Terraces and of the cold period at the base of the latter." [1]

The deposits composing the infilling of the lower part of this valley are shown by the Survey to be "Brickearth 2 to 4 feet", "Gravel with big flints 0 to 6 feet", and "Chalk Rubble 6 feet"; whilst in the tramway-cutting immediately west of Cobham Terrace a section is recorded as "Brickearth 2 feet", "Gravel 4 feet", and "Chalk Rubble 8 feet".

Here, as in the lateral valley to the east,[2] I have found the stoneless brickearth, which rests upon the melt-water gravels of the Coombe Rock and underlies the stony loam, to contain artefacts of Upper Palæolithic types together with calcined flints. In places the Bean-Greenhithe brickearth is calcareous and tufaceous, when, in addition to the implements exhibiting a white porcellanous patination, the shells of various land molluscs of temperate species have been preserved in the deposit.

The researches I have undertaken within the area included on Sheet IX., N.E. Kent, 6 in. to 1 m., definitely establish a break in the deposition of the Coombe Deposits, a break which occurred after the melt-waters of the Coombe Rock glaciation had subsided, but prior to the deposition of the stoneless brickearth.[3]

In the geological sequence the Survey places the Coombe Deposits between the formation of the Middle and Low Terraces: this correlation is supported on archæological evidence in the vicinity of Belmont Castle, Grays, Essex, where the Coombe Deposits are overlain by the Upper Flood Plain gravels.[4]

The break in the deposition of the Coombe Deposits referred to above must necessarily represent the interglacial phase coincident with the Upper Palæolithic (Upper Mousterian, Aurignacian, and Solutrian) period.

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[1] *Mem. Geol. Survey* (London District), 1922, pp. 59-60.
[2] NATURE, Sept. 26, 1931.
[3] NATURE, Nov. 28, 1931.
[4] NATURE, Jan. 2, 1932.

Structure and Development of Temperature Inversions in the Atmosphere.

THE present view of the development of temperature inversions in the atmosphere with a sudden decrease of humidity with increase of height as due to a general slow descent of air from higher levels,[1] regards the appearance of the temperature discontinuity as a condition precedent to the development of humidity discontinuity in the form of a haze or cloud layer below it. Kopp,[2] however, from the experience of his aeroplane flights, pointed out that after the passage of a cyclone, humidity discontinuity in the form of haze or cloud layer precedes the temperature discontinuity, the latter being probably brought into existence as a result of radiation from the haze or cloud layers. An examination of Lindeberg and Berlin kite and aeroplane ascents confirms the view that dry inversions in the free atmosphere can and do owe their origin to humidity discontinuities in the form of haze layers or cloud sheets.

In a forthcoming publication, we have discussed the rôle of subsidence and radiation in the production of inversions both qualitatively and quantitatively. It has been shown that subsidence combined with turbulence up to a definite limit [3] cannot adequately explain the development and maintenance of dry horizontal inversions in anticyclonic weather, but that radiation from the top of cloud or haze layers combined with turbulence up to a definite limit offers a more satisfactory explanation. Taking, for example, a cloud sheet at a temperature of 273° abs. with air of 40 per cent humidity above it, and assuming the eddy conductivity within the cloud to be 10^3 C.G.S. units, the cooling of the top of the cloud by radiation in 10 hours comes out to be of the order of 25° C. If the eddy conductivity is increased to 10^4 C.G.S. units, the cooling becomes 8° C.; with another cloud sheet above with the temperature of its base at 263° abs. the cooling comes out to be 5° C. and 2° C. respectively. The spreading upward of this cooling by radiative diffusion and eddy conduction has been calculated in the way suggested by Brunt.[4] The temperature-height curves thus obtained above the cloud agree with observed results.

On the basis of Mendenhall and Mason's experiments [5] on the "stratified subsidence of suspended particles", a mechanism has also been suggested for the production of a number of haze layers in the atmosphere met with in one single aeroplane ascent after the passage of a cyclone. These haze layers give rise to humidity discontinuities, and in some cases to cloud sheets later, which in turn are responsible for the development of dry inversions.

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[1] Hann Suring, "Lehrbuch der Meteorologie", 1926, p. 164.
[2] Beit, "Zür Phy. der freien Atmos.", Hergeseli-Festschrift, p. 266; 1929.
[3] Douglas, *Q.J.R. Met. Soc.*, **55**, p. 137, paras. 4, 7; 1929.
[4] *Proc. Roy. Soc.*, A, **130**; 1930.
[5] *Proc. Nat. Acad. Sci.*, U.S.A., **9**, pp. 199-207; 1923. See also Morrison, *Proc. Roy. Soc.*, A, **108**, pp. 280-284; 1925.

Thermal Chlorination of Methane.

ON correlating the data in two recent papers [1, 2] on the thermal chlorination of methane and methyl chloride, it appears that there is a possibility that the four hydrogen atoms of methane are not simultaneously equally available for chlorination, but that after the substitution of one of them the other three are.

Pease and Waltz [2] have shown that the chlorination of methyl chloride proceeds more rapidly than the chlorination of methane, that is, the relative reaction velocities of methane and methyl chloride chlorination are not in the proportion of the numbers of hydrogen atoms in the molecules, and therefore not in agreement with this postulate in the derivation of Martin and Fuchs's [3] kinetic formulæ. The published results of Mason and Wheeler's experiments on the chlorination of methyl chloride (these are, of course, liable to error on account of the approximate fractionation methods used, though the error has been corrected for so far as possible) are in agreement with Martin and Fuchs's kinetic formulæ for a three-stage reaction, from which it would appear that the three remaining hydrogen atoms are equally available for chlorination, and that the relative reaction velocities for the successive stages are proportional to the numbers of residual hydrogen atoms.

Although Mason and Wheeler's results with methane are in fair agreement with the kinetic four-stage formulæ of Martin and Fuchs, it is apparent on close inspection that the amounts of methyl chloride and methylene chloride formed are respectively less and more than the amounts demanded by theory, although it would be expected from calculation that the methyl chloride would not be underestimated in the experiments with a large excess of methane. The results are in general agreement with those of Martin and