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Professor Roman Teisseyre (1929–2022) Brief Biography of the Prominent Scientist and Outstanding Man

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Roman Teisseyre was born on April 11, 1929, in Lwów (Lviv), to a family with French roots. In 1935, the family moved to Warsaw. After the outbreak of World War II on September 1, 1939, when the country fell under German occupation, Roman continues his school education in the underground classes. By the outbreak of the Warsaw Uprising (August 1, 1944), he managed to complete three grades of junior high school. At the age of 15, being a member of the underground scouting movement, the Polish Gray Scouts (Szare Szeregi), he participates in the uprising fights in the Żoliborz neighborhood, platoon 257 of the Group "Viper" ("Żmija", District II "Żywiciel" of the Home Army's Warsaw Region) taking the pseudonym "Grom". Roman's father Kazimierz and older brother Mieczysław, while fighting in the Uprising in the regions of Czerniaków and the Old Town, were wounded.

After 63 days of the Uprising fights, Kazimierz and Mieczysław are sent to a prisoner-of-war camp in Germany, while Roman and the civilian population go to the transit camp in Pruszków (Dulag 121). Eventually, the Teisseyres go to Jędrzejów and then to Cracow, already free from German occupation, where Roman, after completing the fourth grade of junior high school, obtains a minor high school diploma. The family then moves to Wrocław, upon shorter stays in the towns of Zielona Góra and Jelenia Góra. It should be noted that in these harsh times, young Roman tried to help the family by working in a mill near Cracow and as an industrial guard in Zielona Góra. He completes the first year of senior high school in Jelenia Góra and the second in Wrocław, getting the high school diploma in 1947. He begins studies at the Faculty of Mathematics, Physics, and Chemistry at the University of Wrocław.

In the summer of 1948, he works as an observer in the Magnetic Group of Prof. Henryk Orkisz's team, doing magnetic measurements in the Kłodzko region on behalf of the State Geological Institute. After moving to Warsaw in 1949, he continues his physics studies at the University of Warsaw, also working at the Geophysics Department of the State Geological

Institute, first in the magnetic group and then in the electrical resistivity group of Prof. Henryk Orkisz.

In April 1950, he becomes a research assistant under Prof. Edward Stenz at the Faculty of Geophysics, University of Warsaw, but in September 1951 he moves to the Department of Theoretical Physics as a research assistant to Prof. Leopold Infeld, a famous theoretician working on general relativity, electrodynamics, and field theory, a coworker of Albert Einstein. It would seem that being a member of such a distinguished team, Roman Teisseyre should choose a career as a theoretical physicist.

However, it was the geological/geophysical genes that prevailed in Roman's mind. His grandfather, Wawrzyniec Teisseyre, was a very well-known Polish geologist, a discoverer of the great tectonic zone, named the Teisseyre–Tornquist zone. Also his uncle Henry was a geologist, a well-known specialist in the tectonics of the Carpathians and Sudetes. So, after receiving his master's degree in 1952 on the basis of a thesis on the problem of coordinate systems and equations of motion in the general theory of relativity, Roman decides to move, in August 1953, to the newly established Department of Geophysics of the Polish Academy of Sciences (upgraded to the Institute of Geophysics PAS in 1971) taking the position of head of the seismology department. His scientific career goes on very fast.

In 1955, he becomes the Scientific Secretary of the Polish Committee of the International Geophysical Year. However, he resigns from this position to take the lead of a geophysical expedition to Vietnam. He goes there three times: in 1956, 1957, and 1958. The expeditions established two modern observatories, in Cha-Pa and Phu-Lien, operative in various fields of geophysics until today.

In 1959, at the Faculty of Mathematics and Physics of the University of Warsaw, Roman Teisseyre defends his doctoral thesis titled "The general problem of diffraction on a conducting wedge", whose supervisor was Prof. Leopold Infeld, and then awards research fellowships to Great Britain and France (1959, 1960). Since 1960, he has served as Poland's representative to the European Seismological Commission. Having received the habilitation degree in 1961, he is appointed the Deputy Director for Scientific Matters of the Department of Geophysics PAS. In 1965, he goes to Japan for a year at the International Institute of Seismology in Tokyo as a UNESCO expert. He soon obtains the academic titles of professor of physical sciences: associate in 1967, and full in 1974. As an outstanding scientist, he becomes a Corresponding Member of the Polish Academy of Sciences in 1969, and a full member in 1980.

