These drawings are sorted into two types. Some islands never existed. Maybe, Perczel placed them on his globe after contemporary descriptions or sometimes he clearly took them from source maps (e.g. the island of St Juan) (Figure 9). These representations give the “image” of remote lands of the Earth.

The second type includes features that were added, without doubt, after the completion of the globe (1862), but surely not by László Perczel (he died in 1897). Such examples include, e.g. the roughly drawn coast line of the archipelago of Severnaya Zemlya (Northern Land) discovered in the Arctic Ocean at the Siberian coast of the Russian Empire only in 1913 (Figure 10).

5.1 Original cartographic solutions

Probably, Perczel did not follow a system of symbols when he started working on the map of the globe. Therefore, there are larger or smaller differences between the symbols of certain map elements. The representation of borders is a good example of this inconsistency.

He precisely coloured the coastal area at the northern part of the Gulf of Aden (Figure 11, left). This method was often used in his age (and later too) mainly when showing the uncertain areas of countries. The same representation method on a larger area, for the border between Egypt and Nubia, returns on the 51-cm diameter globe made by Manó Kogutowicz in 1910 (VGM ID 24). The traditional band along the borderline is completed with an eight times wider band on the inner side of the countries. This band has the same colour but of much lighter tone than the outer band thus creating a double border band (Figure 11, right).

Perczel used again an original graphical method to represent the ocean currents. The outer boundaries of the current are shown in continuous dark blue lines. This is accompanied by a blue band towards inside the current with changing width. In the case of currents that extend over a wide area, the blue tone of several parallel bands gradually fades towards inside (Figure 13). The bands normally do not fill the full width of the current: the middle parts receive the light blue colour of the seas, while the arrows drawn in the axis express the direction of the current.

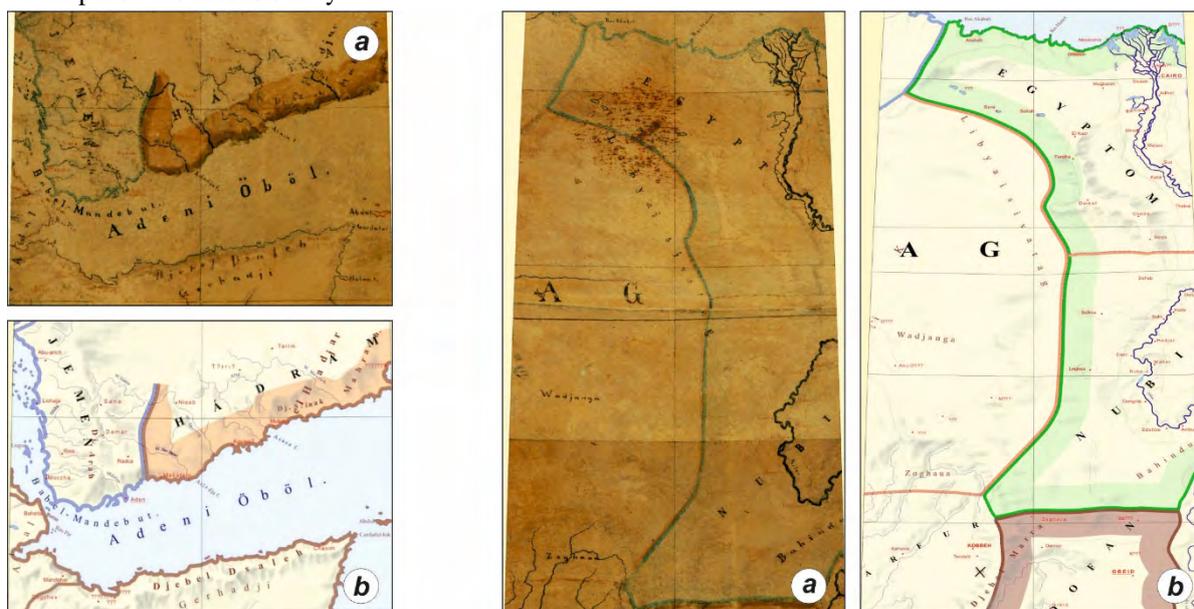


Figure 11. Western part of Hadramaut region (left): **a)** on Perczel's globe; **b)** on the drawing in 2019. An original representation of borders of Egypt and Nubia (right): **a)** on Perczel's globe; **b)** on the drawing in 2019

