let them be confined to the scientific workers. The man or institution that has not already begun to lay broad foundations may well be considered among the condemned. Only those who have the true spirit of investigation will win out under the Adams Fund. Instead of winning out by popularity, they will win out in spite of popularity, if they must work for popularity. Being able to reduce science to the popular is no indication of success, whether it be astronomy, meteorology, physiology, pathology, botany, bacteriology, medicine, or what-not. The fact that any truth becomes popular in any degree should be because of its broad application, and should, and generally does, bespeak years of sacrifice on the part of some investigator. Whatever is worthy to be called truth is worthy the best there is in us, and especially should this be so in agricultural science, where results will benefit almost the whole of the human race.

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LIKELY PLACES FOR EVIDENCE AS TO THE HISTORY OF THE EVOLUTION OF THE ANTHROPOID APES AND PRIMITIVE MAN

THE recent discovery of the chimpanzee in a part of Africa where it had not been previously known to exist enables us now to define a few regions in which the gorilla, the chimpanzee and the pygmies are found in conditions suggestive of the possibility of the discovery of fossils of their ancestry in a good state of preservation.

Until these new loci could be determined, the geological character of other regions where one of the three occurred was not such as to encourage hopes of the kind.

The writer is engaged upon the determination of these likely places, and wishes now to call attention to the matter, so that in the exploration going on in Africa the scientific importance of the matter may receive due attention. The pygmies are now known to have existed practically *in situ* for three thousand years, and there is abundant antecedent probability that the two great anthropoids there now have been there for as great or greater a length of time.

Indeed, the writer believes that it will soon be possible to indicate localities, of less than a few hundred square miles in area, in which the likelihood of discovering these fossils is very great. His own explorations have partly been responsible for this conclusion, and an increasing knowledge of the geology and petrology of the great African crest has helped to augment the surmise. Correspondence on this subject is invited.

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SPECIAL ARTICLES

A SIMPLE REFLECTION GONIOMETER

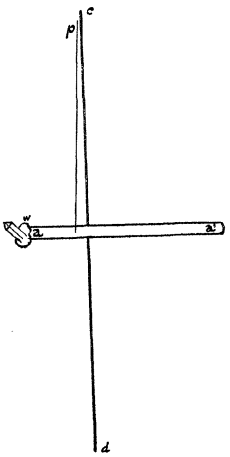
THE lack of a reflection goniometer has probably prevented many persons from measuring crystals and has consequently limited the study of crystals. The use of the contact goniometer is confined to fair-sized crystals with faces of appreciable size. Minute faces even on large crystals can not be measured by the contact goniometer.

In order to encourage the study of crystals the writer desires to describe a simple and convenient reflection goniometer which can be made of materials costing but fifty cents. It is simply Penfield's cardboard contact goniometer, model B,[1] fitted with an axis. The axis, upon one end of which the crystal is mounted, is provided with a pointer by which the interfacial angles may be read off.

The accompanying figure is a diagrammatic cross-section of the apparatus. *cd* is the cardboard protractor, consisting of a semi-circle of seven cm. diameter. *aa'* is the axis which is a cylindrical piece of wood four mm. in diameter and about five cm. in length. This axis must fit snugly into the eyelet of the protractor so as not to wobble when it is revolved. On one end of the axis is a piece of wax, *w*, upon which the crystal is mounted. *p* is a fine piece of wire attached to the axis, by means of which interfacial angles are read off on the protractor.

[1] Sold by E. L. Washburn & Co., New Haven, Conn. (price, 50 cents). It is better to cut off the celluloid arm of the protractor.

The crystal is mounted so that the intersection edges of the faces to be measured are parallel to and almost in line with the axis. The goniometer is held so that the crystal is close up to the eye, that is, with the protractor part extending perpendicularly in front of and away from one. The crystal is rotated by means of the axis until the reflected image of a window bar, electric light or similar object for a particular face coincides with



some line of reference such as a chalk mark on the floor, a ruler or the edge of a table. The reading is taken for this face, then the crystal is rotated until a similar image is obtained for an adjacent face. The difference between the two readings is the desired interfacial angle (supplement angle). And so on for other faces in the zone. As the protractor is a semi-circle, only 180° of a zone may be measured at one time and the crystal must be remounted for the rest of the zone. A face must always be connected up with its image.

The sources of error are: first, the edge can not be made to coincide exactly with the axis, and second, the angles can not be read much closer than quarter degrees. Yet the goniometer furnishes a simple method of measuring small crystals with bright faces even when the faces are minute, and of testing whether a given face lies in a given zone.

Some measurements obtained on pyrite crystals will show the accuracy of the instrument. The calculated angles are indicated in parentheses alongside the measured angles. 210 $\wedge$ 311 = 25° (25° 14′); 311 $\wedge$ 211 = 10° (10° 2′); 211 $\wedge$ 111 = 20° (19° 28′); 210 $\wedge$ 100 = 27° (26° 34′); 210 $\wedge$ 111 = 38° (39° 14′). These faces were all bright and gave good images, but some of them were less than one half mm. in width.

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The Existence of Rœstelia penicillata and its Telial Phase in North America

In taking up the study of the flora or fauna of a new region systematists attempt to make use of established names. In doing so they sometimes apply them to forms afterwards found to be wholly unlike those for which the name was originally intended. The name then occurs in the literature and the matter of determining what the species listed under it really are may require much subsequent study. Such is the case, in the mycological literature of North America, with *Rœstelia penicillata*,[1] a very old European name dating back to the time of the earliest mycological workers. It was chiefly applied by the first American authors attempting systematic work in this field to the form *Rœstelia pyrata*, now known to be distinctly American, but some other entirely distinct forms such as *Rœstelia globosa* and *Rœstelia lacerata* were often referred to it, so that it is not possible to determine in every instance just what species some earlier American writers had in mind when they used the name *R. penicillata*. It was frequently used in local catalogues and was much overworked, until somewhat later it was authentically shown by an American investigator[2] that the genuine *R. penicillata* of Europe was a very characteristic form differing materially from anything then known in this country. At that time, however, exploration had not extended beyond the eastern and central states, and that there should occur in the western mountains strange and different forms is not a matter of surprise, but that

[1] *Rœstelia penicillata* (Pers.) Fries, Sum. Veg. Scand., **2**: 510. 1849. (*Æcidium penicillatum* Pers.; Gmel. Syst. Nat., **2**: 1472. 1791.)

[2] Thaxter, *Proc. Am. Acad.*, **22**: 265. 1886.