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# WHAT HAS BEEN REPORTED ON ASTRONOMY IN THE SERBIAN MAGAZINE "JAVOR" (MAPLE) [1862 – 1863, 1876 – 1893]

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**Abstract.** The Serbian magazine "JAVOR" (MAPLE) was taken at random to show that in the XIX century there has been, among Serbs, a vivid interest in Astronomy.

## 0. THE MAGAZINE ITSELF

This review started with a subtitle "Magazine For Amusement And Instruction". In the second period "And Literature" has been added. Publishers were: Zmaj Jovan Jovanovic (1862 –1863), Kosta Trifkovic (1874 – 1875), Luka Jocic (1877 – 1889) and Jova Karamata (1893). The editors were: Dr. Ilija Ognjanovic ( 1874 – 1892) and Danilo Zivaljevic (1893). It has first been published biweekly, and from the year 1877 on, weekly. We will narrow our attention only to one science – to Astronomy, and we will analyze the published material accordigly. If there is only one data, it is a Julian; and if there are two data the first is Julian and the second is Gregorian.

## 1. THE SOLAR SYSTEM IN GENERAL

*THE EARTH.* V. Mladenovic, using Dr. Klein's article, writes "SINCE WHEN EXISTS OUR EARTH" [1]. Among several geological methods the author uses for calculation in one involving the precession of equinoxes. The other astronomical expedient was the Laplacean cosmological theory. The final result was approximately four billion years.

"WHAT WILL FINALLY BE WITH OUR EARTH?" [2] is a short notice on deceleration of the Earth rotation. Mercuty, Venus and Earth will fall onto the Sun. After that, due to Sun's rotation, new planets will be formed.

The earthquakes are caused by the influence of the Sun and Moon [3]. The credit for this idea has been attributed to Prof. Rudolf Falb. But a year later [4] David Milankovic, uncle of our famous scientist Milutin Milankovic, proves that Milutin's great uncle Uros Milankovic was the first who mentioned this idea.

"*THE MOON* AS A CELESTIAL BODY" [5] is a detailed description written by Svetislav Kolarovic; starting with its apparent motions among stars, revolutions, rotation, eclipses, surface formations, continuing with imaginary sights from it, its influence on Earth (tides, eventually climate, ending with popular beliefs), its surface temperature, "days" and "nights", seasons, nonexistence of atmosphere, as well as twilight and dawns,

phenomena during occultations, lack of water (reasons for this), blackness of its sky, nonexistence of living creatures, ending with eventual possibility to reach and settle on it, adding the necessary time for, at that time, known vehicles.

In the article "THE SEA" [6] Pavle Padejski describes the reasons for the appearance of tides on Earth, mentioning Newton's law of gravity.

A short notice "THE MOON AND ITS INHABITANTS" [7] considers: the distance Moon-Earth, the surface configurations and their shadows, Edmund Neison's observation of the changes in shape of the Linnee's crater, and supposes that there may be some living creatures.

"MOUNTAINS ON THE MOON" [8] considers their number and their height.

*THE SUN.* Andrija M. Matic (Professor at the Great Gymnasium of the Serbian Orthodox Parish in Novi Sad, comment B.D.J.), using German sources wrote "WHAT IS THE SUN MADE OF AND HOW IT DOES ITS JOB?" [9]. He describes the Sun's size, its influence on terrestrial phenomena, the historical progress of human thought on the subject, the chemical composition, its gaseous atmosphere, chromosphere, prominences, spots, incrustation of its surface, and its cooling, as a consequence.

Another essay on the same subject has been published under the title "WILL THE SUN GET COOL AND WHY?" [10].

P.V. Vujic translated "COOLING OF THE SUN", written by Dr. K. Prell [11]. Some calculations are given how long could the Sun emit such an amount of energy if it is built of different materials. One of consequences would be a shrinking of its dimensions. Some theories on genesis of sunspots are cited.

The result of the investigations of the physicist Dr. O. Froehlich, from Berlin, is reported in the notice "THE TEMPERATURE OF THE SUN IS CHANGING" [12].

In the long article "ON THE SOURCE OF MOTIONS ON OUR EARTH" [13], Todor V. Jovanovic reports on influence of solar radiation on terrestrial phenomena, such as earthquakes, wind, rain, sea currents, tides, warmth, etc.

*MERCURY* has been described in "THE NEAREST NEIGHBOUR OF THE SUN" [14], by Andrija M. Matic. After a historical introduction the author mentions the discrepancy between theoretical and observed data, the transit across the Sun's disc (on 7th May 1878), the possibility of existing of a new planet nearer to the Sun which was named Vulcan, on observations during the eclipses of the Sun.

