director of the Virginia Truck Experiment Station at Norfolk. He will take up his new work on July 1.

DR. J. BROOKES KNIGHT, lecturer and curator of paleozoic invertebrates in the department of geology of Princeton University, has been appointed research associate in paleontology at the Smithsonian Institution. He will work at the U. S. National Museum beginning on July 1.

DR. DAVID F. SMITH, director of research of Johnson and Johnson, New Brunswick, N. J., has been elected a member of the board of directors of the company.

DISCUSSION

HEPATIC "INACTIVATION" OF ESTROGENS

LIPSCHÜTZ *et al.*[1] recently presented data purporting to indicate "that the liver is able to inactivate great quantities of estriol and equilinin." This conclusion was reached on the basis of the relatively poor "fibrous tumoral effect" of these agents when implanted in the spleen of guinea pigs as compared with subcutaneous implantation.

We[2,3] have shown that large amounts of endogenous and exogenous estrogen are excreted in the bile of dogs and human subjects; the rapid disappearance of exogenous estrogen from the systemic circulation and urine is due to this mechanism and not to its rapid destruction or inactivation by the liver. When a 15 mg pellet of alpha-estradiol was implanted in the spleen of a bile-fistula dog, estrogen was excreted in the bile in large amounts for at least 23 days, although no estrogenic activity could be demonstrated in the urine at any time during this period.[3] This is conclusive evidence that with splenic implantation the absence of any type of effect dependent upon the presence of estrogen in the systemic circulation can not be interpreted as indicating its rapid destruction by the liver.

There can be no doubt that the liver is capable of inactivating estrogens *in vitro*, but that it does so rapidly *in vivo* is highly questionable. The results of all experiments on which this hypothesis is based prove only that the normal liver prevents estrogens from entering the systemic circulation in effective concentration. This could be accomplished by biliary excretion and subsequent enterohepatic circulation (as is the case with bile acids) as well as by rapid destruction in the liver. The latter hypothesis not only lacks incontrovertible proof but is indeed directly contradicted by our findings.

A. CANTAROW
K. E. PASCHKIS
A. E. RAKOFF

JEFFERSON MEDICAL COLLEGE,
PHILADELPHIA, PA.

[1] A. Lipschütz, C. Becker, R. F. Mello and A. Riesco, SCIENCE, 101: 410, 1945.

[2] A. Cantarow, A. E. Rakoff, K. E. Paschkis, L. P. Hansen and A. A. Walkling, *Endocrinology*, 31: 515, 1942.

[3] A. Cantarow, A. E. Rakoff, K. E. Paschkis, L. P. Hansen and A. A. Walkling, *Proc. Soc. Exp. Biol. and Med.*, 52: 256, 1943.

A POSSIBLE CASE OF FICTITIOUS CONTINENTAL DRIFT

ONE point has apparently been overlooked in connection with early determinations of longitude cited as observational evidence in connection with the Wegener hypothesis of continental drift.[1] These earlier longitudes were determined from occultations of stars by the moon. The point is not the relatively low degree of accuracy attainable by this method; that point is conceded by all. The point is that longitudes determined from occultations are essentially different in character from longitudes determined by the observation of local times and the exchange of telegraphic or radio time signals.

An ordinary difference of longitude obtained from the exchange of time signals necessarily depends on the directions of the plumb lines at the two points involved. Ultimately we get back to the plumb line at Greenwich. The plumb line at either point may be deflected from what may be conceived as its normal direction. The deflection is due to the visible irregularities in the conformation of the earth's surface and to the invisible irregularities in the densities of the surrounding portions of the earth's crust.

On the other hand, if we examine the underlying equations used to determine longitudes from occultations, we shall find that the longitudes—and the latitudes also—implied in these equations depend not at all upon the direction of the plumb line but depend solely upon position with respect to the center and axis of the earth. They are latitudes and longitudes such as the geodesist would very much like to know, latitudes and longitudes freed from the effect of the irregular deflections of the plumb line. These latitudes and longitudes might be appropriately termed "ideal geodetic" latitudes and longitudes.

