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# Simple Instrument for Quick Measurement Of Crown Projections

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**ABSTRACT**—For the determination of vertical projections of vegetation, a simple instrument which levels automatically is described. It can be used both for point-quadrat and line-intercept sampling. The instrument consists of two prisms attached to a gimbaled suspension system. It projects an optical line both upward and downward, thus allowing the simultaneous interception of the tree canopy and the herbaceous vegetation.

Accurate measurement of crown projections is often necessary for determining frequency or cover in tree stands. Several devices have been developed for this purpose. For point-quadrat estimations Garrison (1949) devised a boxlike periscope or "moosehorn" which projects upwards a grid of 25 dots. Morrison and Yarranton (1970) used a rifle telescope with a prism, mounted on a beam. Buell and Cantlon (1950) took line intercepts with a "coversight," which is a boxlike periscope with two cross hairs to eliminate parallax. Lindsey (1955) made line-strip measurements with a "sighting level" that consisted of a stick 5 feet long with a carpenter's level mounted at one foot from its lower end. All these instruments must be kept vertical by use of leveling devices—a procedure that is time-consuming, and can be very tiring with hand-held instruments.

Here we describe a light hand-held periscope that levels automatically and simplifies field work considerably. It is being used with good results in temperate forests in Patagonia and in mangrove forests in Mexico.

The instrument (*fig. 1*) consists of two concentric metal rings (*a* and *b*) which form a gimbaled suspension system; Gounot (1969) proposed this system for the mounting of point-quadrat measurement instruments in forest vegetation. The handle (*c*) is attached to the external ring. A U-shaped metal piece (*d*) is linked by two pivots to the internal ring. The axis of these pivots is perpendicular to the axis of the pivots joining the two rings, so that the U-shaped piece always remains vertical and is unaffected by movements in the external ring and handle. At the bottom of this piece two adjacent right-angle prisms (*e*) are mounted in a protective case (not shown in the figure). One prism faces upward and the other downward. Cross hairs mounted in the external faces of the prisms permit exact and simultaneous location of points in the canopy and on the ground. Parallax

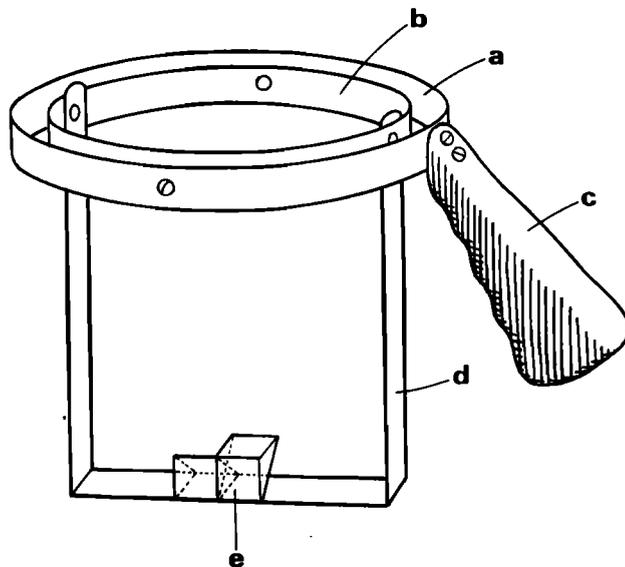


Figure 1. Instrument for measuring crown projection.

is eliminated by visual comparison of the position of the cross hairs seen in both prisms simultaneously. When the observer holding the handle looks through the prisms, he can see upward, downward, and forward simultaneously.

The instrument has to be calibrated before use. Regulating screws can be placed, or tiny weights can be added, until the optical line becomes vertical. The error in a reading is proportional to the height of the canopy and the angular error of the instrument (or deviation from the vertical). To ensure maximum accuracy, it is important to minimize friction in the pivots. ■

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