Roman Teisseyre's wide and very long-lasting (more than 65 years) activity to the benefit of geophysics can be divided into several groups: functions performed at the Institute of Geophysics, PAS; functions in the structures of the Polish Academy of Sciences; functions in foreign scientific bodies, other organizational activities; scientific cooperation; research projects; editions of monographs; the permanent services as a teacher, head and scientific supervisor.

Functions at the Institute of Geophysics, PAS:

- organized the Department of Seismology, the Department of Seismology and Physics of the Earth's Interior, and then the Department of Dynamics of the Earth's Interior – was the head of departments for 50 years (1954–2004);
- served as a Deputy Director of the Institute of Geophysics, PAS, in 1960–1970 and 1973–1992;
- was the Director of the Institute of Geophysics, PAS, from 1970 to 1972 (in total, he held directorial positions for 32 years);
- served as the Editor-in-Chief of the journal *Acta Geophysica Polonica* for 12 years (1994–2005);

- initiated and was a long-time editor of the journal *Publications of the Institute of Geophysics, Polish Academy of Sciences*.

Functions in structures of the Polish Academy of Sciences:

- was a member of the Presidium of the Polish Academy of Sciences in 1973–1981;
- was a Deputy Secretary of Division III of Mathematical, Physical, Chemical, and Geological-Geographical Sciences of the Polish Academy of Sciences from 1973 to 1976;
- served as a Secretary of Division VII of Earth and Mining Sciences of the Polish Academy of Sciences in 1980–1983;
- was Chairman of the Committee on Geophysics of the Polish Academy of Sciences in two terms (1976–1980, 1988–1992);

Functions in foreign scientific bodies:

- became a member of the Finnish Academy of Science and Literature in 1975;
- served as a Vice President in 1972–1976 and then, in 1976–1978, as the President of the European Seismological Commission;
- was a member of the Executive Committee of the International Association of Seismology and Physics of the Earth's Interior (1970–1975);
- was a UNESCO expert at the International Institute of Seismology and Earthquake Engineering, Tokyo (1965–1966);
- in addition, was a member of the editorial committees of foreign geophysical journals: *Gerlands Beitrage*, *Bollettino di Geofisica Teorica e Applicata*, and *Pure and Applied Geophysics*.

Other organizational activities; scientific cooperation:

- in the framework of the International Geophysical Year (1957–1960), became head of the geophysical expedition to Vietnam, where two comprehensive Geophysical Observatories, in Phu-Lien and Cha-Pa, were established.
- by invitation of leading scientific centers, was a Visiting Professor: at the International School of Advanced Studies of the Theoretical Physics Center in Trieste, Italy, 1979–1980; at the University of Strasbourg, France, 1984; and at Hokkaido University in Sapporo, Japan, 1999.
- participated in several polar scientific expeditions to Spitsbergen (1962, 1974, 2000).
- carried out close cooperation with many scientific institutions and scientists abroad: in Japan (Earthquake Research Institute in Tokyo, University of Hokkaido in Sapporo, Institute of Seismology and Volcanology, Tohoku University in Sendai) with Keichi Kasahara, Setumi Miyamura, Syun'ichiro Omote, Teruo Yamashita, Hiroyuki Nagahama; in Finland (University of Helsinki, Institute of Seismology) with Eijo Vesanen; in Italy (Istituto Nationale di Geofisica e Vulcanologia, Rome, Universita degli Studi, Trieste) with Antonio Meloni, Marco Marchetti, Paolo Palangio, Valerio de Rubeis; and in Greece (University of Athens, Physics Department) with Panayiotis Varotsos.

Research

Professor Roman Teisseyre was a prominent member of Polish scientific life. His original scientific output is impressive, comprising almost 400 (390) published papers. He was mainly a theoretician dealing with physics of the Earth's interior. Most of his works are related to

seismology, geodynamics, thermodynamics of the process of rock deformation and fractioning, and the electromagnetic field, but his output is very comprehensive and also includes works initiating new directions of research or summarizing the state of current geophysical knowledge on some problems.

Making an attempt to enlist the areas in which Roman Teisseyre made his most important contributions, one should enumerate the following:

- was one of the world pioneers in developing the dislocation theory of earthquakes,
- introduced the micromorphic description of the medium to seismology,
- advanced the studies on the convection and dynamics of the Earth's mantle,
- established the fundamentals of the theory and interpretation of phenomena occurring prior to earthquakes and mining tremors,
- initiated the study of tremors associated with glacier motion,
- applied the non-Riemannian geometry to the description of deformations, geodynamic fields, and potential fields of the Earth,
- developed the fundamentals of thermodynamics of linear defects and earthquake-related processes,
- studied and interpreted telluric precursors of earthquakes,
- derived the generalized equations of motion and constitutive relations for asymmetric fields in continuous media, as applied to seismology,
- formulated the generalized model of a continuous medium with defects and nucleation of rotation-type deformation.

