the 12 days. This was a little surprising to us after we had failed, in a previous trial, to obtain a positive calcium balance on a dry ration and a mineral supplement. We realize that the goats were in a later stage of lactation in this trial than in the one two months previous, when a negative calcium balance was obtained, with practically the same intake, yet we do not believe that this difference can be entirely attributed to this factor.

A vitamin or the vitamins of green plants may play an important part in the assimilation of calcium, yet we do believe the difference between green (fresh) and dry plants in causing the assimilation of calcium is partly due to the difference in physical properties of the cell wall and the cell content.

Our data are not yet inclusive enough to substantiate our hypothesis or to draw definite conclusions.

CHAS. H. HUNT,
A. R. WINTER
OHIO AGRICULTURAL EXPERIMENT STATION,
WOOSTER

TRABECULAE OF SANIO IN ANGIOSPERMS

THE occurrence of "Trabeculæ of Sanio" has been noted previously only in Gymnosperms but their discovery in an Angiosperm at the Forest Products Laboratories of Canada demonstrates a wider distribution than hitherto has been credited to these rod-like structures which extend across the lumina of cells.

Typical trabeculæ—homologues of those common to Gymnosperms—were observed extending radially throughout a series of tracheids in secondary wood from the stem of *Alnus oregona,* Nutt. One section of this alder shows a series of trabeculæ which, as well as crossing a number of tracheids, traverses the lumen of a wood parenchyma cell.

Generalizations regarding a primitive position for the Betulaceæ which are based on the occurrence of trabeculæ in members of this group must be hazardous as the ubiquitous distribution of these typically rod-like structures in the Gymnosperms leads to the presumption that they may be of widespread occurrence in the Angiosperms as well.

J. D. HALE
FOREST PRODUCT LABORATORIES OF CANADA,
MONTREAL

A COURSE IN PHYSICAL MEASUREMENTS FOR STUDENTS IN OTHER SCIENCES

IN the issue of SCIENCE for August 29, 1919, a plea was made by Dr. Paul E. Klopsteg for courses in physical measurements for students of chemistry and related sciences. In view of the inherently physical nature of almost all quantities which can be observed and evaluated, the reasonableness of such a plea seems obvious. The emphasis of the writer was upon the need of training in physical measurements as differentiated from "physics."

During the past semester we have offered a course of this type and it seems advisable to add our experience to the plea made by Dr. Klopsteg. The section has consisted of ten men, seniors and juniors, whose major interests have been in astronomy, chemistry, engineering and mathematics. All have pursued a course in general physics which included a year of laboratory practice of the ordinary college type. Each one has had laboratory experience, more or less extended, in some other science.

The material for the course was determined by choosing from the instruments commonly employed in the physical laboratory those which were judged to have application in other fields. Opportunity was given for becoming familiar with each instrument by using it for some particular determination. The method of its use was stressed rather than the quantity which was being determined. For instance, the potentiometer was studied in principle and one was used in calibrating a thermocouple. The choice of instruments has been influenced by the resources of the laboratory and the list here given is not to be taken as a final selection. In each case the particular use to which the instrument was put has been indicated.

1. The Pulfrich refractometer for the index of pure liquids, solutions and solids.

2. The prism spectroscope with photographic registration of an "unknown" and a comparison spectrum, measured with a comparator.

3. The alternating current bridge and galvanometer for electrolytic conductivity, using an electrically controlled thermostat.

4. The Carey-Foster bridge for the checking, coil by coil, of a decade box against a standard.

5. The potentiometer in the calibration of a base metal thermocouple.