

**ON A NEW METHOD OF
RECORDING
THE MOTIONS OF
THE SOFT PALATE**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649174638

On a new method of recording the motions of the soft palate by Harrison Allen

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Cover @ 2017

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BY

HARRISON ALLEN, M.D.,

PROFESSOR OF PHYSIOLOGY IN THE UNIVERSITY OF PENNSYLVANIA.

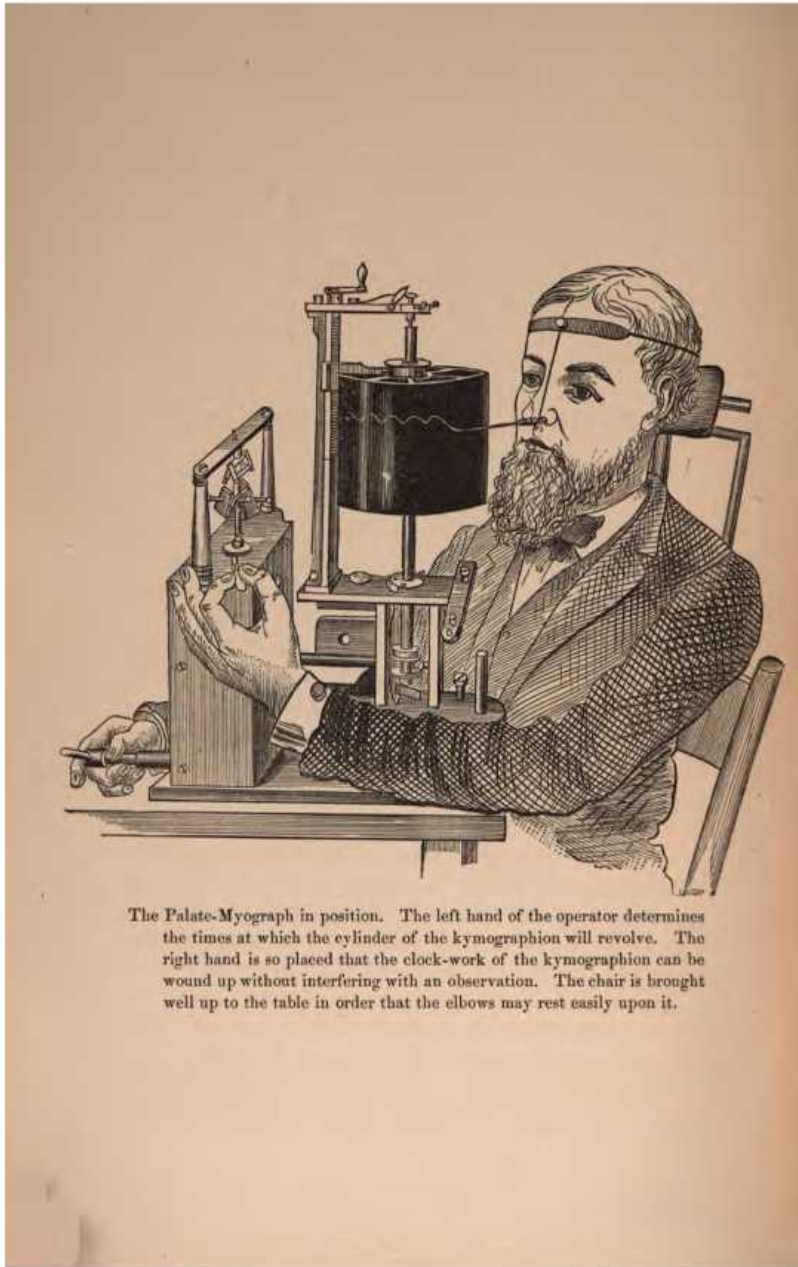


EXTRACTED FROM THE

TRANSACTIONS OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA,
THIRD SERIES, VOLUME VII.

PHILADELPHIA:
P. BLAKISTON, SON & CO.
No. 1012 WALNUT STREET.
1884.

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The Palate-Myograph in position. The left hand of the operator determines the times at which the cylinder of the kymographion will revolve. The right hand is so placed that the clock-work of the kymographion can be wound up without interfering with an observation. The chair is brought well up to the table in order that the elbows may rest easily upon it.

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IN this paper I will describe a new method of recording the motions of the soft palate.

