

the blood. Snellen also contains a complete bibliography of Marey's published work, which also reappears in Braun. FRANK, a historian of science, is interested in the transfer of scientific instruments and technologies from the physiological laboratory to the practice of clinical examinations. In this article he focusses especially on the cardiology of Marey and his successors such as the English physiologist John Burdon Sanderson and the Dutch cardiologist Willem Einthoven. Frank examines the invention of the sphygmograph, a device for recording arterial pulse in graphic form and its promotion as a tool for clinical diagnosis. BRAIN considers the development of the graphic method in the 19th century in a range of disciplines. In his account, Marey appears as a central figure in the promotion of the graphic method as a universal means of scientific communication.

Among the books which deal exclusively with Marey's chronophotography, FRIZOT's is the most comprehensive and insightful, and places Marey in a broader context of related photographic studies. Marey's role in the early history of cinematography has been entangled in debates about who was the "true" inventor of the cinematographic method. This complicated and perhaps badly posed question of priority has been further muddled by polemics and partisanship, often tinged with nationalistic passions. Accordingly, Marey's role has figured more prominently in French accounts and has been downplayed by English language author in favor of Thomas Alva Edison and others. SAUVAGE is a recent and the most judicious French account.

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See also Graphical Method; Photography

Marshall, Alfred 1842-1924

British economist

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Alfred Marshall is historically important because he was one of the three or four leading economic theorists of all time. His *Principles* is the last great comprehensive treatise on economics, constituting the core document of neo-classical economics and incorporating many of the tools of analysis that are currently central to the foundation of economics (which is called either "price theory" or "microeconomics").

Keynes's long biographical essay in PIGOU is a still useful, elegant and stimulating introduction to the life of Marshall. Keynes's sometime rival Schumpeter once described this essay as "the most brilliant life of a man of science I have ever read". Keynes was an admiring student of Marshall's (and Keynes's father had been an ally), so it may not be surprising that Keynes's essay has been criticized for being too protective of Marshall. The Nobel prize winner COASE, for example, has carefully collected evidence on Marshall's family background, and found it less distinguished than Keynes claimed. A brief source that enriches the biographical detail of Marshall's life is the memoir written by his wife, Mary MARSHALL, near the end of her long life.

GROENEWEGEN's careful and massive work will probably be the definitive biography of Marshall for a very long time to come. The author appears to have read and exploited nearly all known sources of archival information on Marshall's life, and to have subjected early drafts of his biography to useful criticism from several of the leading Marshall scholars. Although generally favorable to Marshall, Groenewegen does not shy away from issues that may show him in an unfavorable light, such as his attitude toward women.

Several useful summaries of various aspects of Marshall's views are available. Written in a non-technical style, REISMAN (1986) summarizes Marshall's positions on issues such as the evolutionary character of economics and how to lead a moral and good life. The Nobel prize winner STIGLER, in his published doctoral dissertation, devoted a chapter to explaining clearly Marshall's position on the key theoretical tools of marginal productivity. Late in his career, Stigler (in the WHITAKER volume) also summarized Marshall's main contributions. With characteristic Stiglerian mischief, he suggests that one of Marshall's contributions is to have delayed by a generation the dominance of the "abstract formalism" of the Walrasian general equilibrium economists. A "reader's guide" to Marshall's main work, the *Principles*, can be found in BLAUG.

MALONEY incites controversy by arguing that Marshall's main contribution was not his addition to the toolbox of economics, but rather his successful efforts to complete the professionalization of economics. This professionalization is

seen as accompanied by an increased emphasis on theory, by the goal of scientific objectivity, and by a sympathy toward the marketplace in policy analysis. A quite different view is presented in REISMAN (1990), which argues that Marshall's main objective was to benefit humanity through social reform.

Although Marshall's main contribution to economics is usually seen as his development of price theory, his writings on macroeconomics have received attention, both because they were considered important when they were written, and because there is interest in how they may have influenced Marshall's student and colleague, Keynes. In ESHAG's brief monograph tracing the development of macroeconomics from Marshall to Keynes, the author finds little in this area that is original to Marshall. BIGG's analysis is more favorable to Marshall, arguing that his macroeconomic theory was a progressive research program that contained the seeds that eventually grew into the Keynesian revolution.

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See also Keynes; Political Economy