Company, on the subject, "Qualifications of a Research Physicist." The discussion was led by President Karl T. Compton, of the Massachusetts Institute of Technology. The attendance was about six hundred. A dinner and business meeting were held in the evening at which there was general discussion of the plans of the organization. The first annual meeting will he held in New Orleans in connection with the meetings of the American Association for the Advancement of Science, probably on December 31. The programs for this meeting are being arranged by the executive committee. Application has been made for affiliation with Section B of the American Association for the Advancement of Science. The association, which was organized at the Cleveland meeting, now numbers four hundred members. The campaign for increase of membership is continuing. Applications received prior to June 1 will result in enrolment of the applicant as a charter member. The secretary of the association is Professor William S. Webb, University of Kentucky, Lexington.

THE North Texas Biological Society, an organization made up of teachers and major students of biology and geology of a number of schools of North Central Texas, held a spring field meeting on May 1 and 2. More than sixty were in attendance at the meeting, which was held at the Worth Ranch Boy Scout camp in the Palo Pinto Mountains, west of Mineral Wells. The Friday evening program was given over to talks on the natural history of the region, while Saturday was spent entirely in field work. The plant students, under the direction of Professor Albert Ruth, of Fort Worth, dean of southwestern botanists, now eighty-seven years old, enjoyed particularly rich collecting.

THE reconstruction of the Royal Institution, in Albemarle Street, London, was celebrated on the evening of May 6 by a house warming, when guests were received by the president, Lord Eustace Percy, and the managers.

THE annual report of the National Institute of Industrial Psychology records that in every one of the many fields of the institute's activities 1930 has proved another record. Membership of the institute has increased from 1,430 to 1,600. The number of applicants for vocational guidance has increased by more than 50 per cent. compared with 1929. Investigations in factories, etc., have covered a varied field, and it is pointed out that "In a review of the past ten years the most satisfactory feature has been that not only have investigations been carried on for periods varying from one to eight years, but firms have come back to the institute for further help.

MR. SCOTT TURNER, director of the United States Bureau of Mines, estimated the total value of mineral products in the United States in 1930 to be approximately $4,795,000,000. This is a drop of about 18 per cent. from the total value of mineral products in 1929. Declines in values, accounted for both by lower unit prices and by the falling off in output of nearly all mineral products, are principally explained by the depression prevailing during the year in most lines of industrial activity. The total value of metallic products in 1930 decreased about 33 per cent., as compared with 1929. Notable decreases in total values, ranging from approximately 25 to 50 per cent., were recorded for copper, iron, silver, lead and zinc, but the value of gold production increased slightly. The total value of nonmetallic mineral products in 1930 decreased about 15 per cent. from the preceding year. Of the mineral fuels, the total value of natural gas increased, while the total values of bituminous coal, natural gasoline and petroleum recorded sharp declines.

DISCUSSION

UNDERTOW AND RIP TIDES

SEVERAL years ago I contributed an inquiry to these pages on the disputed subject of the undertow, which is supposed to drag surf-swimmers below the water surface and drown them. The inquiry aroused some discussion but brought forward little positive knowledge. One correspondent described a *surface* current, deflected off shore by a groin, as an "undertow," but without citing any evidence to show that it towed swimmers *under* water. Another implied a dangerous state of things in the so-called "rip tide" at Long Beach, a shore resort south of Los Angeles, California, by writing that, if I would come out there and try sea bathing, he would pay my funeral expenses; but apart from that tragic aspect of the case he gave no information whatever. One correspondent, a good swimmer, described a moderate, outgoing under-current that was felt outside of the surf in a small bay; such a current as one might suppose could be produced in compensation for an inward surface drift caused by a strong on-shore wind; but no on-shore wind or drift was mentioned. No one gave a careful description of an actual undertow that he had experienced, distinguishing it critically from the ordinary oscillatory movements of the water in the swell and surf near a beach; no one described an undertow as a recurring phenomenon, definitely related to the pattern of the shore and the form of the

