professor of geology, chemistry, agriculture, and first dean of the College of Agriculture, University of Missouri. First State Geologist of Missouri. Erected by Boone County Historical Society, Agricultural Club and Geological Club." Dr. Swallow began his career in the university on January, 1852. He resigned in 1853 to become state geologist, but returned to the university in 1870, remaining until 1882.

*The British Medical Journal* reports that the German Physiological Congress, which was to have been held this year at Innsbruck, has been indefinitely postponed. The following German congresses will be held in September: Society for Thalassotherapy at Norderney in the first week of September; twenty-second congress of the Society for Forensic and Social Medicine at Munich, September 4 to 7; Society for Study of Heredity at Göttingen, September 6 to 9; Society of History of Medicine at Erfurt, September 9 and 10; Orthopaedic Society at Leipzig, September 11 to 13; Society for Microbiology at Munich, September 21 to 23.

ABOUT 1,000 men in many states will be returned to work by the Department of Commerce as a result of the allocation of $2,600,000 by the Public Works Administration to the Coast and Geodetic Survey, according to an announcement made by Secretary Roper. Secretary Roper stated that the money will be expended within the next twelve months for the purpose of conducting surveying work throughout the country and along the Atlantic, Gulf and Pacific coasts. About 70 per cent. of the fund will be paid out directly as wages to men urgently in need of work, and the remainder will be spent chiefly for the operation of surveying parties. The work, while technical in character, is of such importance that, in spite of the recent depression, three states—North Carolina, California and New Jersey—have voluntarily contributed state funds in order that the work within their boundaries might be completed more promptly under the direction of the survey than would otherwise be possible.

*Nature* reports that the British Genetical Society is raising a fund for the benefit of genetical workers, regardless of nationality, who have lost their positions as a result of racial or political discrimination, to be administered by the society's committee, in cooperation with relief organizations. Grants will be made to as many individuals as the sum subscribed will warrant, in order to assist them to carry on research work in the British Empire.

A GRANT of $58,500 has been made to the Washington University School of Medicine from the Rockefeller Foundation towards the expense of conducting a five-year research project in the physiology of the nervous system. This grant will provide for the expansion of a comprehensive program of research on the nervous system, which has been under way in the School of Medicine for a number of years and in which several of the departments of the school have cooperated. The work to be done under the present grant will be conducted chiefly by Dr. George H. Bishop, professor of biophysics in the Washington University School of Medicine, and by Dr. S. Howard Bartley, research associate of biophysics and psychology. The work, which will be done in the laboratories of the Oscar Johnson Institute for Research, is based on the fundamental series of investigations on the nature of nervous activity carried out by Dr. Joseph Erlanger and Dr. Herbert S. Gasser, now of the Cornell University Medical College, and their associates in the department of physiology.

WITH a total number of 1,471,016 visitors checked through its doors from January 1 to July 23, inclusive, the Field Museum, Chicago, has had a gain in attendance of 585,057 persons thus far in 1933, or more than 66 per cent. as compared with 1932, when up to the same date the total attendance was 885,959. While a certain amount of this increase may be attributed to the museum's proximity to the grounds of A Century of Progress Exposition, there is said to be a large normal increase. The attendance from January 1 to May 26, 1933, inclusive (the period prior to the opening of the exposition), was 707,245, which compares with the 549,407 registered between the same two dates of 1932. Thus the pre-exposition period of 1933 shows an increase of 157,838, or more than 28 per cent. over 1932.

# DISCUSSION

## THE SCIENTIFIC WORK OF THE GOVERNMENT

AN appeal to the President on behalf of the scientific work of the government, recently much curtailed by cuts in appropriations, has been circulated in New York for signatures. It reads:

The undersigned hereby protests against the recent wholesale reductions, amounting to more than ten million dollars, in the Government appropriations for the Bureau of Standards, the Public Health Service, the Geological Survey, the Bureau of Mines, the Bureau of Fisheries, the various State agricultural experiment stations, and many other testing and research activities.

These reductions will result or have already resulted in the temporary or permanent dismissal of many hundreds of trained, able, and efficient scientists. They mean that many research projects of great importance for the

efficient operation of these branches of the Government will be abandoned, while valuable apparatus and equipment will lie idle. Unemployment will be increased at the very time when other branches of the Government are incurring large expenses in the effort to put men back to work.

Moreover, the savings which can result from these reductions are only a few millions, while at the same time the Government is making new appropriations of hundreds of millions of dollars for other purposes.

