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Abstracts of Plenary and Invited Lectures

Section:

19. History of Mathematics

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The Riemann-Roch Theorem and Geometry, 1854-1914

In this talk I shall consider aspects of the history of the Riemann-Roch Theorem, from its discovery by Riemann and Roch to its use by Castelnuovo and Enriques. The theorem offers one of the most instructive examples in the history of mathematics of how a result stays alive by admitting many interpretations: in complex function theory, and in both the algebraic and geometric styles of algebraic geometry. This profusion of approaches, at times incompatible and not always firmly grounded, demonstrates the challenges and the pleasures involved in doing mathematics, and challenges the historian to capture the richness of the subject.
I shall consider three main developments:

1) The original discovery and the uses to which Riemann put it;
2) The algebraic reformulation by Brill and Noether after Riemann's death;
3) The geometric twist Castelnuovo and Enriques gave to the Brill-Noether approach, and the role of the Riemann-Roch Theorem in their eventual classification of algebraic surfaces.

Brill and Noether deliberately rejected Riemann's function-theoretic formulation of the Theorem, but in so doing they also blurred his distinction between intrinsic geometrical properties and properties of embeddings. Italian mathematicians, unlike their French counter-parts, also kept away from complex function theory, but they adapted the techniques of Brill and Noether to give a deliberately intrinsic theory of algebraic surfaces.