

H. Mayer

Augenkllinik der Medizinischen
Hochschule Hannover, BRD

Theodor Scheimpflug

His Personality and Lifework

Key Words

Biography
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Abstract

Today, Scheimpflug's principle is used for technical photography, even in slitlamp photography of the anterior eye segment. Little is known about the young Austrian marine captain, who sacrificed his military career to proceed in the uncertain future of aerial photogrammetry. His adolescence, a character study during military service and his obsession to use the newly developed photographic technique for land surveying, reveal a highly intelligent, sometimes difficult and always unwavering personality. Even though he died at an early age, he succeeded in developing the Scheimpflug principle for practical use.

On April 1, 1985, the Scheimpflug Club was founded in Bonn by a group of scientists engaged in cataract research. The name was given in honor of the contribution of Scheimpflug's principle in photography, which was applied to the slitlamp photography of lens transparency changes. Up to this date, Scheimpflug was unknown in ophthalmology. Today, Scheimpflug's name is inseparable from cataract research all over the world.

Who was Scheimpflug?

Theodor Scheimpflug was born October 7, 1865, in Vienna.

His father Dr. Josef Scheimpflug was the head of a wealthy family. He was a civil servant of high standing and the director of a bank in Vienna. His family was ennobled on the maternal side by the Austrian Emperor follow-

ing their achievements in government administration [1, 2].

Theodor had two brothers, Karl and Max, and two sisters, Martha and Marianne.

After 4 years of high school he joined the marines and became an 18-year-old naval cadet on July 1, 1883 (fig. 1) [1]. In former days, Austria had access to the Mediterranean Sea and maintained an adequate navy. According to the assessments of his military superiors, he was a well-qualified officer, yet his personality was difficult and contradictory. He was very intelligent and ambitious and had many interests. On the one hand, he mastered five languages, was proficient in fencing and diving, popular in society, but on the other hand he was as vain as a peacock and easily offended. But even after 1 year as a marine he was not pro-

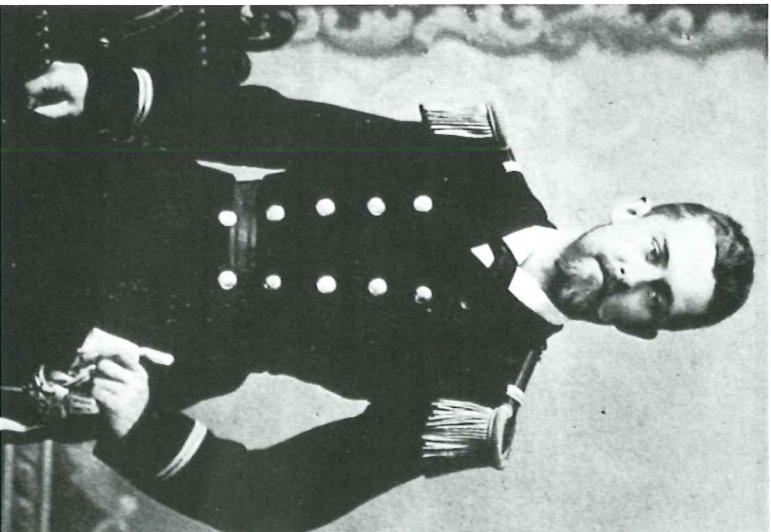


Fig. 1. Theodor Scheimpflug, May 1, 1888, in Pola, when he became a petty officer.



Fig. 2. Captain Scheimpflug during his studies in Vienna in 1895.

noted to a leading position [3]. His military career completely changed direction at this point when his studies in geometry under Prof. E. Mayer aroused his interest in photogrammetry [2]. The latter became the main occupation for the rest of his life.

The practical use of photogrammetry required knowledge of photographic procedures which were underdeveloped at the end of the last century. The daguerrotype became available to the general public on July 30, 1839, by the French Government. The improvement of this technique was based on the development of fast objectives by Hugo A. Steinheil in 1866 and the invention of gelatine plates by Richard L. Maddox in 1871. Photogrammetry was used

to photograph buildings and monuments, and eventually landscapes on the basis of this technology [4].

Since 1883, Scheimpflug considered the possibility of recording landscapes from aerial photographs [5]. He focused on three fields of investigations: (1) double projection; (2) transformation or rectification of distorted photographs, and (3) aerial land surveying.

