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(*b*. Lucca, Italy, 22 June 1960; *d*. Sant' Andrea di Compito (Lucca), Italy, I March 1913)

*Projecive geometry, foundations of geometry*.

Pieri's father, Pellegrtno Pieri, was a lawyer; his mother was Erminia Luporini. He began his university studies in 1880 al Bologna, where Salvatore Pincherle was among the first to recognize his talent; but he obtained a scholarship to the Scuola Normale Superiore of Pisa in November 1881 and completed his university studies there, receiving his degree on 27 June 1884. After teaching briefly at the technical secondary school in Pisa he became professor of projective geometry at the military academy in Turin and also, in 1888, assistant in projective geometry at the University of Turin, holding both posts until 1900. He became *libero docente* at the university in 1891 and for several years taught an elective course in projective geometry there.

On 30 January 1900, following a competition he was named extraordinary professor of projective and descriptive geometry at the University of Catania. In 1908 he transferred to Parma, where in the winter of 1911 he began to complain of fatigue. His fatal illness, cancer, was diagnosed a few months later.

For ten years following his first publication in 1884, Pieri worked primarily in projective geometry. From 1895 he studied the foundations of mathematics, especially the axiomatic treatment of geometry. Pieri had made a thorough study of Christian von Staudt's geometry of position, but he was also influenced by his colleagues at the military academy and the university, Peano and Cesare Burali-Forti. He learned symbolic logic from the latter, and Peano's axiom systems for arithmetic and ordinary geometry furnished models for Pieri's axiomatic study of projective geometry.

In 1895 Pieri constructed ordinary projective geometry on three undefined terms: point, line, and segment. The same undefined terms were used in 1896 in an axiom system for the projective geometry of hyperspaces, and in 1897 he showed that all of th geometry of position can be based on only two undefined terms: projective point and the join of two projective points. In the memoir"I principii della geometria di posizione composti in un sistema logicodeduttivo" (1898) Pieri combined the results, reached thus far into a more organic whole. Here the same two undefined terms were used to construct projective geometry as a logical-deductive system based on nineteen sequentially independent axioms—each independent of the preceding ones—which are introduced one by one as they are needed in the development, thus allowing the reader to determine on which axioms a given theorem depends. Of this paper Bertrand Russell wrote: "This is. in my opinion. the best work on the present subject" (*Principles of Mathematics*, 2nd ed. [New York, 1964], 382), a judgment that Peano echoed in his report in 1903 to the judging committee for the Lobachevsky Award of the Société Physico-Mathematique de Kasan. (Pieri received honorable mention, the prize going to David Hilbert.)

In their axiom systems for ordinary geometry, Pasch had used four undefined terms, and Peano three. With Pieri's memoir of 1899. "Delia geometria elementare come sistema ipotetieo-deduttivo," the number was reduced to two—point and motion—the latter understood as the transformation of one point into another. Pieri continued to apply the axiomatic method to the study of geometry, and in several subsequent

publications he investigated the possibility of using different sets of undefined terms to construct various geometries. In "Nuovi principii di geometria proiettiva complessa" (1905) he gave the first axiom system for complex projective geometry that is not constructed on real projective geometry.

Two brief notes published in 1906-1907 on the foundations of arithmetic are notable. In "Sur la compatibility des axiomes de l'arithmetique" he gave an interpretation of the notion of whole number in the context of the logic of classes; and in "Sopra gli assiomi aritmetici" he selected as primitive notions "number" and "successor of a number." and characterized them with a system of axioms that from a logical point of view simplified Peano's theory, in 1911 Pieri" may have been on the point of begining a new phase of his scientific activity. He was then attracted by the vectorial calculus of Burali-Forti and Roberto Marcolongo, but he left only three notes on this subject.

Pieri became one of the strongest admirers of symbolic logic; and although most of his works are published in more ordinary mathematical language, the statements of colleagues and his own statements show that Pieri considered the use of Peano's symbolism of the greatest help not only in obtaining rigor but also in deriving new results..

Pieri was among the first to promote the idea of geometry as a hypothetical-deductive system. His address at the First International Congress of Philosophy in 1900 had the highly significant title "Sur la geometric envisagee comme un systeme purement logique." Bertrand Russell wrote in 1903: "The true founder of non-quantitative Geometry is von Staudt… But there remained one further step, before projective Geometry could be considered complete, and this step was taken by Pieri… Thus at last the long process by which projective Geometry has purified itself from every metrical taint is completed" (*Principles of Mathematics*, 2nd ed. [New York, 1964], 421).

# BIBLIOGRAPHY

I. Original Works. A chronological list of Pieri's publications appears in Beppo Levi, "Mario Pieri," in *Bullettino di bibliografia e storia delle scienze marematiche*, **15** (1913), 65-74, with additions and corrections in 16 (1914), 32, The list includes 57 articles, a textbook of projective geometry for students at the military academy, a translation of Christian von Staudt's *Geometric der Lage*, and four book reviews.

II. Secondary Literature. Besides the obituary by Beppo Levi (cited above), see Guido Castelnuovo, "Mario Pieri," in *Bollenuw delta mattiesis*, 5 (1913), 4041; and [Giuseppe Peano], "Mario Pieri," in Accidentia pro Interliftgua, Discussiones, 4(1913), 31-35. On the centenial of Pieri's birth Fuivia Skof published "Sull opera scientifa di Mario Pieri," in *Bolleltion dell'Unione malematica italiana*, 3rd ser.. **15** (1960), 63-68.

Hubert C. Kennedy