

Planetariums in the world

Jean-Michel Faidit

Planétarium de Montpellier,
BP 1088, 34007 Montpellier, France
email: faiditmontpellier@yahoo.fr

Abstract. Modern planetaria achieved in 1923 a synthesis between planetaries and stellariums. In 2009, there are nearly 3000 planetariums all over the world, mainly in developed countries. We present here a brief historical and statistical analysis of this development.

Keywords. Planetarium, science education, history

1. Historical introduction

Since Antiquity, humans try to understand the movement of the stars and to reproduce them using devices which allow them to analyse the observed phenomena. Astronomical astrolabes, quadrants and globes are examples of these attempts. Using mechanisms from the clock industry, it is possible nowadays to reproduce the revolution of planets around the Sun at everyone's home.

The large planet gears were developed in the 18th century, and for example the orrery built by Eise Eisinga in 1774, making good use of the ceiling of his room in his house at Franeker (Netherlands), is still working †. In parallel, the representation of stars is conceived initially with spheres, and Coronelli is perhaps the best European expert at the end of the 17th century. Then one imagines a representation of the celestial sphere as seen from the interior. Spheres were built by Dr. Long in Cambridge in 1758, which were inclined as the axis of the world and put in rotation. A larger sized example is the machine built by Atwood in Chicago in 1912, with both mechanical and electrical gears. People who went inside this *Stellarium* could observe the constellations and the diurnal movement.

The architect Boullée conceived a Cenotaph for Newton (1784, Fig. 1), a project with an immense spangled hollow sphere, anticipating the emotional dimension of the planetariums and their spherical immersive effects. Other projects, such as by Lequeu, developed at the end of 18th century the concept of rooms with planetariums made by starry vaults with holes. These ideas were largely forgotten until the Zeiss project in the 1910s.

Delayed by World War I, it is only in 1923 that an instrument was successfully made with a synthesis of these concepts: to simultaneously project under a dome the Sun, Moon, stars, and planets and also their apparent movements.

The first modern planetarium, built for the *Technic Museum* of Munich, was led by the engineer Bauersfeld and the Zeiss Company in Iena. It caused a massive enthusiasm and moved massive crowds. This induced many cities to build planetaria : Berlin in 1925, Moscow in 1928, Hamburg in 1930, ... so that the majority of the German big cities were equipped with planetaria of large diameters before World War II.

In the United States, the first planetarium was built in Chicago in 1930, the initiative of the billionaire Max Adler, with an architecture which reminds Boullée's cenotaph project. It is built with a Museum, and which today contains one of the most important

† see <http://www.planetarium-friesland.nl/engels.html>

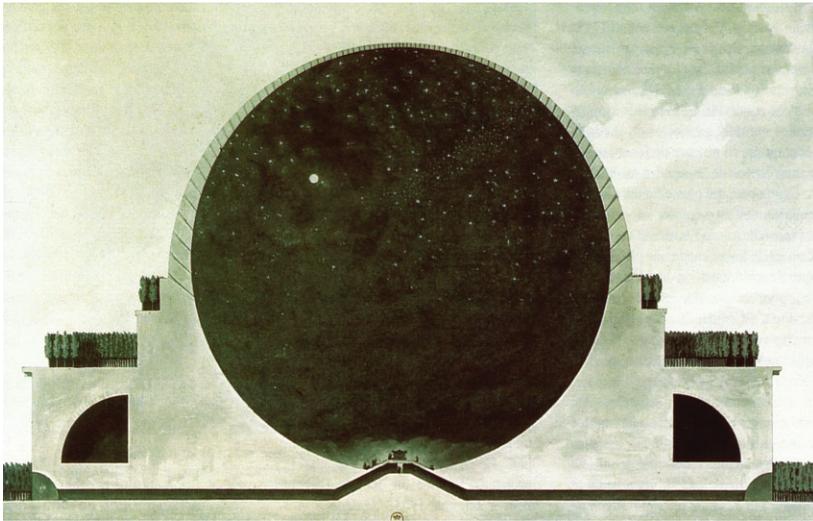


Figure 1. The Boullée project for a cenotaph for Newton, with night effect (1784).

