Weingarten, Julius | Encyclopedia.com

(*b*. Berlin, Germany, 2 March 1836; *d*. Freiburg im Breisgau, Germany, 16 June 1910), *mathematics*.

The son of a weaver who had emigrated from Poland, Weingarten graduated from the Berlin municipal trade school in 1852 and then studied mathematics and physics at the University of Berlin and chemistry at the Berlin Gewerbeinstitut. Between 1858 and 1864 he was an assistant teacher at various schools in Berlin. After receiving the Ph.D. from the University of Halle in 1864, Weingarten taught at the Bauakademie in Berlin, where he was promoted to the rank of professor in 1871. His next position was at the newly founded Technische Hochschule in Berlin. In 1902, for reasons of health, he moved to Freiburg im Breisgau, where he taught as honorary profesor until 1908.

Weingarten was inspired by Dirichlet's lectures to study potential theory and later in his career he occasionally published papers on theoretical physics. It was, however, in pure mathematics, particularly in differential geometry, that he made his greatest contribution. Lack of money obliged Weingarten to accept unsatisfactory teaching positions for many years. It was not until he came to Freiburg that, at an advanced age, he found a suitable academic post.

In 1857 the University of Berlin awarded Weingarten a prize for a work on the lines of curvature of a surface, and in 1864 he received the doctorate for the same work. In the meantime he had written other major papers on the theory of surfaces (1861, 1863). This was the most important subject in differential geometry in the nineteenth century, and one of its main probblems was that of stating all the surfaces isometric to a given surface. The only class of such surfaces known before Weingarten consisted of the developable surfaces isometric to the plane. These included the cones.

Weingarten was the first to go beyond this stage. For example, he gave the class of surfaces isometric to a given surface of revolution. He had the important insight of introducing those surfaces for which there exists a definite functional relationship between their principal curvatures (1863). These are now called W-surfaces in his honor. Weingarten showed that the one nappe of the central surface of a W-surface is isometric to a surface of revolution and, conversely, that all surfaces isometric to surfaces of revolution can also be obtained in this manner. The W–surfaces are best conceived by considering their spherical image and, operating from this point of view, Weingarten also described various classes of surfaces that are isomorphic to each other. Later he cited classes of this kind in hich there are no surfaces of revolution (1884).

In 1886 and 1887 Weingarten studied the infinitesimal deformation of surfaces. Jean-Gaston Darboux, the leading differential geometer of the nineteenth century and author of the four–volume

Leçons sur la théorie générale des surfaces … ,

stated that Weingarten's achievements were worthy of Gauss. Darboux's work inspired Weingarten to undertake further research, which appeared in a long paper that was awarded a prize by the Paris Academy of Sciences in 1894 and was published in

Acta mathematica in 1897. In this paper Weingarten reduced the problem of determining all the surfaces isometric to a given surface *F* to that of determining all solutions of a certain partial differential equation of the Monge-Ampère type.

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Werner Burau