The combination of these topics resulted in an accurate-scale photo map, which was Scheimpflug's main goal. The background doing so is easily defined. The poor quality of nautical charts annoyed him. Between 1887 and 1895 he made several cruises from his base in the Hydrographic Institute at Pola. At the

end of this period he achieved the master's certificate as captain. He was heart and soul a marine spending almost 6 years on famous battleships in the heyday of the Austrian Navy, for example the Novara, Habsburg, Schwarzenberg and the Emperor Franz Josef I [2].

In 1895, he was granted leave for an academic year at the Technical University of Vienna, where he studied mechanical engineering, photochemistry, mathematics, geology, optics and astronomy. He completed his studies with the grade 'very good' and 'excellent' [2]. One year later, he got his first patents, e.g. for a rangefinder with variable focal length for military purposes [5].

The academic year was too short to complete all his intentions. He therefore requested a transfer to the military geographic institute in Vienna and was allowed to continue his studies. In 1896, he presented his ideas about transformation of aerial photographs into accurate maps by an optico-mechanical method at the Academy of Sciences in Vienna. One year later, he for the first time held a lecture on his investigations to an interested audience in Braunschweig [6]. His presentation was followed by enthusiastic appraisal [2]. After being promoted to captain he was transferred to the army. In spite of this great disappointment, he diverted his investigations from sea maps to landscapes (fig. 2).

He started to construct a special camera, the first Scheimpflug camera, which he called 'The eye of a fly' or the panorama apparatus (fig. 3) [1]. The device included 8 separate cameras, 7 of which were fixed at 45° angles to a central camera. The film plane of the cameras was perpendicular to the optical axis of the objective and not yet tilted. He attached the camera to the basket of a hydrogen-filled balloon (fig. 4) [4]. Because of the hydrogen, balloon flights were very expensive in those days and he made painfully slow progress. The flights were weather-dependent and the motion of the balloon was

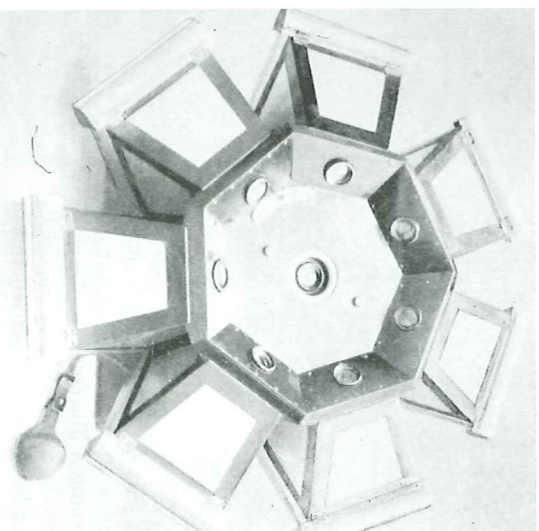


Fig. 3. The panorama apparatus ('The eye of a fly') seen from below. It is composed of heptagonally attached cameras which were arranged around an eighth central camera.

not so controllable to allow repeat photographs. The balloon was so fast that great distances between individual shots occurred and consecutive panoramic photographs did not overlap. During one flight, Scheimpflug could only take one set of 20 photographs [2].

He therefore changed his strategy and constructed hang gliders which were suitable for transportation of the heavy Scheimpflug camera [2]. The shutter was released by a radio signal. Scheimpflug was obsessed with the realisation of his idea. He invested most of his money to buy the photo equipment and to manufacture the different gliders. To save time and money he ran his flights at the outskirts of Vienna near the Donau. One day in 1899, a huge glider with a complete camera system was destroyed in a thunderstorm. The complete device was valued at more than 3,000 Gulden. This is equivalent today to about 30,000 US dollars [4]. The situation was very delicate

