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“For the purpose of scientific research of Professor M. Milanković, at the Astronomical Observatory in Belgrade, during 1928 and 1929, was undertaken the tedious and meticulous work of recomputing the secular changes in the astronomical elements of the Earth’s trajectory, based on Le Verrier’s work, and taking into account the values of the masses of planets known by 1928. The work was organized like this. Stanimir Fempl, then a university teaching assistant, and I, then a student, independently of one another, had to perform the proposed calculations.” Dragoslav Mitrinović, *The Life of Mihailo Petrović* (1968).

“This year, a new scientific endeavor was completed at the University of Belgrade, with the cooperation of mathematicians and astronomers who teach mathematical physics, celestial mechanics and astronomy at the University’s Faculty of Natural Sciences. The endeavor consisted in forming an approximate picture of the course of the insolation of the earth’s surface, as well as the relationship between the sun’s surface and the temperature of the earth’s surface on one side and the atmosphere on the other. No matter how difficult this task may have been, having consisted in re-doing the work all over again because the corrections made on the masses of the planets originated from their last calculations, and then recalculating values of secular inequalities for the elements of motion of the planet (which included 600,000 years before 1800), Mr. Milanković took it without hesitation. Assisted by Mr. V.V. Mišković, Director of the Astronomical Observatory of the University of Belgrade, who took over all astronomical calculations, Mr. Milanković could successfully complete this work on testing his new theory of climate change on Earth.” Mihailo Petrović Alas, *On the Occasion of a Recent Application of Astronomy to Climatology* (1932).



Dragoslav Mitrinović, Stanimir Fempl, Vojislav V. Mišković, Vojislav Grujić and Radivoje Damljanović, Beograd, 1928. (From the private photoarchive of V. V. Mišković)

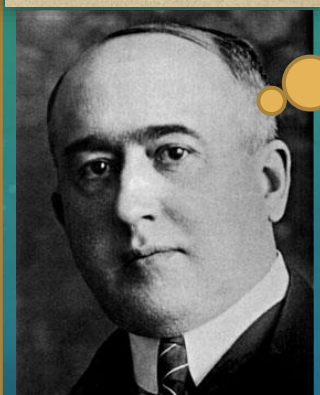


Photo: N. Janc, 1987.)

The astronomer’s desk at the Museum Collection located at the Meteorological Observatory. It features the Original Odhner Gothenburg, one of the desktop computing machines that was used to perform Milanković’s calculations.



Mihailo Petrović Alas (1868-1943)



Milutin Milanković (1879-1958)



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Tatomir P. Andjelić (1903–1993), mathematician, university professor and academician of SANU, has invested a lot of work in checking formulas, numerical tables, languages, etc. in *Canon*.

# MILUTIN MILANKOVIĆ AND ASSOCIATES IN THE PREPARATION OF THE “CANON”

Milutin Milanković has published papers on the subject of *Mathematical Climatology* in significant scientific publications, among which are the *Handbook of Climatology* and the Gutenberg’s *Handbook of Geophysics*. However, as he noted, his works were hardly accessible to interested readers because few of the libraries had all the volumes of these *Handbooks* and other relevant journals (Milanković 1952). So he decided to publish all his 28 papers on the paleoclimatic problem in a separate book (Milanković 1952).

**This is how the idea of creating the *Canon* was born.**

The idea and content of the book were presented on March 27, 1938 at a meeting of the Academy of Natural Sciences in Belgrade, when a decision was made to publish it as an edition of the Serbian Royal Academy, in German, so that it would be accessible to foreign scientists (Milanković, 1952).

In 1930, Mišković initiated and edited the *Yearbook*, which, from the following year, was renamed the *Yearbook of Our Sky*. The same year the second edition of the *Annuaire de l’Observatoire astronomique de l’Université de Belgrade* was published. On this occasion, Milanković sent his congratulations to Mišković in a letter dated November 24, 1930. Milanković also wrote that he realized that some of the tables could be further elaborated, e.g., Table 5 *Length of day and night in the polar zone (Lange Tage und Nächte der Polarzonen)*. He asked Mišković to prepare some more tables for him, which he marked on a separate piece of paper; unfortunately, that paper was not preserved. He needed the tables by the second half of December 1930 for his paper *The Earth Rotation* that he was preparing for the *Handbook of Geophysics*. (Janc et al., 2019.)

The problem of the shape of the Earth and the position of the Earth’s poles began to be addressed by Milanković in 1932 and 1933, following the earlier suggestions of Alfred Wegener (Andjelić, 1979).

Andjelić T., (1979) *Milutin Milanković biografija*, digitalni legat, Galerija SANU, 36; Janc N. et al. (2019), *Ice age theory: Correspondence between Milutin Milanković and Vojislav Mišković*, Open Geosciences, Vol. 11, Issue 1, 262 – 272; Milanković M., (1952), *Uspomene, doživljaji i saznanja iz godina 1909 do 1944*, SAN, Posebna izdanja, Knjiga CXCV, Odeljenje prirodno-matematičkih nauka, Knjiga 6, Beograd.; Mitrinović D., (1968), *Život Mihaila Petrovića*, Matematička biblioteka, Beograd, vol. 38, Trifunović D., (1979), *Naučne teme koje je Milutin Milanković ostavio otvorenim*, Dijalektika, Časopis za metodičko – filozofske probleme matematičkih, prirodnih i tehničkih nauka, Broj 3 – 4, Godina XIV, Beograd; Petrovića M., (1932), *Povodno jedne nedavne primene astronomije na klimatologiju* SKA.; Pešić N., *Palme i banane u beogradskim parkovima...*, Borba, godina I. broj 10, 15-III-1958, Beograd.



Milanković opted for a different approach to climatology than meteorologists at the time. Therefore, it can be considered that he participated in laying the foundations of modern climatology.

Celestial mechanics was the foundation upon which he founded the theory of climate change (Milanković, 1952).

(Photo: N. Janc, 2017)

The *Borba* newspaper published in 1958 an article entitled *Palms and Bananas in Belgrade*, which claims that “In the next 100,000 years we will not reach the Ice Age – according to the mathematician Fempl!” and quoted him as saying: “The results I have received are not only very interesting, but are encouraging as well. It turned out that in the future, in forty thousand years, the amount of heat emitted by the sun would constantly increase in our northern hemisphere. In the southern hemisphere, in the temperate zone, where New Zealand is located, the picture will be quite different. Very high minimums will appear, ten thousand and twenty thousand years from now.”



V. V. Mišković (1892-1976) and S. Fempl (1903-1985) (From the private photoarchive of V. V. Mišković)

Milanković, under the title *Problems to be worked on*, presented 26 topics that should be addressed by members of the Mathematical Institute, the Astronomical Institute, as well as graduate students and doctoral students (Trifunović, 1979). Given that Milanković mentions the Mathematical Institute, the list of topics must have emerged after the year 1946 (Trifunović, 1979).

**PROBLEMS TO BE WORKED ON:** *For the Mathematical Institute, For the Astronomical Institute, For graduate students (some of the topics), For Ph.D. candidates*