Anniversaries

Great Kanto Earthquake 100 years ago

OMORI FUSAKICHI: WITNESS AT THE 2ND PAN-PACIFIC SCIENCE CONGRESS OF THE GREAT KANTO EARTHQUAKE IN 1923

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CRUSTAL MOVEMENTS MERGED: THE GREAT KANTO EARTHQUAKE IN 1923

A large earthquake struck the southern Kanto area of Japan at noon, 1 September 1923. Tokyo city was seriously damaged by not only tremors but also enormous fires. More than one hundred and five thousand lives were lost. The needle of the seismometer at the Imperial University of Tokyo was overthrown. But the network of seismometers indicated the epicentre as being located at Sagami Bay and a 7.9 magnitude earthquake. Crustal movement with active faults in Kanagawa and Chiba prefectures was evident (Figure 1). However, the 'earthquake master' Omori Fusakichi was absent at that time from Japan. He was in Australia.

Figure 1. Collapsed rubble of Nojima-zaki lighthouse on uplifted strata in southern Chiba Prefecture
(Source: *Awa shinsai shi* (Records of Earthquake Disaster in Awa Province, 1926))
https://tsunami-dl.jp/docimg/146/146_021.jpg/medium

Omori Fusakichi (28 October 1868 – 8 November 1923) was born in Fukui Prefecture and was a renowned seismologist worldwide, however, not so much so in Japan. He studied physics and geosciences at the Imperial University under the guidance of British scientists especially that of John Milne (1850–1913), the mining geologist who worked in Japan from 1876 to 1895, and who later went on to become an important seismologist. When Omori was

a student at the School of Science of the university, the Mino-Owari earthquake occurred on 28 October 1891. This was a pivotal event for Japanese science and technology for the establishment of an initiative to promote its effectiveness in mitigation of natural disasters and lead to the foundation of the Japanese Imperial Earthquake Investigation Committee (1892–1925).

After the death of professor Sekiya Seikei (also known as Kiyokage, 1855–1896), who held the first seismology chair at the university, Omori succeeded him in this position and concentrated his efforts in the development of this young scientific sector (Clancey 2006, Kim 2007, Ueyama 2018).

Among Omori's contributions to seismology in the early years of his career was his formula on the decreasing frequency of the aftershock rate of earthquakes by approximately the reciprocal of time after the main shock (1894), now known as Omori's Law. In 1899, Omori invented a horizontal recording pendulum, which would be widely used under the name of the Bosch-Omori Seismometer with modifications by a German production company.

Omori's activities went beyond the national level to the international scene such as his commitment to overseas seismic disasters: Formosa (1906), San Francisco (1906), Messina (1908), and so forth. In fact, many monitoring stations from a variety of countries and regions sent their data for earthquakes to Omori's laboratory, which functioned as a sort of 'centre of calculation' of world seismology. That was, indeed, Omori's age of seismology in Japan between 1891 and 1923. (Cf. Clancey 2006, Kim 2007; specifically in Italy, see Valensise 2019.)

SCIENCE MOVEMENTS MERGED: SECOND PAN-PACIFIC SCIENCE CONGRESS

In the meantime, the Pan-Pacific Science Congress (PPSC, later PSC), was first held in Hawaii in 1920; Australia in 1923; and Japan in 1926. There had emerged a "Pacific sense" or "Pacific consciousness" based on an environmental unit for scientific investigations contrasted to the Atlantic world (MacLeod and Rehbock 2000). Omori was invited to be one of the six members of the "committee on future conferences" established after the first congress in Honolulu. The second Pan-Pacific Science Congress was held in Australia, Melbourne (13-22 August) and Sydney (23 August-3 September), in 1923. Many Japanese scientists attended as the next congress would be held in Japan. There is a photo from an archive of Kyoto University which shows three geoscientists at the Melbourne meeting (Figure 2): Omori Fusakichi (1868–1923), Shinjo Shinzo (1873–1938), and Ogura Shinkichi (1884–1936).

Figure 2. Omori (center) and his colleagues, Shinjo (right), and Ogura in Melbourne, August 1923
(Source: Shinjo Bunko, Dept. of Astronomy, Kyoto University)

Omori was already quite famous for his seismological contributions and his commitment to organize the next congress; Shinjo was a cosmophysicist from the Kyoto Imperial University; and Ogura belonged to the Hydrographic Office of the Imperial Japanese Navy. Omori may not have been in good health; he had proposed presentations but only the following titles: "Pulsatory oscillations," "Nature of the destructive earthquake motion," "Engineering and architectural construction in countries of high seismicity," and "Earthquake forecasting."

Additionally, Shinjo's titles were listed as: "Comparative study of certain terrestrial and celestial features," in which application of Wegener's hypothesis to other planets was discussed, and "On gravity measurements in Japan," including Matsuyama Motonori (1884–1958)'s contributions in this field. Ogura's articles were presented as "Preliminary note on the tides in the western part of the northern Pacific Ocean," and "On the prediction of tidal currents."

The congress in Australia was successful. It was important because the congress gave rise to a sustainable organization (Pacific Science Association) for international and interdisciplinary academic meetings to support "Pacific science". The movement in science of "the "pan-Pacific" gathered momentum and achieved recognition" (MacLeod and Rehbock 2000: 223).

Unfortunately, however, Omori's age of seismology had then been declining under the critiques from both the camps of the physicists and of the seismologists. When he visited the Jesuit seismic station in Riverview Observatory in Sydney on 1 September 1923, which Edward F. Pigot SJ (1858–1929) directed, the needle began to move on the seismometer. He was shocked recognizing the possibility that a relatively large earthquake was happening at that moment in eastern Japan (Branagan 2009).

After the congress Omori returned to Japan on board the ship *Ten'yo-maru* arriving at Yokohama on 4 October. Tragically, the metropolis including his laboratory at the university was destroyed during the Great Kanto earthquake. His illness had gotten worse during the travel and he was taken to the university hospital shortly after his arrival. However, he did not recover and died at age 55 on 8 November 1923.

Another episode related to the theoretical physicist and poet Ishiwara Jun (1881–1947) may also be added here. Ishiwara was a friend and co-researcher of Albert Einstein (1879–1955) and experienced the Great Kanto earthquake in the Awa Province of the Boso Peninsula, located in the Chiba Prefecture. Ishiwara accompanied Einstein during the latter's stay in Japan in 1922, which raised a 'sensation' among the Japanese people and media. Ishiwara had an inspiration saying that these two extraordinary events (Einstein and Earthquake) made us recognize the importance of science for our life in his 1924 article (Yamada 2019).

The third Pan-Pacific Science Congress held in Japan in 1926 was successful and significant in the recovery from the disaster. Japanese scientists not only learned much from the foreign visitors but also had the confidence to manage the congress and science by themselves. Evidently, science and its popularization took roots in Japan through these procedures.

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Further Reading

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