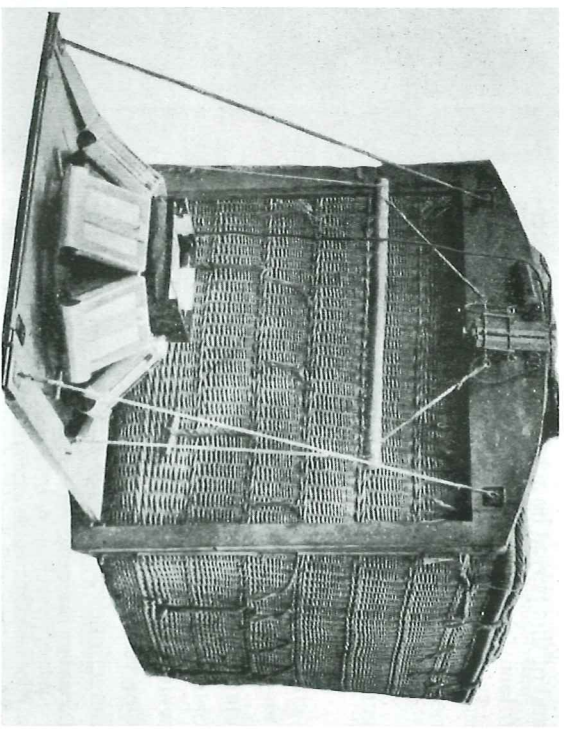


Fig. 4. The panorama apparatus is attached to the basket of a hydrogen-filled balloon. The photo shows a simple but ingenious mechanism for proper adjustment to achieve horizontal levelling.



Fig. 5. Scheimpflug's house in Vienna, Sternwartweg 39. The window on the right on the first floor belonged to his office.

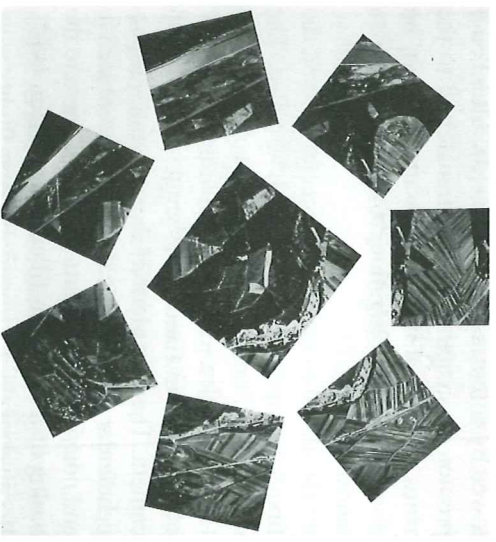


Fig. 6. Seven original photographs taken with the 'eye of a fly' camera surround the untitled central one. All photographs have a rectangular shape.

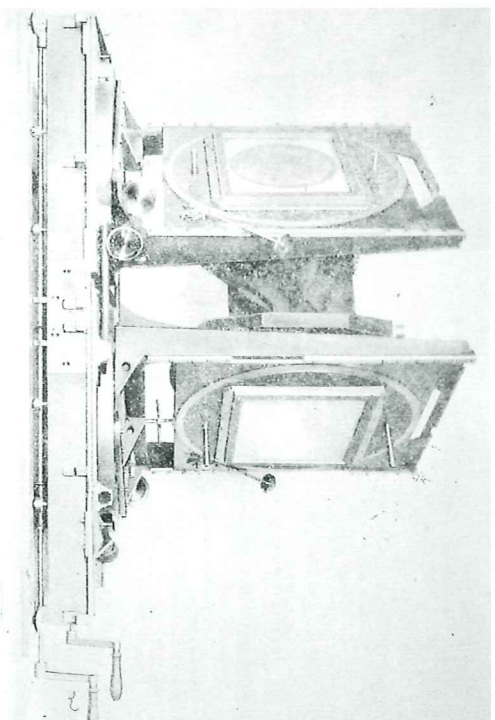


Fig. 7. Late stage of development of the photoperspectograph, the so-called universal transformer by Scheimpflug and Kammerer [1]. Scheimpflug's principle is easily seen by the movable mountings, which take the original aerial photograph on the one hand and the corrected copy on the other. The reproducing lens is covered by the black bellows between.

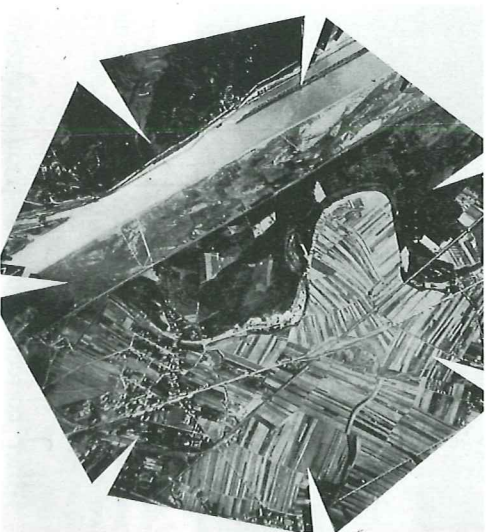


Fig. 8. Photo assembled from figure 6 after transformation by the photoperspectograph.

