Méray, Hugues Charles Robert | Encyclopedia.com

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(*b*. Chalon-sur-Saône, France, 12 November 1835; (*d*. Dijon, France, 2 February 1911)

mathematics.

Méray entered the École Normale Supérieure in 1854. After teaching at the lycée of St. Quentin from 1857 to 1859 he retired for seven years to a small village near Chalon-sur-Saô;ne. In 1866 he became a lecturer at the University of Lyons and, in 1867, professor at the University of Dijon, where he spent the remainder of his career.

In his time he was a respected but not a leading mathematician. Méray is remembered for having anticipated, clearly and with only minor differences of style, Cantor's theory of irrational numbers, one of the main steps in the arithmetization of analysis.

Méray first expounded his theory in an article entitled "Remarques sur la nature des quantités definies par la condition de servir de limites à des variables données" (1869). His precise formulation in the framework of the terminology of the time and the place is of considerable historical interest.

I shall now reserve the name number or quantity to the integers and fractions; I shall call *progressive variable* any quantity v which takes its several values successively in unlimited numbers.

Let v_n be the value of v of rank n: if as n increases to infinity there exists a number V such that beginning with a suitable value of n, $V — v_n$ remains smaller than any quantity as small as might be supposed, one says that V is the limit of v and one sees immediately that $\nu_{n+p} — \nu_n$ has zero for limit whatever the simultaneous laws of variation imposed on n and p.

If there is no such number it is no longer legitimate, analytically speaking, to claim that v has a limit; but if, in this case, the difference $\nu_{n+p} — \nu_n$ still converges to zero then the nature of ν shows an extraordinary similarity with that of the variables which really possess limits. We need a special term in order to express the remarkable differentiation with which we are concerned: **I** shall say that the progressive variable is *convergent*, whether or not a numerical limit can be assigned to it.

The existence of a limit to a convergent variable permits greater ease in stating certain of its properties which do not depend on this particular question [i.e., whether or not there exists a numerical limit] and which frequently can be formulated directly only with much greater difficulty. One sees therefore that it is advantageous, in cases where there is no limit, to retain the same abbreviated language which is used property when a limit exists, and in order to express the convergence of the variable one may say simply that it *possesses a fictitious limit*.

Here is a first example of the usefulness of this convention: if, when m and n both increase to infinity, the difference $u_m — u_n$ between two convergent variables tends to zero for a certain mutual dependence between the subscripts, then one proves easily that it remains infinitely small also for any other law [i.e., law of dependence between m and n]: I shall then say that the variables u and v are *equivalent*, and one sees immediately that two variables which are equivalent to a third variable are equivalent to each other [*toc. cit*. p. 284, in translation].

In this paper Méray also discussed the question of how to assign values to a given function for irrational values of the argument or arguments, and he suggested that this problem could always be solved by a passage to the limit. In this connection, as well as elsewhere in his writings, he did in fact assume a somewhat constructive point of view of the notion of a function, taking it for granted that a function can always be obtained constructively either by rational operations or by limiting processes.

The paper marked the first appearance in print of an "arithmetical" theory of irrational numbers. Some years earlier Weierstrass had, in his lectures, introduced the real numbers as sums of sequences or, more precisely, indexed sets, of rational numbers; but he had not published his theory and there is no trace of any influence of Weierstrass' thinking on Méray's. Dedekind also seems to have developed his theory of irrationals at an earlier date, but he did not publish it until after the appearance of Cantor's relevant paper in 1872. In that year Méray's *Nouveau précis d'analyse infinitésimale* was published in Paris. In the first chapter the author sketches again his theory of irrationals and remarks that however peculiar it might appear to be, compared with the classical traditions, he considers it more in agreement with the nature of the problem than the physical examples required in other approaches.

The *Nouveau précis* had as its principal aim the development of a theory of functions of complex variables based on the notion of a power series. Thus here again, Méray followed unconsciously in the footsteps of Weierstrass; consciously, he was developing the subject in the spirit of Lagrange but feltrightly—that he could firmly establish what Lagrange had only conjectured. The book is in fact written with far greater attention to rigor than was customary in Méray's time.

Little regard was paid to Méray's main achievement until long after it was first produced, partly because of the obscurity of the journal in which it was published. But even in his review (1873) of the *Nouveau précis*, H. Laurent pays no attention to the theory, while gently chiding the author for using too narrow a notion of a function and for being too rigorous in a supposed textbook. At that time there was not in France—as there was in Germany—a sufficient appreciation of the kind of problem considered by Méray, and not until much later was it realized that he had produced a theory of a kind that had added luster to the names of some of the greatest mathematicians of the perio*d*.

Although Méray's theory of irrationals stands out above the remainder of his work, his development of it may be regarded as more than an accident. For elsewhere he also showed the same critical spirit, the same regard to detail, and the same independence of thought that led him to his greatest discovery.

BIBLIOGRAPHY

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II. Secondary Literature. Laurent's review of the *Noureau précis* was published in *Bulletin des sciences mathématiques*, **4** (1873), 24–28. See also the biography of Méray in *La grande encyclopédie* XXIII (Paris, 1886), 692; and J. Molk, "Nombres irrationels et la notion de limite," in *Encyctopédie des sciences muthématiques pures et appliquées*, French ed., I (Paris, 1904), 133–160, after the German article by A. Pringsheim.

Abraham Robinson