The undersigned believes that to neglect scientific research and to discharge highly trained research workers is a step backward and will prove very costly to the Government, and therefore most respectfully appeals to you to restore the appropriations for the scientific work of the Government.

For detailed information as to the situation in the Government Scientific Bureaus see *Science News Letter*, July 8, p. 31; July 15, pp. 35–39; July 22, pp. 51, 61; July 29, pp. 77–78; SCIENCE, July 21, pp. 53, 61; July 28, p. 86. The undersigned urge readers of SCIENCE to send to President Roosevelt the above or a similar appeal.

GEORGE B. PEGRAM
ARTHUR H. COMPTON
BERGEN DAVIS
DAVID SINCLAIR
WILLIAM F. BROWN

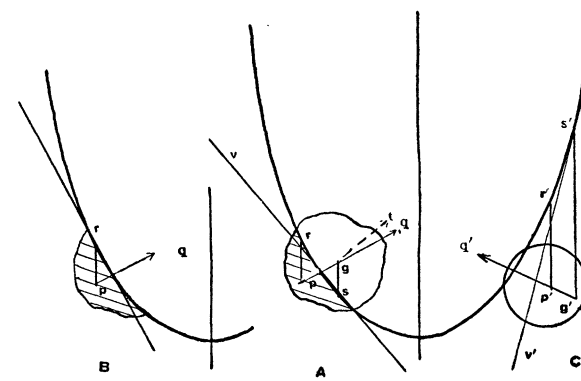
DEPARTMENT OF PHYSICS
COLUMBIA UNIVERSITY

## THE RESULTANT FORCE ACTING ON A SOLID BODY FLOATING IN A BOWL OF ROTATING LIQUID

THE phenomenon here noted does not appear to have been recorded in any of our books of reference.

Since all points in the surface of a fluid in steady rotation about a vertical axis are on the same equipotential, the normal to the surface at any point gives the "apparent vertical" and the tangent, the "apparent horizontal" for that point. Further, due to the fact that the acceleration of each particle in the fluid has no vertical component, equipotential surfaces in the body of the fluid are paraboloids of the same dimensions as that formed by the free surface, and they have the same axis. All the particles in a given line parallel to the axis of rotation are in one and the same condition as regards velocity, acceleration, etc., and thus will have a common direction for their "apparent vertical," and their "apparent horizontals" will all be parallel to the plane tangent to the free surface at the point where the line in question cuts that surface.

Let the figure at *a* represent a solid (say a ping-pong ball) floating on the surface of a steadily rotating fluid. The hatched part represents the volume formerly occupied by the displaced fluid. To get the direction and line of action of the resultant of all the forces exerted on the solid by the fluid, consider the solid removed and the hatched portion again occupied by fluid, as in *b*. Next suppose that this portion of fluid acts as a solid, losing all mobility of one part relatively to another, but retaining its shape and density. Let the center of mass of this solid be at *p*. Then as the resultant force ($m\ r\ \omega^2$) and the weight ($m\ g$) of the portion both act through the center of mass, the necessary condition for steady rotation is




that the resultant of the forces due to the fluid external to this solid also act through *p*, and that it lie along the "apparent vertical" for the point *p*, *i.e.*, along *p q* parallel to the normal to the surface at *r*, *p r* being parallel to the axis of rotation.

Return now to the floating body at *a*. This, when in a steady state, will move with its center of mass *g* on the line *p q* (otherwise it would rotate in the plane of the diagram). Here we meet two cases with different results. First, bodies with their center of mass on *p q* but nearer the axis than *p*, and those which float with the center of mass farther from the axis than the center of mass of the fluid they displace, as shown at *c*. In the first case, as has been shown, the force due to the fluid pressures acts along *p q*, which is normal to the tangent plane at *r*, while the "apparent vertical" for the body (its center of mass) is *g t* normal to the tangent plane at *s*. Thus there is a component of the force *p q* along the "apparent horizontal" for the body, *v s*, and it moves towards the axis of rotation to reach equilibrium only at the vertex of the paraboloid, where its center of mass is on the axis of rotation of the fluid. On the other hand, consider a wooden ball loaded with lead so that it will just float (as shown at *c*, center of mass at *g'*). The same argument shows that the resultant force due to the fluid pressure is along *q' p'* (normal to the tangent plane at *r'*, but that the "apparent horizontal" for the system is parallel to the tangent plane at *s'*. So there is a component along that plane *v' s'* away from the axis, and the body moves "down hill" to a