When a straight rod is passed through the nose from before backward in the living subject as far as is possible, it will be found to impinge against the roof of the naso-pharynx. In this position the rod is not influenced by any motions of the soft palate; but if the end of the rod which remains without the nostril be raised so that the rod be brought in contact with the anterior border of the nostril, the pharyngeal end of the rod will lie in a position which will cause a decided motion to be transmitted to it when the soft palate is raised. I have for a long time been in the habit of relying upon this test to determine when an instrument thrust through the nose had reached the region of the naso-pharynx.

Having observed that the sensations upon the fingers when the rod was thus held in position varied according to the character of the sound of the voice, I instituted a series of careful comparisons, which led me to infer that the elevation of the soft palate was

greater in the sounds of \bar{a} and \bar{e} than in the sounds of \bar{i} , \bar{o} , and \bar{u} , or in any of the short vowel sounds. Substituting for the support of the fingers a flexible copper wire, one end of which was attached to the head-band, which is in common use for the support of the laryngeal mirror, and the wire itself bent round the rod so as to maintain the apposition of the rod against the anterior border of the nostril, I found that the motions of the palate caused a perceptible deviation of the free end of the rod. If, while the wire was thus supporting the rod, a rhinoscopic examination was made, the pharyngeal end of the rod was found projecting from the posterior nares into the naso-pharynx, at a point about midway between the roof and the upper surface of the relaxed soft palate. The rod being carefully adjusted so as to secure the best effects when the palate was raised, and the subject seated in front of the Ludwig kymographion (see Frontispiece), which had been previously prepared with carbon covered paper, it was ascertained that when the free end of the lever touched the cylinder, at a time when the latter was in motion from right to left and the soft palate was raised, that a distinct tracing appeared upon the cylinder and that the differences between the long and short sounds of the vowels were found to correlate with the curves made by the rod upon the kymographion.

Fig. 1 represents this rod as completed. *a* is that part of the rod, four inches in length, which is inserted within the nose. The end to the left being furnished with a bulb, and that to the right with a screw thread for attachment to *b*, which is a delicate piece of vul-

canite, marked by a number of annular depressions. The portion of the rod marked *c* extends from *b*, and represents that part of the instrument which is brought in contact with the kymographion-cylinder: it measures four inches in length, and terminates in a thin, flat, flexible end for the purpose of making a tracing.

FIG. 1.



FIG. 1.—The apparatus. The two arms of the rod should be of the same length. *a*, the arm, or portion of the lever which is inserted within the nose; *b*, the vulcanite annular support for the wire-loop; *c*, the arm or portion of the lever projecting from the nostril (†).

When the instrument is in position (see Frontispiece) and the palate is raised (as in the voluntary motion which constitutes the first act of deglutition) a tracing is made (Fig. 2), which, when analyzed,

FIG. 2.



FIG. 2.—Voluntary elevation of the soft palate illustrated in the first act of deglutition.

found to be composed of a number of acute depressions interrupting a horizontal line, and which yields for examination three distinct parts: first, a long, concave, slightly undulating line—which represents the extent of downward deviation of the rod from its horizontal position; second, a short vertical line,

which represents the descent of the palate, and begins at the point at which the curved line ends and terminates at the horizontal line; and, third, the horizontal line itself, which represents the record made by the end of the rod when at rest upon the surface of the moving cylinder. It is evident that the number of the notch-like depressions will answer to as many acts of elevation as are recorded at a single trial. The differences in the depressions will be the differences in the acts of elevation themselves. The degree of elevation and the abruptness of the fall are constant, but the length of the curve will depend upon the time taken by the palate to reach its highest elevation and the time it is sustained in that position before it falls to the position of rest.¹

The tracing of the motion of the palate in the first act of deglutition is found to vary slightly from the above when the act of swallowing is completed (Fig. 3). This difference is expressed in the tracing

FIG. 3.



FIG. 3.—The tracing of the act of deglutition.

in a shorter curve of elevation, and a very gradual instead of a precipitous descent.

The tracings of the acts of "exhaling,"² of coughing, of hawking, and of sniffing will be found to be

¹ All tracings are to read from left to right.

² By "exhaling" is meant the sound without voice which is made by suddenly depressing the palate from a moderately elevated position (the mouth being closed), and by driving the air out through the nostrils. It is a sound habitual with some persons who suffer from catarrh.