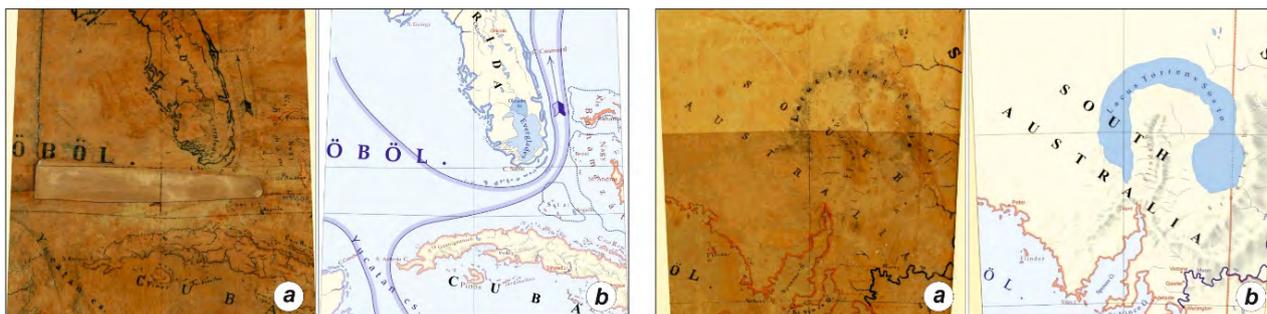


Figure 12. An original representation of the wetlands of Florida (left): **a**) on Perczel's globe; **b**) on the drawing in 2019. Map of Lacus Torrens Sos to (right): **a**) on Perczel's globe; **b**) on the drawing in 2019

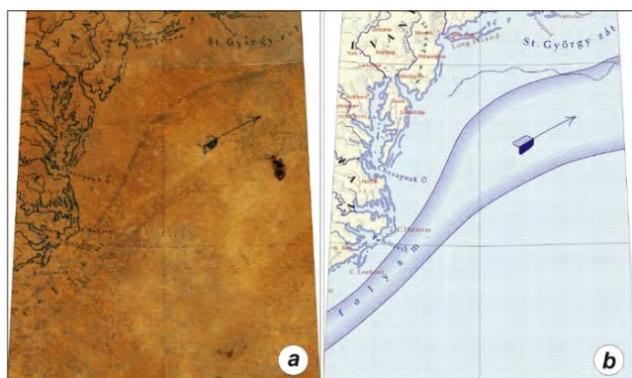


Figure 13. Ocean currents: **a**) on Perczel's globe; **b**) on the drawing in 2019

Even some maps published in the first half of the 20th century showed the unexplored coastlines broken (Figure 14). Such representations can be found on Perczel's globe too, particularly in the northern areas, in the North American archipelago and at some parts of Greenland. It would not have been an effective solution to complete these missing lines according to the recent knowledge. Identifying such places where the map content is missing on the seriously damaged parts of the globe can be relatively easily done using contemporaneous maps.

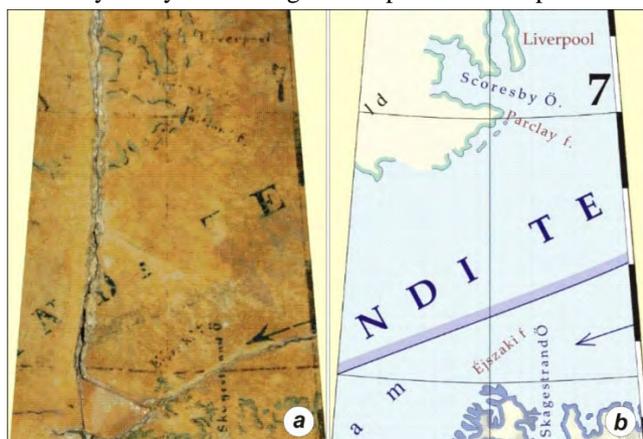


Figure 14. Certain parts of the coastline of Greenland are unknown (e.g. the coasts of the frozen fjords), where their representation is "broken": **a**) on Perczel's globe; **b**) on the drawing in 2019.