*VENUS.* Andrija M. Matic, wrote a thorough forecast of a very interesting phenomenenon: "TRANSIT OF THE PLANET VENUS (OVER THE SUN) ON 9th DECEMBER 1874" [15]. After a review of the event mentioned he said that the same was in the year 1769, will be in 1882, and that the next occasion will be in 2004! He explained the reasons for that, and mentioned that the same may occur with the planet Mercury. The benefits are listed. At the same time the laws of movements of planets have been explained. It ended by a description of an expedition to Tahiti for observing the transit of 3rd June 1769.

*MARS.* Andrija M Matic wrote about the "WAR PLANET (MARS) ACCORDING TO THE LATEST INVESTIGATIONS" [16]. Historical introduction is followed by the description of how were his satellites discoverd by Asafh Hall in the previous year, its surface features, winds, atnosphere, polar caps, his age and the possibility of existence of life.

Another writing, "MARS" [17], by the same author, according to Dr I. Pallis, contains the latest data on this planet.

*PLANETOID* (asteroid or small planet) Nr. 250 has been discoverd on 22nd August 1885 as a "star" of eleventh magnitude. Its position was, at $11^h$, 353°40' in right ascension and 16°10' in declination [18].

"PLANET *JUPITER* AND ITS WORLD" [19], again by A. M. Matic, portrays this planet from the earliaest days of observations, its size, its distance, rotation, revolution, satellites, their eclipses by the planet, characteristics in general, its appearance in small telescopes, its atmposhere, its chemical composition.

*VULCAN.* A short notice [20] announces that astronomer Watson, following Leverrier's instructions, discovered the new planet named Vulcan (!?!).

## 2. STARS

"ON THE AGE OF STARS" [21] is a report on the lecture given by Pier Julies Cesar Jansen in Paris in 1887. He stated, that according to the results of the spectral analysis, all stars are composed of the same elements which may be found on Earth. One may determine the temperature and the state of evolution of the stars.

"HOW MANY STARS ARE THERE?" [22] states that in the entire clear sky there are about 6000 stars, but we are not able to see them all because a part of them is below our horizon. Therefore we see approximately only 3000 of them. But fog, water vapour and other impurities limit their number to near 2000. Using small telescopes we may see up to 600.000. By means of the latest of them, then known, up to 60.000.000 are visible.

"THROUGH THE WORLD OF STARS" [23] has been written by Sophus Tromholz, translated by Z. D. Vladic in Vienna, is a thorough excursion from Sun to the farthest then known stars. At that time the expression "star" has been used for real stars as well as for planets. Starting by explaining the distances, and how they may appear to the ohservers (to see the star which does not exist any more), their number, apparent magnitudes, double and mutiple stars, imaginary view of the sky on a star (planet), star clusters, by Milky Way, finishing by their structure and composition of nebulae.

## 3. COMETS

These celestial objects excite a great interest among the people, so, I separated them from their natural place, the Solar system. Svetislav Kolarovic, professor at the Orthodox Great Gymnasium in Sremski Karlovci, wrote a long and detailed article "COMETS "[24]. Historical view, followed by the criticism of superstition, describes what their orbits look like, explaining characteristics, their number, shape, mass, conditions for apparition of their tails, comae, nuclei, their structure, extensions; cites theories on their origins through the history, contens the possibility of existence of living creatures on them, and, tells some anecdotes.

Short notes announce apparitions, or describe the comets seen earlier. [25] concerns one seen before, from 22$^{nd}$ September 1807 to 27$^{th}$ March 1808, registered again on 1$^{st}$ June 1881 (1881 III or 1881b); [26] is devoted to the same , but with more details. (1882 I or 1882b) has been noticed [27] on 6$^{th}$ /18$^{th}$ March and it should be seen from our regions approximately before 21$^{st}$ May/2$^{nd}$ June. It is expected to have an expanded tail, which will be seen also by daylight [28]. (1882 II or 1882d) has been described in [29] noticing that its period is about 730 (exactly 760.9) years. The next one is (1885 III or 1885c): "...on 22$^{nd}$ August at $8^h$ $26^m$ its right ascension was 206°, and its declination 37° 6' N, and the

magnitude m=9 [30]. The comet (1887 I or 1887a) has been discovered in Cordoba on 18th January [31]. Its tail extended approximately 30°.

