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NOTES, CASES, INSTRUMENTS

A TELEMETER WITHOUT REFRACTIVE OPTICS

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The Talmud mentions (Eruvin 43b) that Rabban Gamaliel II, who lived at the end of the first century A.D., had a tube through which he could measure a distance of 2,000 cubits (approximately 1,000 meters).[1] The instrument aided in defining a strip of land of 1,000 meters around the town, within which the Talmud permits walking on the holydays. A simple conic tube, lacking refractive optics, may be adjusted for measuring a certain distance.

The mode of operation of this device is based on our binocular vision, consisting of nonconcentric overlapping monocular fields. The conic tube (Figure)—HLRI—is adjusted in such a way that its base (LR), through which the eyes look, is equal to the interpupillary distance (ipd) of the measurer. The imaginary lines continuing from the wall of the cone meet at point F, 1,000 meters in front of the measurer, on top of the imaginary cone LFR. In other words, angle α, which represents the steepness of the cone's wall, is given by the equation: $\tan \alpha = 1{,}000 \text{ meters}/\frac{1}{2} \text{ ipd}$.

The examiner holds the instrument fixed horizontally and looks through it with both eyes, with the pupils at points L and R. Closing the right eye, the examiner sees with the left eye a space subtended by the horizontal visual angle CLD. By closing the left eye the examiner sees with the right eye another space subtended by the horizontal visual angle ARB. Looking toward the central line, the examiner notices that the objects situated in the visual triangle HFI (for instance, the tree G) are seen with either eye, as well as with both eyes simultaneously. Objects situated outside this visual triangle, within the space AHFB and CFID, are seen only with the right or left eye, but not with both. Moreover, objects located beyond the point F, in the angle BFC (for instance, the tree E), are invisible since they are out of the visual field of each eye. The most distant object that is seen through the device simultaneously by both eyes, is at 1,000 meters (point F), which is why the telemeter was constructed.

This conic tube may even be used for measuring different distances by increasing or decreasing the diameter of its distal opening (HI) according to the purpose.

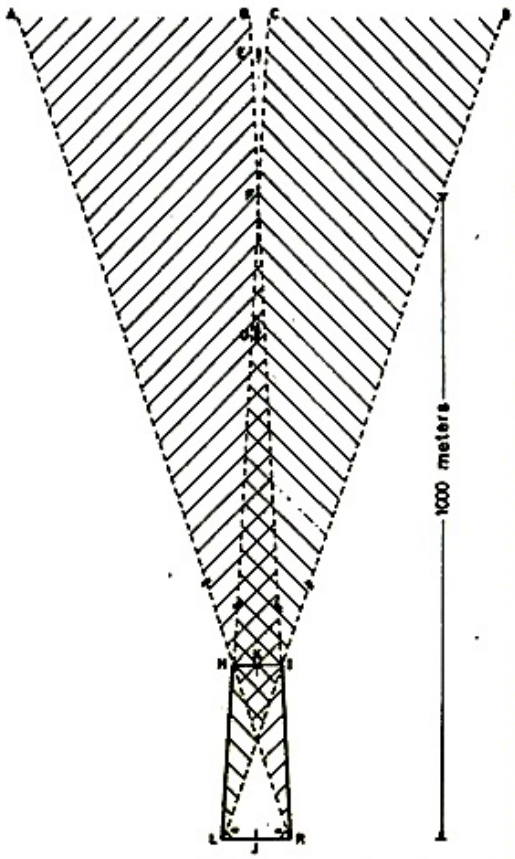

Figure (Abraham). Telemetry through a conic tube adjusted for measuring a distance of 1,000 meters.

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SUMMARY

A conic tube may be adjusted by varying the distal diameter and by using binocular vision for measuring distances. This device appears to be the earliest telemeter in the world. It is mentioned in the Talmud as being used in the first century A.D.

REFERENCE

1. Bar-Ilan, M., and Zevin, S. I.: Talmudic Encyclopedia. Jerusalem, Talmudic Encyclopedia Publisher, 1949, pp. 28-29.

IMPROVED VITRECTOMY ILLUMINATION SYSTEM

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Although vitrectomy can be performed under visualization of the fundus with the light source of the operating microscope,[1-5] many vitrectomy instruments[6-8] are presently equipped with a fiberoptic light guide. However, the advantage of a reflex-free operation must be weighed against the shortcomings of the fiberoptic light guides. The light pipes presently available for use in vitrectomy have one major disadvantage. The tip of the fiberoptic sleeve builds a shoulder on the vitrectomy instrument. As a result, the choroid or the retina can be pushed away when the light pipe and vitrectomy instrument are inserted inside the vitreous body, thus causing dialysis. An additional disadvantage of this light pipe is that there is always a potential space between the instrument's tip and the light guide. Vitreous humor can intrude and catch in this space; thus, when this instrument is removed vitreous traction can tear the retina. Because of these potential hazards, we have only infrequently used the

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