Edition of monographs:

Among Roman Teisseyre's very important scientific achievements is the editing and co-authorship of a number of multi-volume, unique monographs on the physics and evolution of the Earth's interior. These books synthesize the huge scope of scientific problems of the Earth's interior physics and constitute a very important contribution to world geophysics. The books were issued by leading publishers (Academic Press, Elsevier, PWN), and, since 2010, within the new series, GeoPlanet Book Series, according to the agreement with Springer (presently Springer Nature Switzerland):

- The first, two-volume monograph, (*Physics and Evolution of the Earth's Interior*, 1983, PWN) was published in Polish.
- The flagship monograph in 6 volumes, covering the entire theory of the Earth's interior (*Physics and Evolution of the Earth's Interior*, Elsevier-PWN) was published throughout the years 1984–1993.
- The crowning work of the dislocation theory of seismic sources (*Theory of Earthquake Premonitory and Fracture Processes*, PWN) was published in 1995.
- The earthquake thermodynamics was the topic of the monograph issued in 2001 (*Earthquake Thermodynamics and Phase Transformations in the Earth's Interior*, 2001, Academic Press).

Alongside, the theory of asymmetric medium, in its various aspects, has been discussed as many as three monographs (*Earthquake Source Asymmetry, Structural Media and Rotation Effects*, 2006, Springer-Verlag; *Physics of Asymmetric Continuum: Extreme and Fracture Processes*, 2008, Springer-Verlag; *Asymmetric Continuum: Extreme Processes in Solids and Fluids*, 2014, GeoPlanet Book Series, Springer-Verlag).

Problems of synchronization of various geophysical processes are presented in the 2010 monograph: *Synchronization and Triggering: From Fracture to Earthquake Processes*, 2010, GeoPlanet Book Series, Springer-Verlag.

It should be emphasized that Prof. Roman Teisseyre's work combines theoretical elements with research methods and their interpretation. He directly participated in the organization of seismic research both in our country, especially in mining basins, and abroad, in the study of electromagnetic precursors of earthquakes and rotational effects. A number of works have a clear utilitarian and practical aspect.

In recognition of his achievements, Professor Roman Teisseyre received a number of prestigious honors and awards, including: Officer's Cross (1961) and Commander's Cross (1969) of the Order of Polonia Restituta; Warsaw Uprising Cross (1986); as well as the Awards of Division VII of the Polish Academy of Sciences, Secretary of the Polish Academy of Sciences; Chairman of the Council of Ministers (1995). He holds an honorary doctorate from the AGH University of Science and Technology in Cracow (2004).

The list of functions and important positions that Prof. Roman Teisseyre held, as well as a summary of scientific achievements, does not fill out the entire profile of the Professor as a scientist. After all, one of the most important roles of a scientist is that of a teacher, boss, and scientific supervisor.

At this point I will use my personal recollection. Being a young assistant professor, I used to come to Prof. Roman Teisseyre's office from time to time to present him my latest ideas and the results of the work I had done. I always entered with some anxiety, not being quite sure of the soundness of my ideas. The Professor patiently listened to my not-so-long speech, then invariably stated – "very well done, Zbyszek, very well done, keep it up". And I walked out of that office as if on wings, full of good motivation and energy for further scientific work.

This anecdote, although short, still contains a large amount of information of what was Roman Teisseyre's attitude toward the education of young scientists. It was based on such principles as:

- freedom to search for one's own topic, the most interesting for a young adept in geophysics,
- independence in scientific work, which forces self-education,
- good motivation through encouragement and acknowledgment (avoiding discouraging, demobilizing criticism),
- confidence and faith that the young person will strive to act effectively on his own.

In terms of educational activity, of great importance was also the supervision of doctoral theses and consultations over habilitation treatises. He promoted a group of 20 PhDs, and those people are now world-renowned scientists in the field of seismology and the physics of the Earth's interior. Professor Roman Teisseyre gathered around him a large group of collaborators, professors, and young academicians who, under his leadership, have been intensely developing the theory and conducting research related to seismology: the theory and prediction of earthquakes. He was the founder of a nationally and internationally recognized scientific school (the Polish school of theoretical geophysics). He developed the dislocation theory of earthquakes and new original methods of studying mining and glacial tremors and the mechanisms of those tremors. In his diverse scientific works, he used the whole available apparatus of physics and mathematics, and combined the theory with the methods and interpretation of geophysical research, obtaining outstanding, worldwide renowned and applicable results.

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