## 4. METEORS, METEORITES AND BOLIDES

One more group of object of public interest, and for that reason again separated from Part 1. were meteors, meteorites and bolides.

P.V.Vujic translated the article "METEORITES" written by K.Prell [32]. He describes the structure, chemical composition, movement through the terrestrial atmosphere, origins, similarities with volcanic ejections, finding of organic material , so, that there, maybe, exists some sort of life in the space, including the hypothesis that they might be products of cosmical decompositions.

Another writing on the same subject [33] deals with origins of life on Earth and discusses the posibilities of its coming from the outer space. Describes their appearence, structure, sorts, chemical and cristalline composition, volcanic (from other celestial bodies) origin, traces of organic material (due to crystals and pseudomorphosis of some minerals). It closes by mentionig chondrites.

Under the title "STARS ARE FALLING" S. M. (Stevan Milovanov?, professor at the Great Gymnasium of the Serbian Ortodox Parish in Novi Sad) [34] mentions the meteor showers on the nights between 21st and 22nd April, 10th and 12th August, 12th to 14th November and 27th and 28th November, citing the historical data, how far they are visible, how long they shine. In the conclusion states that many astronomers connect their aparition with comets and their remains. Their shining comes from the friction with molecules of atmosphere.

Again some short notes inform the readers about intersting events. So [35] is a letter from Belgrade which describes a bolide which fall in the begining of October 1877 near Aleksinacka Banja. A note by the editor completes the writing. A report about the session of the Governmental Geological Society in Vienna, of 24th December 1877, sais [36] that the just referred to was a chondrite.

The people in Cetinje, observing the blue, violet and red sparks in the sky, between 7 p.m. and 8 p.m. on 24th September 1885, thought that it was a firework [37], but after that a thunder has been heard about five seconds. Its height could be about ten thousand meters in NE direction. It has been visible from Bar, Ulcinj, Rijeka, Vir and Podgorica.

On 15th/27th November 1885 again a meteor shower was seen [38]. The author in "THE FALLING STARS", connects them with comets - the former are firm, and the latter fluid remnants (ascording to H. W. Olbers). The paths are elliptical around the Sun. Reaching our atmoshere they start glowing. Some historical data are cited.

In the district of Cacak on 19th November, at $2^h$ $30^m$ [39] a powerful explosion, which lasted about two minutes, has been heard. There were numerous pieces, some of them weighting about three kilograms. No lightning has been observed. The chemical composition is cited.

In Russia, in Cherson district, an aerolit fallen in 1890. In its middle there was an organic matter composed of carbon and some resin [40].

## 5. LIVING CREATURES IN THE COSMOS

Our ancestors were curious too, as we are , to know: "Are we the only ones belonging to organic features in the Universe?". G.A. Hirn wrote "ON WHICH STARS

THERE MAY BE INHABITANTS" (translated again by S. (tevan) M. (ilovanov)?) [41]. The author mentions the views of B. Fontenelle, H.K. Oersted, N. C. Flammarion, C. Pouillet, Langley and discussed arguments pro et contra. Especially considers the Moon. In conclusion he cites the conditions for life: a) water in liquid state, b) average temperature over $0^{\circ}$ C, c) existence of an atmosphere suffincently dense to preserve that body not colder than $0^{\circ}$ C. One condition more is that this celestial body must have a central star, a sun, which emit to it light and warmth.

There are again short notes on the same subject such as "ARE THERE IN STARS LIVING CREATURES?" [42]. A certain Dr. Hahn examined some meteorites and found remnants of corals. The editor hopes that these results will be proved and that in the space there are some organic creatures.

Another notice is "ARE THERE ON PLANETS LIVING CREATURES?" [43]. "On the Moon there is no life. Mercury is unknown to us. On Venus we know only that there is no atmosphere. Uranus and Neptune we hardly know. Jupiter and Saturn have no firm crust. Mars is the only one, for which we may assert that life on it is possible, because there the physical conditions are similar to those on Earth, but are there some living creatures, and of what kind, nobody knows".

## *6. CALENDAR*

Dimitrije Ruvarac describes "SLAVENO-SERBSKIJ MJESJACOSLOV ZA 1792 GODINU" (Calendar For The Year 1792) [44]. We will focus our attention on the astronomical part of it. "Astronomical forecasting for the leap year 1792" includes: On winter, On the reiging planet, On spring, On Summer, On autumn, On eclipses.