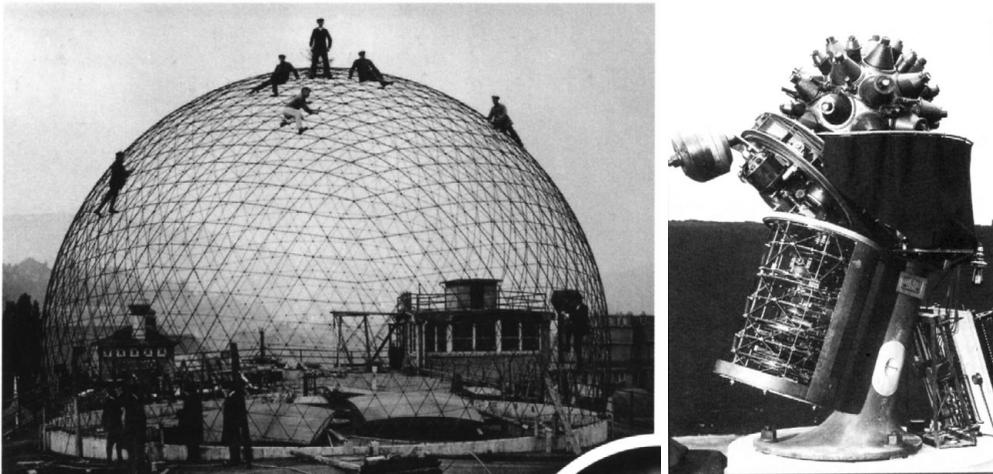


Figure 2. The first dome and planetarium projector by Zeiss (1923).

collections of astronomical instruments and old books. It was to be followed by the Fels planetarium in Philadelphia in 1933, Hayden in New York in 1934 and Griffith in Los Angeles in 1935. The first American planetaria are associated with sponsors, the equipment being very costly, approximately USD 150,000 of the time. By any standards, the fifth Planetarium built, opened in November 1937 at the Natural History Museum of Springfield (Massachusetts) showed originality. Built by a technician of the Museum, Frank Korkosz, it introduced a colouring of the main stars and red and blue projectors to simulate the dawning Sun and twilight. Special colour effects made their appearance. With his young brother, Korkosz developed panoramas giving a local touch and foresaw a concept of more compact planetaria that would eventually be developed by the brilliant Armand Spitz after WWII.

In the same year, 1937, the first planetarium is installed in Paris during the six month-long *Exposition Universelle*. Built in a especially-designed building, the projector will be reinstalled in 1952 at the *Palais de la découverte*. The Commonwealth Countries were



Figure 3. The first success: queuing up on the roof of the Zeiss company (1923).

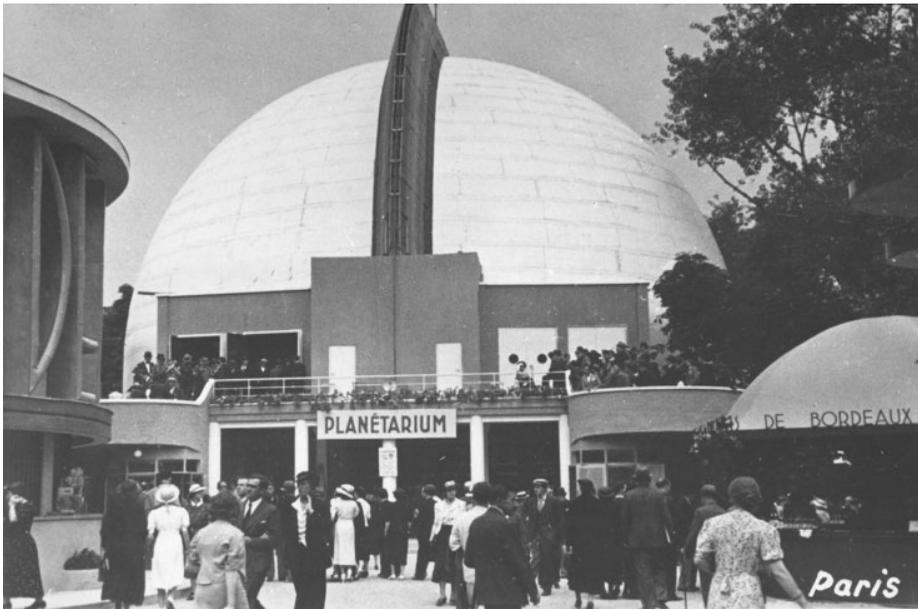


Figure 4. The Paris planetarium at the *Exposition Universelle* of 1937.

slower in getting equipped. After a project which was not completed due to WWII, the London Planetarium is installed in 1958, while the first Canadian planetarium is built in 1960 in Edmonton, Alberta, and the first Australian planetarium in 1965.

Considering all countries, between 1923 and 1939, nearly 30 planetaria were opened. Among them, about twenty were in Europe, mostly in Germany. After WWII, the rate accelerates to culminate with the opening of the hundredth planetarium during the 1969 *Apollo* year. Since then, about fifty equipments are installed every year.

2. Global statistics

We examine first the world evolution of planetaria, then we do a comparative analysis on the evolution of dimensions in Europe, USA and Japan since 1950, leading to reflexions on the data base.