6. The calendar frame (horizon ring)

In 2019, the horizon ring (calendar frame) of Perczel's globe (Figure 15) was also processed within the last phase of the project. This part of the globe was damaged as much as the globe.

The graphical execution of the horizon ring, which contains plenty of astronomical-geographical data, is of high standard. The horizon ring contains the following information from inside to out:

Ring 1. Graticule (360 degrees in total) by 1 degree. The division of degrees starts from the NYUGAT (West) point with an empty "rectangle" leftward, and with a "rectangle" in full red rightward. (The term "rectangle" here and from now on means a small section of the ring.)

Ring 2. Writing of degrees, which starts from the NYUGAT (West) point, which is set at the 0 degree. Every 10 degrees are written to the right and to the left.

Ring 3. Division of the twelve signs of the zodiac.

Ring 4. Writing of degrees belonging to the signs of the zodiac. It starts from the NYUGAT (West) point with an empty "rectangle" leftward and with a "rectangle" in full black rightward. For instance, the writings of Virgo are as follows: 30 (0); 10; 20; the number 30 is placed on the lower part of ring 3. The signs of the zodiac and their calendar time are listed below starting from the vernal equinox (KELET /East/). Naturally, their beginning is not at 0 hour on the given calendar day.

KOS – ARIES (21 March – 20 April); BIKA – TAURUS (21 April – 21 May); IKREK – GEMINI (22 May – 21 June); RÁK – CANCER (22 June – 22 July); OROSZLÁN – LEO (23 July – 23 August); SZŰZ – VIRGO (24 August – 22 September); MÉRLEG – LIBRA (23 September – 23 October); OLLÓS – SCORPIUS (24 October – 22 November); NYILAS – SAGITTARIUS (23 November – 21 December); BAK – CAPRICORNUS (22 December – 20 January); VIZÖNTÖ – AQUARIUS (21 January – 19 February); HALAK – PISCES (20 February – 20 March).

Ring 5. Empty.

Ring 6. Names of the months (in Latin), e.g. SEPTEMBER.

Ring 7. Division of the month by days (365 empty and full "rectangles" in total). For instance, the writing of the days

of SEPTEMBER are as follows: 31. (0); 10; 20; the number 30 is placed on the lower part of ring 6 (because August has 31 days). The letters of the names of months are written in colour with black contours, and the full “rectangles” have the same colour. JANUARIUS 31 (red), FEBRUARIUS 28 (red), MARTIUS 31 (red), APRILIS 30 (empty – it may have been yellow, but the darkening of the lacquer cover “swallowed” it), MAJUS 31 (red), JUNIUS 30 (empty – the “rectangles” of the first day of the months are red), JULIUS 31 (red), AUGUSTUS 31 (dark brown – the “rectangles” are partly red), SEPTEMBER 30 (red), OCTOBER 31 (green), NOVEMBER 30 (red), DECEMBER 31 (green). (365 days in total.)

It is worth noting that the boundaries of the signs of the zodiac are exactly adjusted to division of degrees on ring 1, and not to the days of the months, because the Sun does not necessarily pass through the vernal or autumnal equinox at 0 hour. The time of the autumnal equinox was at around 18:15 on 22 September according to the horizon ring on Perczel’s globe. This date coincides with the NYUGAT (West) point (0 degree).

The 365 small “rectangles” mean that the radius of the ring has to be turned by 360/365, that is 0.9863 degrees to get the boundary lines of the days. The starting point is about at the three-quarters of the day 22 September.