Prof. Andrija M. Matic wrote "CORRECTION TO OUR CALENDAR" [45]. That is a commentary on the letter to the Patriarch of Constantinople, written by Serbian Metropolitan Mihajlo proposing the election of a council for correcting of the Julian calendar according to astronomical data. The historical facts on both calendars are cited, and their errors are given. J.H. Maedler's proposal was recommanded. Namely, after each 128 years one must omit a leap year.

Dimitrije Ruvarac recommends "HOW ONE MAY IN THE EASIEST AND FASTEST WAY RELIABLY FIND THE WEEKDAY OF A GIVEN DATE?" [46], with worked out examples.

## 7. HISTORY OF ASTRONOMY

In this case we will follow the chronological series of events. "A SERBIAN EXPERT" [47] informs the reader, inter alia, that "In the year 1404 a monk from the Mons Athos named Lazar, a born Serb, made in Moscow, at the court of the great duke Vasilij Dimitrovic, the first tower clock which struck hours".

Marko Car desribes the life and work of "GIORDANO BRUNO" [48].

The merits and troubles of "GALILEO GALILEI" are reported in two parts [49].

An anecdote on "ISAAK NEWTON AND A SHEPARD" recorded his ignorance of meteorology [50].

The celebration of the centennial of the death of Rudjer Josif Boskovic took place in Beograd on $10^{th}$ February 1887 [51]. A communication describes his life and the programme. It included a performance, in one act, "A Day In Life Of An Astronomer" written by Jean Mirvole, describing the strugle of Johann Kepler's scientific work against astrology.

Another report of Jozuf (sic) R. Boskovic [52] was written by Hadzi Rizvan. It gives some details on scientist's origins.

The article by A. Bernstein"WHAT MIRACLES WILL THE ASTRONOMY DO" [53] was translated by Vaso T. Gavrilovic (who died as a student of philosophy, and who translated the book "Some Facts On The Life Of Earth And The Velocity Of Light" by A. Bernstein and "From Earth To The Moon And Around The Moon" by Jules Verne, etc) gives a complete picture of work done by Urbain Jean Joseph Leverrier on discovering the planet Neptune.

A short note communicate that KARLO LITTROW [54] died at the age of 67. He was the son of Joseph J. Littrow, after whose death in 1842, he became director of astronomical observatory in Vienna.

Under the title "THE WORK OF RUSSIANS IN THE SCIENTIFIC FIELD [55], among others the role of Fjodor Aleksandrovic Bredihin, in exploring the comets, especially of their tailes, was mentioned.

A necrology on the passing away of Dr. Djordje (Georgije) Maksimovic [56] was published. Living as a city doctor in Sombor he had hobbies: meteorology and astronomy.

## 8. MYTHOLOGY

Pavle Padejski wrote an article on "MYTHOLOGY AMONG ANCIENT SLAVS" [57]. He discusses the roots and the etymology of names. The sky with Slavs was a round rock. The God divided it into halves, the one he took in his right and the other in his left hand - the latter was given to the devil. One may suppose that the word "nebo" has been taken from Sanskrit "nab hasea", or from the Aryan "nebo, nabo". The son of the highest god Svarog was Dazbog - benefactor, the Sun itself. Rugevit or Ranovit had seven faces and seven swords; he has been taken as a god of summer Sun. At the same time when a baby is born, in the skies there appears a star. It is not good to look for it because if he by chanse catches on it, the star falls and he dies.

## 9. COSMOGONY

Following German sources Svetozar Stamatovic wrote "THE HISTORICAL DEVELOPMENT OF THE WORLD NOTION" [58]. It is a detailed historical essay starting with Greek philosophers (Homer, Thales, Platon, Aristotheles, Eudoxos...), then over medieval scientist (G. Purbach, N. Copernicus, Tycho de Brache, J. Kepler, ...), concluding with modern ones (C. Huygens, I. Newton, G. Galilei, W. Herschel). Their views have been described.

A reviews of the book 'THE STUDY OF SOCIOLOGY' by Herbert Spencer, Henry S. King & Co, London, 1874, was published [59]. It concerns the thoughts of A. Humboldt and J. Herschel on origins of the solar system.

One more writing by S(tevan) M(ilovanov?) is "HOW THE WORLD SYSTEM ORIGINATED" [60], again following German sources. The hypotheses of Woodward, Burnet, Leibnitz, Whiston, Buffon, Franklin, Lichtenberg, Newton, Laplace, Plateau, Faraday, and some experiments performed by them, were described. As we may see the main attention has been paid to the XVIII century.

