

METHODS

USE OF AN ELECTRICAL THERMOMETER FOR RECORDING EXTERNAL RESPIRATION

V. V. Kravtsov

UDC 612.2-087.5

A method of recording the electropneumogram based on the use of the "Temp-1" electrical thermometer is suggested. The sensor element of the thermometer is fixed to the inlet of the mask placed over the head of the experimental animal.

When respiration is recorded by means of cuffs, Marey's capsules, and a series of transducers (piezoelectric detector, photoelectric cells, etc.), the animal's motor responses affect the respiration curves. Pneumograms recorded by means of thermosensitive methods (thermocouples, thermistors), detecting fluctuations of temperature arising as the result of the current of air during breathing, are free from this disadvantage.

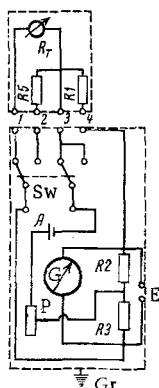


Fig. 1. Electrical circuit of the "Temp-1" instrument with modifications. $R_{1,2,3,5}$) wire resistors; G) galvanometer; Sw) switch; P) 820 Ω potentiometer; R_T) thermistor; A) source of current; E) output to electroencephalograph; Gr) ground.

The writer has suggested a method of recording external respiration in intact animals using the widely available "Temp-1" electrical thermometer made by the Leningrad "Krasnogvardeets" Factory. Unlike the method suggested previously [1], the present method does not require tracheotomy. The electropneumogram can be recorded on any apparatus which will amplify and record a potential (electrocardiograph, electroencephalograph, etc.).

The high sensitivity of the electrical thermometer is due to the use of a semiconductor resistor (thermistor) as the detector; this type of detector changes its resistance considerably in response to a change in the environmental temperature.

The theoretical circuit of the instrument consists of an unbalanced Wheatstone bridge, with the thermistor connected into one arm of the bridge and a sensitive microameter connected across the measuring diagonal (Fig. 1).

The equipment provided with the apparatus for recording the electropneumogram includes: a truncated conical mask made of tin plate, the electrical thermometer with thermistor for measuring the skin temperature, amplifier and recording apparatus. The detector is fixed to the narrow end of the mask by means of three brackets so as not to increase the obstruction to the animal's breathing. A rubber membrane with a hole for the animal's snout is fixed to the wide end of the mask. The mask is fixed to the head by means of a rubber strap.

The measuring diagonal of the bridge is connected in parallel with a microameter to the input of one channel of the recording instrument. The metal case of the electrical thermometer is connected to ground. In trial experiments breathing was recorded within the range of frequencies of 0.3 to 50 Hz, and with paper winding speeds of 7.5-15 and 30 mm/sec.

Donetsk Research Institute of Traumatology and Orthopedics. (Presented by Academician V. V. Parin.) Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 72, No. 9, pp. 122-123, September, 1971. Original article submitted December 18, 1970.

© 1972 Consultants Bureau, a division of Plenum Publishing Corporation, 227 West 17th Street, New York, N. Y. 10011. All rights reserved. This article cannot be reproduced for any purpose whatsoever without permission of the publisher. A copy of this article is available from the publisher for \$15.00.

LITERATURE CITED

1. B. N. Orlov, in: Physical and Physicochemical Methods in Experimental and Clinical Practice. (Proceedings of a Scientific Conference) [in Russian], Gor'kii (1967), p. 141.