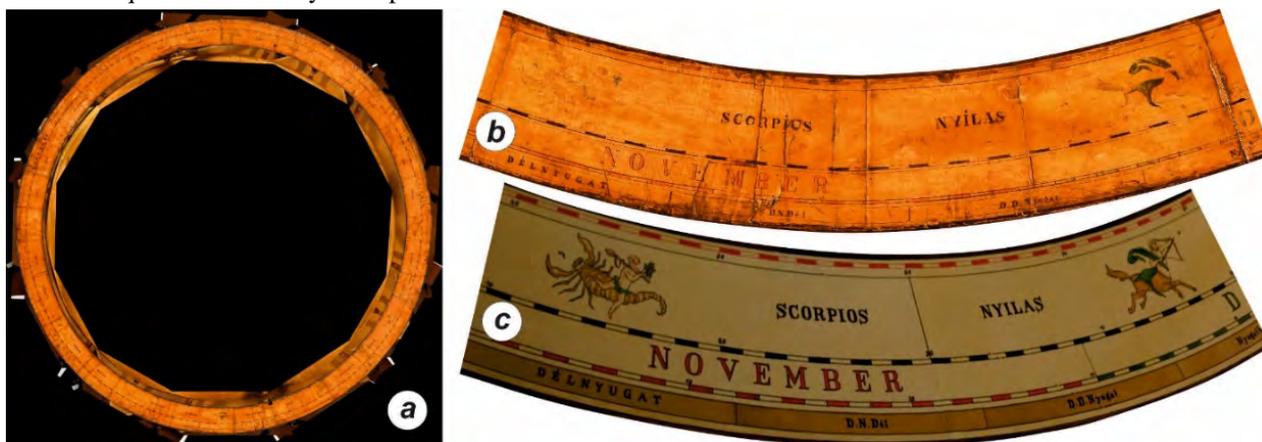


Figure 15. The “assembled” horizon ring (a) and a part of it (b) on the stand of the original globe, and a part of the frame on the artistic copy (c)

7. History repeats itself also our profession

According to the agreement on the re-creation of the globe, three identical copies of the globe (including the stands and frames) were made. The first reconstructed artistic facsimile copy is placed in the office of Hungary’s prime minister. The second copy is on show in the National Széchényi Library on the sixth floor of the Buda Castle. Here, in the Map Room on the seventh floor, the original globe of Perczel can be seen. The third copy is kept in the University Library of ELTE. The transfer of the third globe to ELTE was already seriously hindered by the coronavirus epidemic. The large size of the globe, however, caused considerable complications at all these three places when the globe was moved into its room (Figure 16).

Ring 8. Empty.

Ring 9. Writings of the points of the compass. The name NYUGAT (West) is placed symmetrically on two sides from the 0 degree (first line). Going leftward, ÉSZAK (North) is at 90 degrees, KELET (East) at 180 degrees. Rightward, DÉL (South) is at 90 degrees. It is always the middle line of the writing that shows the given direction. The 11.25-degree section of the ring belonging to the writing is indicated, but its halving line is not. Consequently, the extension of the section of the ring belonging to the name NYUGAT is 5.625 degrees (5 degrees and 37.5 minutes) in both directions from the 0 degree. Measuring 11.25 degrees (11 degrees and 15 minutes) from here will give the boundary line of segments on the ring. In today’s practice, the direction of the cardinal points is indicated.

Perczel gave 32 directions. The four cardinal points and their halving (secondary) directions are used as well the tertiary directions by further halving in the Hungarian language. Perczel, however, indicated the quaternary directions too, the names of which are not in use in Hungarian any longer, but they exist in English.

Ring 10. Empty.

An interesting story of the globe is still remembered in Hungary. Perczel’s globe was part of the exhibited objects of the National Museum of Hungary during the Third International Geographical Congress held in Venice in 1881. The Hungarian exhibition hall was in Palazzo Reale, on Saint Mark Square. A contemporary issue of the Hungarian *Földrajzi Közlemények* (Geographical Review) wrote that “as the globe could not get through either the door or the windows, it was exhibited in the large hall of the Archives”.

Acknowledgement

The authors thank Everybody (here should come a long list) who supported – with their work, moral and financial support – the successful execution of the project to re-create this outstanding artistic work.



Figure 16. Finally, the third re-created globe arrived at the University Library of Eötvös Loránd University (but it was not an easy manoeuvre ...) on 11 March 2021.

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