bottom, or to the stage of the tide or the conditions of wind and weather. It seems reasonable, therefore, to regard the undertow as a somewhat imaginary quantity, the supposed occurrence of which depends largely on the excited sensations of poor swimmers. The fact that floating objects are not ordinarily carried in towards a beach suffices to show that no persistent under-current can be moving outward from it. Let it be understood, however, that a very real out-going movement takes place under the up-rush of the water from a breaking wave upon a sloping beach, for this is the compensating reflux of the preceding up-rush; but it is little felt outside of the line of breakers. Let it be noted also that, next outside of the breakers, the normal water movement of the water in a wave trough is outward; and that this movement is faster at the surface than at the bottom and that it is reversed to a shoreward movement when the next swell arrives. It has no significant under-dragging power. A real undertow should not be confused with these ordinary, systematic movements.

Now as to "rip tides." In the first place they are not to be confounded with "tide rips," such as are commonly seen in the waters around Cape Cod; for tide rips are simply standing waves caused by rather strong tidal currents running over a shallow bottom and increased by an opposing wind. Rip tides are something else, and they are regarded as extremely dangerous to swimmers at the above-named Long Beach; but just what they are is about as difficult to learn as to discover what the mythical undertow is. A recent number of the Los Angeles *Examiner* reproduced what is called an "amazing photo of a rip tide at one of the beaches" without specification of the locality; but the picture is so vague that little can be made of it, except that it shows a whitish patch as if of foaming surface water in the otherwise darker water. The accompanying text states that "the danger spots are rip tides—deep gullies between pairs of whirlpools—caused by winter storms. When the tide is going out, these have terrific dragging force and cast swimmers into the eddies. . . . Nearly all the beaches have rip tides at this equinoctial season, and bathers are advised to consult life guards before entering the water." If a bather is caught in a rip tide he is advised to swim with it, not against it, for he will then be "carried in a curving line back into shallow water."

From other reports that I have read there is no question that the Long Beach rip tides are fraught with danger, but their real nature remains obscure. If the above account of them is taken literally, a rip tide is not a current of water but a "deep gully between a pair of whirlpools, caused by winter storms." Moreover, "these [deep gullies?] have terrific dragging force and cast swimmers into the eddies"; yet a few lines farther on a swimmer is advised to swim with the rip tide, and thus "be carried in a curving line," not into an eddy or gully of terrific dragging force, but "back into shallow water." These irreconcilable statements are fair examples of what is commonly told about undertow as well as about rip tides. Surely, rip tides can not be excavations in the shallow sea floor caused by the storms of a preceding winter; they must be currents, probably of more or less curving, possibly of whirling or vorticular flow; and if such currents really have the terrific dragging force that is attributed to them, they and not the storms of a preceding winter may excavate the deep gullies that are said to be associated with them.

The shore at Long Beach is a long curve concave to the Pacific on the south; it has been cut back in several low bluffs of weak sandy strata, and its beach has been built across two or more shallow intervening embayments under the action of a west-moving backset current, driven by the dominant southeastward current which is there held off shore by the peninsular promontory of San Pedro, farther west. The bottom deepens slowly, so that bathers may wade some distance from the beach before they have to swim. Motor boats are not rare thereabouts and it would seem that they might be easily used to determine just what a rip tide really is; but I have not been able to discover that any such study has thus far been made. A life guard whom I questioned on the beach during a brief visit two summers ago could give no clear account of what takes place when a rip tide is seen, or of the conditions which control its occurrence. Can any reader of SCIENCE give a clear account of these curious phenomena? Are they known and feared on other coasts, like that of Texas and New Jersey, as well as of southern California? Accurate information is much desired. My address from April to August will be 1351 Byron St., Palo Alto, Calif.

W. M. DAVIS

PALO ALTO, CALIFORNIA

NEW MASTODON FINDS IN EUROPEAN TURKEY

THIS note is a preliminary paper sent in now because it is all that can be done at present. Notes, photos and maps are available, and it is expected that a fuller account of the discoveries will be prepared for the *American Journal of Science* within the year, after the author returns home.

About twelve and fifteen miles west of Istanbul are two bays, Large and Small Chekmedje, drowned valleys, carved by streams since the last larger uplift of the region. The railroad from Sofia to Istanbul