"NEW OPINIONS ON THE WORLD GENESIS" [61] written by Dobroslav M. Ruzic. He communicates on earlier coclusions of scientists, how the life may have come to the Earth. Cited were, Thomson, Hahnstein, Chladni, Hahn, Preiss, Darvin, Weinland, Jaeger and their works.

Ideas of P. Tunch, N. Lockyer, Nitzelnadel and others were reported in "WHAT DO THE SCIENTISTS SAY ON THE DESTRUCTION OF THIS WORLD?"[62] by M.D.D.(cjanovic?). One of reasons may be an explosion of a star (according to the event in November 1572). Another is a gigantical body travelling through tha space. The last one is the "falling" of the Earth on the Sun as a consequence of gravity.

## 10. BOOK REVIEWING

In the year 1880. the printing shop of Arsenije Pajevic, edited in Novi Sad the translation of the N. Lockyer's "ASTRONOMY"[63], by Djordje Natosevic. M Petrovic gave a thorough description of the contents. Particular value of this book is a plenty of Serbian names of celestial bodies, constellations and terminology used.

## 11. ASTRONOMICAL INSTRUMENTS

"A NEW TELESCOPE", [64], is a notice on a new instrument. Sir Henry Bessemer installed it in his home, on Denmack Hill, by means of which he will be able to read newspapers in Crystal Palace, in London, at a distance of 3.5 miles, so powerful was its construction.

"THE BIGGEST TELESCOPE", [65], has been mounted in California, at an altitude of 1000 meters. The wealthy American, Jacob Licky, built the whole observatory at his expence, but he did not live long enogh to see the institution finished. He made it for the benefit of science

## 12. ECLIPSES OF THE SUN AND THE MOON.

A.M. Matic announces the "TOTAL ECLIPSE OF THE MOON", [66], and gives details: it will be seen in our county on $15^{th}/17^{th}$ February 1877. At the same time he gives a description of the whole phenomenon.

In the same year there were two more eclipses. Only the "ECLIPSE OF THE MOON", [67], will be visible in Novi Sad in the night between $11^{th}/23^{rd}$ and $12^{th}/24^{th}$ August 1877. The eclipse of the Sun will not be visible from our country.

"THE PARTIAL ECLIPSE OF THE MOON" will be on $16^{th}/28^{th}$ December 1879. The data are given for Berlin. For Novi Sad one must add $26^{m}$ approximately [68].

An "ECLIPSE OF THE SUN" will be on $5^{th}/17^{th}$ May 1882. In Africa it will be a total, but in our county it should be visible only a partial one [69].

There is a report on the lecture, under the title "HISTORICAL ECLIPSES", [70], given by Prof. Oppolzer, in Vienna. He described eclipses of the Sun, throughout history. After his calculations Christ has been crucified on $3^{rd}$ April 33. On that day there was, in Jerusalem, a partial eclipse of the Moon, and the Sun apparently covered by clouds, at the time.

"THE TOTAL ECLIPSE OF THE SUN", [71], will be seen on $7^{th}/19^{th}$ August 1887 in our region, but the beginning will be before sunrise.

In "SCIENTIFIC GAINS OF THE LAST ECLIPSE OF THE SUN", [72], bearing on the one of the $7^{th}/19^{th}$ August 1887, the author concludes that German, English, French, Italian, American, Belgian and Russian expeditions were sent to several places on the surface of our Earth, where, one expected, that the conditions of observations should be the best. To the great dissapointment on all places clouds, fog, or rain prevented the observations. Only the twilight could be noticed.

## 16. CONCLUSION

There were several magazines in Serbian in that time. We chose "JAVOR" AT RANDOM. Therefore no one knows what others, of similar kind, contain on astronomical matter. I hope that there will be enough time to page them also.

We may conclude that among the Serbs, there was a vivid interest concerning these natural phenomena, and that the editors paid due attention to. Serbs living in neighbourhood and in Diaspora were always ready to help them in their efforts to communicate the news and explain the Universe scientifically.

There was no sign of maintaining superstitions, such as e.g. astrology, which we experience today, every day, from all sides, in all media!!! What do we, or the authorities, which are obliged to educate the youth, to prevent the spreading of stupidity and the driving crazy our people???

The teaching of Astronomy with the framework of geography and physics is not enough!!!

IT IS THE LAST TIME FOR INTRODUCING ASTRONOMY AS A SEPARATE SUBJECT INTO OUR TEACHING!!! OTHERWISE WE WILL BE GUILTY OF ALL THE CONSEQENCES!!!

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