As to the existence of the periodic variations of gravity, which Courvoisier observed to be of the order $dg/g = 3 \div 6 \times 10^{-6}$, the problem is different. Up to the present we have so little experimental knowledge about gravity that such alterations through cosmic movement of the earth, which undoubtedly exists, cannot be ruled out as impossible.

For these reasons we have tried to study the tidal variations of gravity with all the exactness attainable. We succeeded in increasing the sensitivity and, above all, in reducing the perturbations to such a degree that we are now able to give certain proof of periodic variations of gravity of the order $dg/g = 10^{-8}$. We used a bifilar gravimeter which, by suitable choice of dimensions, could be made so sensitive as to record a variation of gravity of $10^{-7}g$ by a deflexion of about 2-3 mm. In order to prevent the apparatus from being disturbed by changes of atmospheric pressure and humidity, it was sealed up hermetically. In order to avoid vibrations of the ground, it was erected 20 m. inside a mountain, in a special room about 25 m. below the surface. Registration as well as exact adjustment was done from another room equally isolated. Thus the constancy of temperature during a measuring period of two to three days in each special case amounted to 1/1000°.

Even in the unreduced curves the results obtained did not show any greater variations than about $2 \cdot 3 \times 10^{-7}$, as the order of the tide-effects of the sun and the moon.

Adjusting the curves to sidereal time, during the period of observation up to the present time (7 weeks), it appears that any cosmic influence on gravity cannot exceed the order of about $10^{-8}g$. Therefore the variation of gravity asserted by Courvoisier of about $10^{-6}g$ in consequence of the cosmic movement of the earth does not exist.

On account of their geophysical interest the experiments are to be continued with further improvements.

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Marburg/Lahn, Dec. 1.

Artefacts of Upper Palæolithic Facies from Coombe Deposits underlying the Gravels of the Flood Plain.

I HAVE lately recorded in these columns[1] the occurrence, south of the Thames, of a 'floor' yielding flint implements of Upper Palæolithic types and fragments of coarse pottery inter-stratified between Coombe Deposits. The relation of these Coombe Deposits to the Gravels of the Flood Plain has been clearly demonstrated, north of the Thames, by the officers of the Geological Survey.[2] For there the Flood Plain Gravels may be seen overlying the Coombe Deposits; the latter, as at Greenhithe, consisting, in ascending order, of Coombe Rock, coarse gravel, brickearth, and stony loam containing 'rafts' of Coombe Rock.

I am now able to report that this brickearth or 'sandy loam' yields artefacts presenting the same characteristics as do those from the brickearth at Greenhithe.

It is generally accepted that the Magdalenian horizon occurs resting upon the surface of the Flood Plain Gravels, whilst the Solutrian level immediately underlies them;[3] so that on stratigraphical evidence the Greenhithe series must belong to a period even more remote, that is, Aurignacian-Upper Mousterian times.

Through the good offices of the managing director of the Associated Portland Cement Manufacturers Co., Ltd., I am conducting an examination of the deposits in question, and the results obtained will be fully published in due course. J. P. T. BURCHELL.

30 Southwick Street,
Hyde Park, W.2, Nov. 27.

[1] NATURE, **128**, 548, Sept. 26, 1931; **128**, 909, Nov. 28, 1931.
[2] *Mem. Geol. Survey*, 1924, Dartford, pp. 107 and 109.
[3] Moir, J. Reid, *Proc. Prehist. Soc. E. Anglia*, **6**, 200; 1930.

Diamagnetism of Liquid Mixtures.

AN investigation of binary mixtures of diamagnetic substances (one of the substances being water) made in this laboratory has shown a small but definite departure from additivity. The measurements are made with an improved Curie-Cheneveau magnetic balance.[1] In view of the controversy concerning chloroform-acetone mixtures, it has been of interest to examine this system.

The susceptibility-concentration curve is not straight, but any departure from additivity is small—unlike that found by Trew and Spencer.[2] The curve is of the same type as found by Buchner[3] for alcohol-carbon disulphide. There is a flat maximum at equimolecular proportions of the two substances, which shows the diamagnetic susceptibility at this point to be 3-4 per cent higher than additivity. The two minima on the curve show a departure from additivity of the same order. An interesting point is that at the two ends of the curve there is a slight rise in diamagnetism, showing, possibly, molecular dissociation when a small quantity of one liquid is added to the other. The departure from additivity is of the same order, three per cent, as that recorded by Ranganadham,[4] and slightly greater than the two per cent recorded by Buchner.[5]

Trifonov[6] has described a curve for chloroform-acetone concave towards the abscissæ. The values found here for the susceptibility of the pure substances are in agreement with other investigators, $-0 \cdot 60 \times 10^{-6}$ for acetone, and $-0 \cdot 498 \times 10^{-6}$ for chloroform.

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[1] *Phil. Mag.*, **12**, 283; 1931.
[2] *Proc. Roy. Soc.*, A, **131**, 204; 1931.
[3] *Zeit. für Physik*, **72**, 344; 1931.
[4] NATURE, **127**, 975, June 27, 1931.
[5] NATURE, **128**, 301, Aug. 22, 1931.
[6] *Ann. Inst. Anal. Physico-Chem.*, Leningrad, **3**, 434; 1926.

General Expression for Intensity of Hydrogen Lines.

I HAVE obtained a formula for the total intensity of hydrogen lines in the general case of the transition $n \longrightarrow n'$. The calculation is based on the principles set out in Sommerfeld's "Wave Mechanics" for the determination of intensities.

The corresponding formulæ for the special cases of $n' = 1$, $n' = 2$ were published some time ago and are as follows:

$$n' = 1 \quad \frac{2^7(n-1)^{2n-1}}{n(n+1)^{2n+1}}$$

$$n' = 2 \quad \frac{2^6(n-2)^{2n-3}}{n(n+2)^{2n+3}}(3n^2-4)(5n^2-4).$$

I have proved that in the general case the total intensity can be expressed in terms of hypergeometric series in the following form:

$$\frac{2^4(n-n')^{2n+2n'-1}}{n^2n'^2(n+n')^{2n+2n'}}\left\{\left[F\left(-n+1, -n'; 1; -\frac{4nn'}{(n-n')^2}\right)\right]^2 - \left[F\left(-n'+1, -n; 1; -\frac{4nn'}{(n-n')^2}\right)\right]^2\right\}.$$

L. MCLEAN.

69 Gloucester Place, London, W.1, Nov. 15.