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## Studies in History and Philosophy of Science Part A

Volume 24, Issue 2, June 1993, Pages 267-291

# Graphical method and discipline: Self-recording instruments in nineteenth-century physiology

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**Graphical Method and Discipline:  
Self-Recording Instruments in Nineteenth-Century  
Physiology**

*Soraya de Chadarevian\**

'IN ORDER to register under all circumstances the precise pressure and its temporal extension with Poiseuille's manometer, a rod shaped float is set on top of the free mercury column and its top connected to a pen which will write the variation of pressure onto a plain surface which travels past the pen at a constant speed.' 'One thus obtains curves, in which the height expresses the blood pressure, and the width designates the time.'<sup>1</sup> In this rather dry and unpretentious way Carl Ludwig, then Prosector of Anatomy at Marburg, described in *Müller's Archiv* in 1847 a device, which he presented as a mere modification of the already known apparatus by Spengler for determining the lateral arterial pressure and which later was called the kymograph (or wave writer)<sup>2</sup> (Fig. 1). According to Ludwig's own account, a mere technical problem encountered in his studies of the circulation of the blood prompted the development of the instrument. In order to determine the influence of respiration on the circulation of the blood, very precise measurements were required. But what was more, the changes of the blood-pressure and the air pressure in the thoracic cavity had to be registered in precise synchronization. Not even the most skilled experimenter could meet the demand of taking two rapidly changing manometer readings at the same instant. The development of the automatic registering device, however, made it possible to register parallel

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Received 12 March 1992; in revised form 7 October 1992.

<sup>1</sup>C. Ludwig, 'Beiträge zur Kenntnis des Einflusses der Respirationsbewegungen auf den Blutlauf im Aortensysteme'. *Archiv für Anatomie, Physiologie und wissenschaftliche Medizin* (1847), 242–302, on p. 257 and p. 244. This and the following translations are by the author.

<sup>2</sup>Ludwig's kymograph is generally cited as the first self-recording instrument to be introduced in physiology. On the debate over priority see H. Schröder, *Carl Ludwig: Begründer der messenden Experimentalphysiologie 1816–1895* (Stuttgart: Wissenschaftliche Verlagsgesellschaft, 1967), pp. 111–113. The term 'kymograph' is sometimes used in a more literal and therefore more general sense to designate all kinds of self-recording instruments. In the following, however, it will only be applied to Ludwig's self-recording manometer; cf. the entry 'kymograph' in *The Compact Edition of the Oxford English Dictionary*, vol. 1 (Oxford: Clarendon Press, 1971).

*Stud. Hist. Phil. Sci.* Vol. 24, No. 2, pp. 267–291, 1993.  
Printed in Great Britain

0039-3681/93 \$6.00 + 0.00  
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