atmospheric fluctuations. Using the DB method we sometimes found a noise level as expected from the system noise temperature only.

Fig. 2 shows a number of comparative recordings made under various conditions with the two methods. The temperature scale is in equivalent antenna temperature.

Rejection factors close to 50 have been obtained at 2 cm during bad weather for the atmospheric noise. In fairly good observing conditions a factor of five is still quite normal. At 6 cm the SB fluctuations are considerably less, although certainly significant when a low noise receiver is used (Fig. 2). At 9·5 mm the atmospheric fluctuations are big; the suppression factors are somewhat smaller because of the higher noise level of our present receiver.

In the millimetre wavelength range, where the atmospheric effects are particularly serious, the DB method is expected to give a large increase in usable observing time. It may well be the only way of making reliable observations when more sensitive receivers for this frequency region become available. The dual beam method has been used with satisfactory results by Epstein[2] with a 3·3 mm receiver on a 15 ft. antenna.

These experiments should be capable of providing meteorological data. An analysis of the noise fluctuations yields an average scale length for the turbulons of about three times the antenna diameter, that is 150 m.

The experiments have shown that it is entirely feasible to observe in the DB mode under most weather conditions, as long as atmospheric attenuation is not prohibitive, at times when clouds and rain make SB observations impossible. The influence of different beam separation will be the subject of further investigation. A more extensive account of the measurements and further analysis of the data are planned for a subsequent paper.

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A Micro-fauna from the Bagshot Beds, Eocene, of the London Basin

THE highest Eocene deposits in the London Basin were originally described by Prestwich[1] as the Bagshot Sands. He subdivided these sands into lower, middle and upper divisions. Today, these are recognized as the Bagshot, Bracklesham and Barton Beds respectively on correlation with exposures in the Hampshire Basin[2,3]. Research into the petrography and environment of deposition of the lowest of these divisions, the Bagshot Beds *sensu strictu*, has included an extensive search for a fauna in deposits which many authors describe as being almost unfossiliferous[4,5].

A very restricted macro-fauna has been recorded from the Bagshot Beds, although very little of this material now appears to be available for examination. Whittaker[6] referred to "a piece of the cast of a whorled univalve (*Turritella* ?) that had been found in a ferruginous concretion at Hampstead". Monckton and Herries[7] also reported "finding some casts of shells in sand at Mill Green, north of Frierning, in Essex". Their specimens, which were ferruginous and fragile, were assigned to the following genera: *Natica* sp., *Turritella* sp., and *Voluta* sp. Casts of undescribed lamellibranchs are mentioned in a paper by Salter[8] from the Langdon Hills, Essex; and Hawkins[9] records the presence of *Venericardia planicosta suessonensis* d'Archiac from borehole material in the Enbourne Valley, Berkshire. I have found extensive plant debris from widespread localities in the Bagshot Beds. The fish teeth described by Coomarswarmy[10] from Surrey were undoubtedly collected from higher Bracklesham and Barton Beds.

Techniques for separating hollow micro-fossils described by Cushman[11] have been modified in the Bagshot Bed investigations described here. After an extensive search, a small but diverse micro-fauna has been revealed from certain restricted horizons in the succession. Siliceous sterrasters of the sponge *Geodia* sp.[12] have been identified from twenty of the many Bagshot Bed samples examined. These, because of the large numbers in which they are found, are regarded as indigenous to the deposits, and favour the view that the Beds were, at least in part, deposited in a marine environment. Thirteen of the samples bearing spicules have also yielded well preserved foraminifera. In contrast, these are derived forms from the Cretaceous (Senonian) as proved by forms such as *Bolividinoides* sp. and *Globotruncana* sp. and are consequently of importance in determining the provenance of the deposits. The foraminifera are rarely replaced but often infilled and for this reason are difficult to place systematically. Species of the eight genera, *Bolividinoides* sp., *Cibicides* sp., *Epistominella* sp., *Globeriginella* sp., *Globotruncana* sp., *Gumbelina* sp., *Gyroidina* sp., and *Lenticulina* sp., have so far been recorded.

The restricted vertical distribution of the Bagshot Bed samples bearing micro-fossils, through Surrey and the Rayleigh and Hadleigh outliers in Essex, has enabled correlation within the deposits to be made with greatly increased accuracy.

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THE SOLID STATE

Hyper-velocity Crater Size and Target Strength

IT has been shown[1–3] that at ambient temperature the hyper-velocity force per unit area of crater surface can be related to the engineering ultimate tensile strength of a material by the expression $d^3 = mv^2/4\pi S$ where d is the depth (or radius) of a hemispherical crater, m and v are the mass and velocity of the projectile, and S is the measured ultimate tensile strength of the target. Aluminium alloys were divided[4] into two groups on the basis of their ultimate tensile strength at room temperature; those having a strength of 4×10^9 dynes/cm^2 or larger were not corrected for relaxation while those with strengths of 3×10^9 dynes/cm^2 and less were increased by 25 per cent to obtain agreement between the target strength and impact force per unit area. The relaxation correction is an all-embracing term which includes the correction for relaxation of the target material after release of the impact pressure and other effects such as the error in the determination of the strength of very ductile materials caused by necking during loading.

The strength of an alloy can be controlled by increasing or decreasing the temperature. The proposed model of cratering can therefore be examined by testing an alloy