The International Planetarium Society Directory gives a good representative database for large and medium planetaria. The world park of planetaria rounds 3000, of which a

third are small Planetaria (less than 6 m), and the medium-sized planetaria (6–14 m) represent approximately half of the total, while the very large ones (more than 15 m) account for 10%. Many small school planetaria are not taken into account. The distribution of planetaria on the world follows the economic differences between countries. Two countries however, USA and Japan, have developed planetariums more than anywhere else and China takes now its 4th place in the ranking.

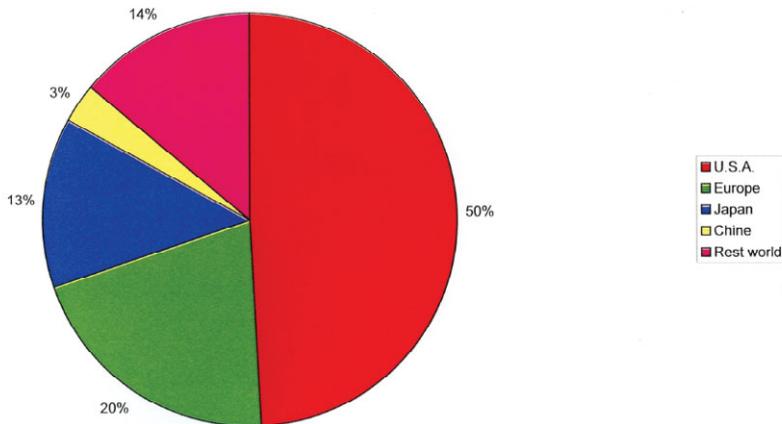


Figure 5. World-wide distribution of planetaria in 2009.

A more reliable database with a more complete coverage of small planetaria would give us the possibility to show our conjecture that, after a few very large prestigious planetariums are built in a country, and a wave of medium equipments when economic and social conditions are favourable, a second wave of larger planetariums appears a few years later. This conjecture comes from our comparative analysis of planetaria evolution between Europe, USA and Japan during the 20th century.

The USA diagram shows an important development in the period 1965–1970, corresponding to the exploration of the Moon and the great expansion of science education. The Japan diagram shows a later expansion growing in the 1970s. In Europe, the diagram shows an even later expansion, during the 1980s.

In the United States, during the 1960s, planetaria approach their greater phase of development. After about thirty years, their number comes close to 200 in 1962. But ten years later, one counts 700 of them, of which a hundred are being able to accommodate more than 100 spectators. They still represent in 2009 about half of the world park. There are fewer new equipments, but they are characterised by a strong renewal rate of their material: thus, among the 40 larger American Planetariums, a dozen were built during the last decade, and three quarters have projectors younger than 10 years old.

In Asia, Japan has a similar increase with a shift in ten years, passing from 4 in 1960 to 50 in 1970 and more than 400 now. It remains the best equipped country, with the strongest concentration of large diameters (88 larger than 16 m, more than twice the United States!) and the record of the biggest screen (30 m in diameter). But, it is no longer the “Eldorado” worldwide market as a decade ago, since now China has doubled its park. Korea and Taiwan have triplicated and made their entry among the ten countries most equipped.

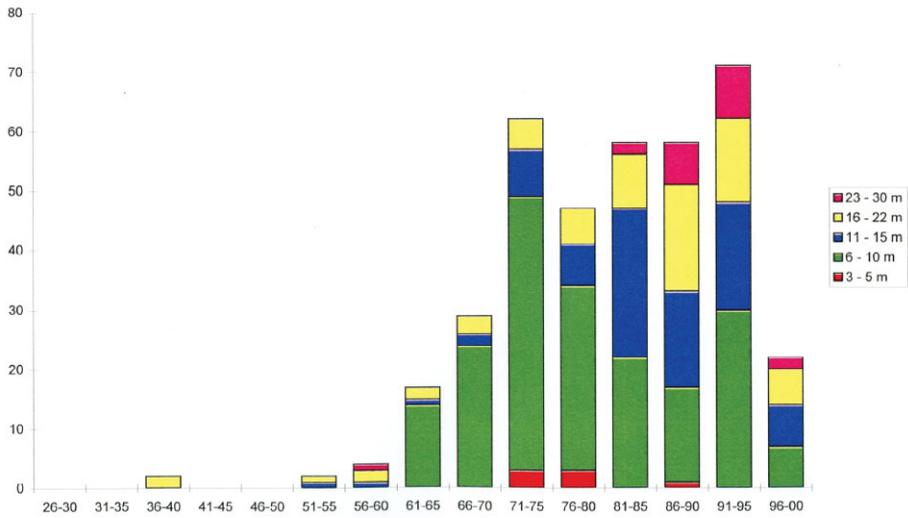


Figure 6. Distribution of planetaria in Japan (20th century).

