for the isolation of the contagious cases. In the Hospital-Colonia of Curupaity is the section of clinical and experimental therapeutics. The school of Curupaity owes its importance in the center to the visit made to the colony in 1931 by Professor Nocht, well-known German expert, who went to Brazil for the League of Nations subsequent to the original proposition made by Professor Chagas.

DISCUSSION

CONCERNING FALLING CHIMNEYS

OCCASIONALLY one sees a photograph of a tall chimney caught in the act of falling to the ground. A characteristic feature of the fall is that the chimney may crack in mid-air soon after it starts to topple over, but the top of the chimney is observed to break *backward* instead of forward. The same phenomenon sometimes accompanies the felling of a tall tree. One may be tempted to speculate upon the cause of this peculiar behavior, for on first thought one might expect the top of the falling chimney to break over and fall forward. However, if the motion is considered as a *rotation* taking place about an axis at the base, it is evident that the break must be closely associated with the moment of inertia of the falling object. A simple analysis shows that, since all points of the chimney are moving with angular acceleration along the arcs of circles prior to the break, the center of percussion of the chimney is the point which has the natural acceleration of a particle moving under gravity along the same path. All parts of the chimney below its center of percussion are retarded; all parts above move with acceleration *greater* than they would have if constrained to move along the same paths under gravity alone. Hence there is an inertial reaction of the upper portion of the chimney which is opposite to the direction of motion, and the top lags behind. Breaks, if they occur at all, appear first above the center of percussion (Fig. 1a). Air

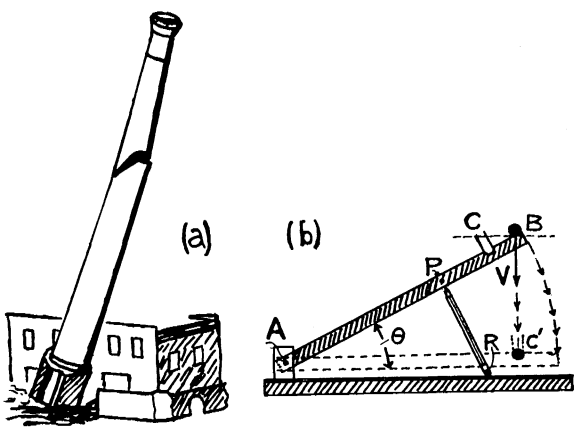

FIG. 1

resistance plays only a minor part, for such breaks develop before speeds commonly encountered in windstorms are reached. The gist of the matter is simply that the top of the chimney, barring such a break, would reach the ground sooner than could a freely moving particle traversing the same path under gravity alone. One might say that the "weight" of the upper portion of the falling chimney is effectively directed backward.

No doubt such an explanation of this interesting phenomenon is well known to engineers. However, two simple demonstrations have occurred to the author to illustrate the fact that the upper end of a toppling object moves with a linear acceleration greater than gravity would impart to a freely moving particle on the same path. The first illustration is effected with very limited facilities: simply take a meter stick and any heavy object, such as a paper weight. Support the object upon the right end of the stick while holding it horizontally with the index fingers of both hands. Release both ends at once, whereupon the stick and the object will be seen to fall together. Repeat the experiment, but this time place the index finger of the left hand *under* one end of the stick so that when the stick is released at the right end it will be forced to rotate about the left forefinger while falling. One might expect that since the left end of the stick is now restrained from falling, the right end would descend with vertical acceleration less than g and that the freely falling object would maintain contact with the right end of the stick or even get ahead of it. But the stick falls away from the object!

The second illustration is effected by means of a simple but entertaining gadget. A uniform stick AB (Fig. 1b) of any length (50 to 100 cm is convenient) is pivoted freely at A about a horizontal axis. At the end B there is bored a slight indentation just deep enough to retain a half inch steel ball. A light paper cylindrical cup is attached to the stick at C, where AC is 0.85 AB. The cup itself can be about 0.10 AB in height. Prop the stick AB by a lead pencil PR (eraser end at R to prevent slipping) in such a position that B is vertically above C′, the position occupied by C when the stick is horizontal. If, now, the prop is suddenly knocked out and the stick AB is allowed to fall, the freely falling ball B will drop into the cup! The whole motion is so rapid that the eye can scarcely follow it, but it proves conclusively that the end of the stick descends with vertical acceleration *greater than the acceleration of gravity*. The only condition imposed is that the angle θ shall not be too

great (less than 35°), and one must be careful not to increase the moment of inertia of the stick by the addition of a heavy cup at C. The prop PR should be so placed that it does not impart an upward motion to AB when struck.