Why this should be so is easily seen. It is convenient to follow the course of an occultation or of a solar eclipse by thinking of the apparent sweep of the moon's shadow across the face of the earth as

[1] A. Wegener. Die Entstehung der Kontinente und Ozeane. 4th ed., 1929, Chap. 3; C. R. Longwell, SCIENCE, 100: 403–404, 1944.

the moon moves in its orbit (the sun also, if an eclipse is considered) and as the earth rotates on its axis. For a given place an eclipse begins or ends at the instant of (Greenwich) time when the exact edge of the shadow reaches the place. For a given place this (Greenwich) instant time will be determined by the *position* of the place with reference to the body of the earth, that is, by its ideal geodetic latitude and longitude—also by its radial distance from the earth's center—and not at all by the direction that the plumb line at that place may happen to take. The direction of the plumb line might vary widely and wildly from the normal without affecting the times of the various phases of the eclipse or occultation. The direction of the plumb line would, of course, affect the local time and hence the inferred longitude, but the equations for determining the longitude from an eclipse assume that the ideal geodetic longitude and the actual longitude affected by a deflection are identical.

The geodesist may be able on the basis of extensive and careful surveys to obtain approximations to these ideal geodetic latitudes and longitudes. But his results are based on studies of limited regions, of a continent at most, not on surveys of all the continents and of all the oceans, such as would be necessary to get really accurate values of ideal geodetic latitudes and longitudes.

How large are the differences between the astronomer's ordinary latitudes and longitudes, which depend on the direction of the plumb line, and the geodesist's latitudes and longitudes, from which the effects of the irregular deflections of the plumb line have been at least partially eliminated and which are thus approximations to ideal geodetic latitudes and longitudes? These differences are commonly known as deflections of the plumb line. Deflections of 5″ are commonplace, of 10″ are common enough; deflections of 20″ are not rare and even larger deflections are sometimes found in mountainous country and on oceanic islands. One second of arc corresponds to about 100 feet in meridional distance on the surface of the earth; one second of deflection in longitude corresponds in latitude 45° to 72 feet measured perpendicular to the meridian. By confounding the two kinds of latitude and longitude we may thus make errors in location of many hundreds of feet.

An argument in favor of the Wegener theory based on a comparison of differences of ideal geodetic longitude derived from lunar occultations—and supposed accurate—with differences of ordinary astronomical longitude derived from exchanges of time signals would therefore be fallacious. The two kinds of longitude are different and a fictitious continental drift of hundreds of feet may be apparently "proved," if the two kinds are confounded.

This discussion has, of course, no bearing on a comparison of earlier differences of longitude with later determinations, both determinations being based on time signals.

WALTER D. LAMBERT
U. S. COAST AND GEODETIC SURVEY

FOSSIL DISCOVERY NEAR SAN FRANCISCO

A FOSSIL deposit recently discovered near San Francisco Bay in California has been found to contain, all in close relationship, elephant bones, the tooth of a prehistoric horse, insect remains and a wide variety of botanical specimens.

The location of the discovery is in the unincorporated village of Millbrae, south of San Francisco, on the peninsula that separates the bay from the ocean. The bay at this point is skirted by a wide strip of former salt marsh which has been drained and used for farming and pasture. The fossil deposit was found under one of a series of low hills that protrude into the edge of the former salt marsh, about three fourths of a mile from the shore of the bay on one side, and about the same distance from the foot of larger hills on the other.

To the west, forming the backbone of the peninsula, is a range of hills that reach an altitude of 1,200 feet. The hill at the edge of the salt marsh, which at the point of the discovery attained an elevation of about 20 feet above sea level, was being cut down and leveled off for a housing project when, about 12 feet under the former hill top, the grading machinery cut through the stump of a tree and an elephant's tusk. A careful investigation of the area was immediately undertaken, and excavation of the fossils has now been completed.

Ten elephant tusks were found, but the bones, teeth and tusks, while generally grouped in positions according to size, thus seeming to indicate where the bodies had originally lain, were not articulated in the form of skeletons, nor were all the parts of any one skeleton found.

The largest tusk was approximately ten feet in length and eight inches in maximum diameter, while the smallest was only about four feet long. The largest tusks were sharply curved in two dimensions, while the smaller ones tended to be more nearly straight.

Because of the advanced state of decay in which the fossils were found, it was only with great care and the use of plaster casts that any of the tusks or bones were preserved. Tusks that appeared to be sound shattered into small bits at the first attempt to move them, and the bones were usually more fragile than the matrix that surrounded them. Portions of bones were partially mineralized, while other portions, sometimes of the same bone, had completely disap-