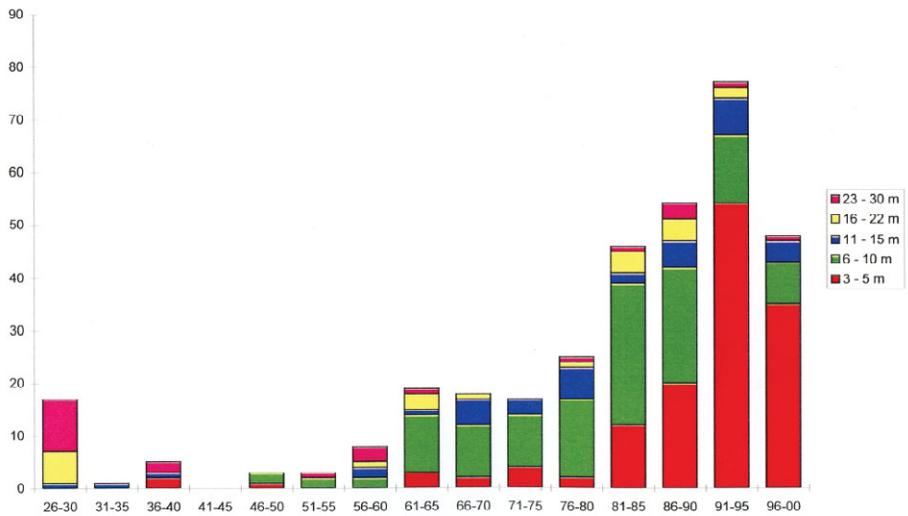


Figure 7. Distribution of planetaria in Europe (20th century).

Turning to the distribution by countries within Europe, we note the dominant position of Germany, which can be accounted for two main reasons : an old industrial tradition in the field of planetaria, and a competition which was more important than in other countries between the East and the West political blocks at the time of cold war, planetaria being a symbolic matter for technological and educational advances.

3. Evolution of technology

As the traditional projectors opto-mechanics evolved to numerical simulators, it became possible to present variable skies, and other areas of space. In addition to the historical German firm Zeiss and the American firm Spitz, new manufacturers appear. In

Japan, since the 1960s, Goto and Minolta compete for the leadership, while the French firm RS Automation makes its entry in 1988. In the USA, Evans and Sutherland develop the first digital planetarium, *Digistar*, installed in Richmond in 1983, while *Sky Skan* develops a full video simulation. Nearly 20 manufacturers in ten countries share the worldwide market, both for the projectors as well as for small inflatable domes.



Figure 8. Albert Pla's inflatable dome for portable planetaria.

Given proliferation of images, the spectacular component takes a more important rôle. The 1980s see a race with the number of stars for the projectors, inversely proportional to the growth of luminous pollution. The old starry sky is superseded by cartoon films. The teaching component is often sacrificed to the ludic aspect. Not only the still images of the slides are replaced by all sky videos, but many special effects make it possible to give to the public the impression to be immersed in a virtual horse-gear.

4. The planetarium community

Conferences on planetaria and magazines grow exponentially. The first meetings of persons in charge of American Planetaria are held in the 1950s. In May 1959, the first International Conference is organised at the Hayden planetarium. The second one (first in Europe) follows in June 1966 in Bochum and Munich, and a third in July 1969 in Vienna.

In October 1970, 300 planetarians of the USA and Canada gathered at the Abrams Planetarium (University of Michigan), and created the International Society of Planetariums Educators (ISPE), which became the International Planetarium Society (IPS) a few years later. This conference also marks the creation of *The Planetarian* magazine.

In many countries, national associations of planetaria are also founded. IPS counts thus more than one score of regional groups. In addition to conferences, there are lively debates on the many issues that are faced today by planetaria: shows and pedagogy, circular or inclined rooms, technology of equipments, data processing, management, teaching, outreach, complementarity of programmes with small portable planetaria, etc.



Figure 9. (Top) The first european meeting in Bochum (1966). (Bottom) The International Planetarium Society meeting in Greenwich (1998).

Planetaria are in mutation and we can imagine that with the development of software and large-scale luminous curved screens, planetaria and video projectors will soon go to the museum ... to be replaced perhaps by full 360° spheres where the public can move around in space with absolutely fantastic sensations. WOW!

References

- Hagar, Ch.F. 1980, *Planetarium, Windows to the Universe* (Oberkochen: Carl Zeiss)
 Faidit, J.-M. 1998, *Planétariums*, 4, 50
 Faidit, J.-M. 2003, *Planetarian*, 32, 6
 Faidit, J.-M. 2005, *Planetarian*, 34, 23
 Faidit, J.-M. 2006, *Planetarian*, 35, 14