The motion offers an interesting problem of analysis to the student of mechanics. In the case of a uniform stick where the center of percussion for axis A is at P (AP = 2/3 AB) the acceleration of P along its circular path is g cos θ; therefore the tangential acceleration of the end B is 3/2 g cos θ. The *vertical* component V of the end B is 3/2 $\cos^2\theta$; hence when $\cos^2\theta$ is greater than 2/3 the vertical component of end B is greater than *g*. This condition is satisfied for all angles θ less than 35°, in which case a ball placed at B will not fall so rapidly as the stick and the ball may be made to plummet directly into the cup. Obviously, in the case of a tall chimney, the heavy construction of the lower portions brings the center of percussion P closer to the base and exaggerates the effect which is demonstrated in this simple case of the rotating stick.

RICHARD M. SUTTON

DEPARTMENT OF PHYSICS
HAVERFORD COLLEGE

ORIENTAL PLANE TREE DISEASE

IN a study of the Hyphomycetes in North America[1] I called attention to a species of *Acrosporium* (Oidium) attacking the leaves of *Platanus orientalis* L. in Pittsburgh. Without specific name, the following description was given: Amphigenous, white, effused, forming a dense stratum on the leaf; mycelium branched, interwoven; sporophores erect, single, septate; spores smooth, ellipsoid, granular within, 25–27 × 40–50 μ.

During the past three years, I have collected the same plant on the same host in Philadelphia, Atlantic City and near Gettysburg. The plant attacks both the young and the older leaves. The leaves are disfigured and made unsightly. A white floccose stratum covering the entire leaf or part of the leaf readily distinguishes the fungus. When the plant is once known it can be recognized at a distance of several hundred feet. It may become a dangerous shade tree disease. The fungus belongs to the genus containing the conidial stages of the Erysiphaceae. I have not been able to find the perfect stage of this particular plant.

Mr. John A. Stevenson, mycologist in the Department of Agriculture, Washington, D. C., to whom specimens were sent, has compared the specimens with material in the Washington Herbarium. It seems to agree with a plant described from Louisiana on *Quercus* and also from West Virginia on *Platanus* under the name *Oidium obductum* Ellis and Langlois.[2] Mr. Stevenson also calls attention to the fact that Salmon combines *Oidium obductum* with *Phyllactinia corylea*, as variety *angulata*.[3]

The name of this fungus is still uncertain. Specimens of the conidial stage to determine its distribution and of the perfect stage, if found, will be gladly received.

DAVID R. SUMSTINE

CARNEGIE MUSEUM
PITTSBURGH, PA.

PIGMENTS OF THE OAT COLEOPTILE

THE light-growth and phototropic responses of *Avena sativa* coleoptiles are evoked almost exclusively by wave-lengths below 550 mμ.[1,2] The spectral sensitivity rises sharply at about 500 mμ and appears to possess at least two maxima, at 430–440 mμ and at 465–480 mμ.[2] It is probable that light influences initially a pigment, the absorption spectrum of which exhibits similar properties. This type of spectrum is characteristic of carotenoids.

In oat seedlings of the "Victory" strain (Siegeshafer), grown in darkness, the first leaf is yellow, due to carotenoid pigments, while the coleoptile appears to be quite colorless. Ethanol or ethanol-ether extracts of several hundred coleoptiles, however, are light yellow. Their pigments, partitioned between 90 per cent. methanol and benzine, separate into the familiar epiphasic carotene and hypophasic xanthophyll fractions. Estimated colorimetrically, from 0.5 to 0.9 γ of xanthophyll, and from one seventh to one third as much carotene, were obtained per 100 coleoptiles, 1.5 to 3 cm in length.

In groups of seedlings which had been exposed intermittently to red light, chlorophyll developed in the first leaf. In these cases small quantities of chlorophyll were found also in the coleoptile.

The *Avena* coleoptile therefore possesses the same pigments as the leaf, though in much lower concentrations. Its photosensitive system, like those of all other plant and animal organs so far investigated, is associated with the presence of carotenoids.

GEORGE WALD
H. G. DU BUY

BIOLOGICAL LABORATORIES OF
HARVARD UNIVERSITY

FLOOD CONTROL IN CONNECTICUT

MUCH serious thought has been given to the matter of preventing destruction by floods in the Connecticut Valley, especially since the bitter experience of 1936. One plan of control, a study of which has been di-

[1] *Mycologia*, 5: 58–59, 1913.
[2] *Jour. Myc.*, 6: 35, 1890.
[3] *Ann. Mycol.*, 3: 493–505, 1905.
[1] A. H. Blaauw, *Rec. trav. bot. néerl.*, 5: 209, 1909.
[2] F. Bachmann and F. Bergann, *Planta*, 10: 744, 1930; E. S. Johnston, *Smithsonian Misc. Collec.*, 92: 11, 1934; C. Haig, *Biol. Bull.*, 69: 305, 1935.