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(*b*. Zhuravka, poltava guberniya, Russia, 28 April 1868; *d*. Warsaw, Poland, 20 November 1908), *mathematics*.

Voronoy's father was superintendent of Gymnasiums in Kishinev and in other towns in the sourthern Ukraine. After graduating from the Gymnasium in Priluki in 1885, Voronoy enrolled in the mathematics section of the Faculty of Physics and Mathematics of the University of St. Petersburg. He graduated in 1889 and was retained to prepare for a teaching career. In 1894 he defended his master's dissertation, on algebraic integers associated with the roots of an irreducible third-degree equation. He then became professor in the Department of Pure Mathematics at the University of Warsaw. He defended his doctoral dissertation, on a generalization of the algorithm of continued fractions, at St. Petersburg in 1897; both dissertations were awarded the Bunyakovsky Prize of the St. Petersburg Academy of Sciences.

Vorony subsequently elaborated his own ideas on the geometry of numbers and conducted investigations on the analytic theory of numbers. In 1904 he participated in the Third International Congress of Mathematicians in Heidelberg, where he met Minkowski, who was then working on topics closely related to those in which Voronoy was interested.

Voronoy's work, all of which concerns the theory of numbers, can be divided into three groups: algebraic theory of numbers, geometry of numbers, and analytic theory of numbers.

In his doctoral dissertation Voronoy gave the best algorithm known at the time for calculating fundamental units of a general cubic field, for both a positive and negative discriminant.

Vorony completed two of a planned series of memoirs in which he intended to apply the principle of continuous Hermite parameters to problems of the arithmetical theory of definite and indefinite quadratic forms. In the first of these works, which dealt with certain characteristics of complete quadratic forms, he solved the question posed by Hermite concerning the precise upper limit of the minima of the positive quadratic forms of a given discriminant of n variables. E. I. Zolotarev and A. N. Korkin had given solutions for $n = 4$ and $n = 5$; with the aid of the methods of the geometrical theory of numbers Voronoy gave a full algorithmic solution for any n. In the second paper, which concerned simple parallelepipeds, Voronoy dealt with the determination of all possible methods of filling an n-dimensional Euclidean space with identical convex nonintersecting polyhedra having completely contiguous boundaries (parallelepipeds). A solution of this problem for three-dimensional space had been given by the crystallographer E. S. Fedorov, but his proofs were incomplete. In 1896 Minkowski demonstrated that the parallelepipeds must have centers of symmetry and that the number of their boundaries did not exceed $2(2^n - 1)$. Voronoy imposed the further requirement n + 1 parallelepipeds converge at each summit and completely solved the problem for these conditions.

In a memoir concerning a problem from the the ories of asymptotic functions Voronoy solved Dirichlet's problem concerning the determination of the number of whole points under the hyperbola $xy=n$. Dirichlet had found that the number of such points lying in the area $x > 0, y > 0, xy \leq n$ was expressed by the formula $F(n) = n(\log n + 2C - 1)+R(n)$, where $R(n)$, where $R(n) =$ $O()$. By introducing series similar to a Farey series and by dividing the area of summation into the subsets associated with these series, Voronoy substantially improved the evaluation, obtaining $R(n) = O(. \log n)$. His paper served as the starting point for the work of I. M. Vinogradov, and the Farey series that he introduced was employed in the investigation of problems in the additive theory of numbers by Vinogradov, G. H. Hardy, and J. E. Littlewood.

BIBLIOGRAPHY

Voronoy's collected works were published as *Sobranie sochineny*, 3 vols. (Kiev, 1952-1953). Papers mentioned in the article are "Sur un problème du calcul des fonctions asymptotiqes," in *Journal für die reine und angewandte Mathematik*, **126** (1903), 241–282; "Sur quelques propriétés des formes quadratiques positives parfaites," *ibid*., **133** (1908), 97–178; and "Recherches sur les paralleloèdres primitifs," *ibid*., **136** (1909), 67 – 179. These papers are reprinted in *Sobranie sochineny*, **II** , 5 – 50, 171 –238, 239 – 368. On his work, see B. N. Delone, *Peterburgskaya shkola teorii chisel* ("The St. Petersburg School of the Theory of Numbers" ; Moscow – Leningrad, 1947).

I. G. Bashmakova