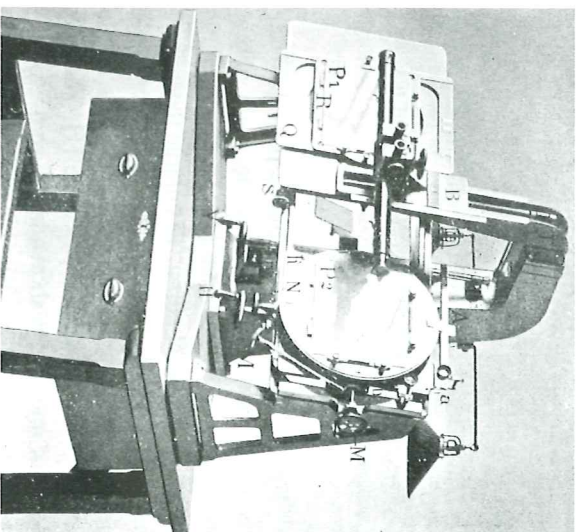


Fig. 9. Stereo comparator by Pulfrich, used to indicate contour readings out of two corresponding Scheimpflug photographs.

because he had borrowed the money for the equipment from his brothers and sisters [7].

Scheimpflug became bankrupt. He was saved financially by the death of his father, who left him an abundant inheritance. He bought a house in Vienna's 18th district at Sternwarteweg 39 (fig. 5) and ordered new camera equipment and turned the basement of his house into a workshop for producing new

gliders [7]. In front of this house a wall sculpture between the adjacent windows was completed in 1912 in honor of this man. On the occasion of the unveiling, Scheimpflug's life and work was summarized for the first time in a commemorative publication [1].



Fig. 10. Actual photo map with contour readings.

His 'eye of the fly' camera permitted the recording of an extremely wide-angle photographic view by accurate photographs suitable for geometric evaluation. To enlarge the area of interest Scheimpflug decided for a multiple objective camera system rather than a single camera with a fish-eye objective [1]. The outcome of one shot is shown in figure 6.

To transform his tilted aerial photos into maps on a horizontal level, Scheimpflug constructed the photoperspectrograph (fig. 7) [8]. To apply this device, each point of the terrain had to be recorded on two different aerial photographs. This meant that two adjoining photographs had to overlap by more than 50%. Scheimpflug recommended by experience an almost 80% overlapping of two photographs. To standardize the correction power, he used photographs of fixed stars taken by night with the panorama apparatus upside-down.



Fig. 11. Theodor Scheimpflug's grave. The stone base indicates his dates and his significance as the inventor of aerial photogrammetry.

After correction by the photoperspectrograph, 8 photographs of one shot were fit together to one single picture while the overlapping parts were cut off. The untitled photographs now had a trapeziform shape (fig. 8). Although the picture was very nice Scheimpflug was not satisfied with the results. Using a stereo-comparator, which was constructed by Pulfrich at Jena (fig. 9) [1, 2], he was able to indicate contour readings out of two corresponding Scheimpflug photos [2]. At this point he came very close to the photo map used today (fig. 10).

Camera flights, the production of photos and the evaluation of the photographs by the

photoperspectograph took all his time. In 1900, he began to suffer from serious late symptoms of a tertiary Schaudinn's disease, which he had acquired on one of his cruises [7]. His sickness was, however, an opportunity to use more and more of his time for research and development. To reduce his military tasks he retired at age 39 in 1904 [3].

To gain some fruits of his work he demonstrated his photogrammetric technique in London and Milan in 1906, in Frankfurt in 1909 and in Brussels in 1911 [9]. One the one hand, he established contact to the aircraft industry to

stay close to the fast development of steerable aircraft like Zeppelins, on the other hand he established personal contact with members of governments interested in aerial photogrammetry of rough landscapes. The government of Brazil of all countries engaged him to perform land surveying of the Amazon Jungle and a first journey was arranged for the summer of 1911 [7]. His death on August 22, 1911, intervened during treatment in his brother's sanatorium [2]. Theodor Scheimpflug is buried in a seldom-visited lovely graveyard in Hinterbrühl near Vienna (fig. 11).

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