the last mineral formed in the rock and replaces chlorite and feldspar. It is also a constituent of small veins and fills occasional druses in the rock. The mineral is intensely pleochroic from pale yellow to a deep golden-brown or black and often shows varying degrees of alteration to a sub-isotropic reddish-brown vermiculite. The form and general characters of the mineral are identical with those of stilpnomelane from California[3].

A chemical analysis of the stilpnomelane-bearing granophyre gave the following: SiO_2 58·97, TiO_2 1·93, Al_2O_3 14·31, Fe_2O_3 2·10, FeO 9·21, MnO 0·21, MgO 2·37, CaO 2·76, Na_2O 4·60, K_2O 0·14, H_2O^+ 3·08, H_2O^- 0·14, P_2O_5 0·78, CO_2 0·00. Total 100·60 (analyst T. W. Bloxam). Detailed optical and chemical analyses of the stilpnomelane will be given in a later communication.

The mode of occurrence and relationships of the mineral are very similar to those of the stilpnomelane[4] from the Skaergaard intrusion, east Greenland. It is probable that the 'biotite' from the Cregennen granophyre[2] is in fact stilpnomelane—a conclusion which is supported by the low K_2O-content of the analysed rock.

Stilpnomelane in the acid tuffs has the same form as that in the basic granophyres, but shows less alteration to vermiculite. Frequently adjacent fibres are orientated at right angles to each other producing a type of 'mesh-structure' in thin sections[5]. The mineral replaces chlorite infillings of small vesicular aggregates and also fine-grained ashy material in the ground-mass.

We suggest tentatively that the stilpnomelane is a product of post-granophyre metasomatism accompanied by low-grade metamorphism equivalent to the chlorite sub-zone one[6]. Woodland[7] has already described the Cambrian (Harlech Series) north of the present area, and has noted the progressive metamorphism of these rocks.

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Lower Purbeck Beds of Swindon Facies in Dorset

IN the course of a yet unpublished study of the pseudomorphs after gypsum prevalent in the 'Purbeck Caps' and 'Broken Beds' of Lower Purbeckian age in Dorset, a marl has been discovered with a fauna resembling that of the freshwater facies of the 'Swindon Series'. In the well-known Portisham quarry with the 'fossil elephant' (a silicified tree trunk[1]), the three-foot "impure marls with seams of chert" listed by Woodward[1] as occurring 9 ft. 6 in. above the Portland Stone have been found to contain the Swindon ostracod *Ulwellia papulata* Anderson, and well-preserved charophytes in abundance. Gastropods are also abundant and perhaps have Swindon affinities. None of these has been recorded before in British strata of indisputably Lower Purbeck age, and a full palæontological investigation of the fauna is at present proceeding.

Lithologically the similarity in facies between the Dorset and Swindon beds is also well marked, and it is only with difficulty that the carbonaceous conglomeratic marl of Portisham can be distinguished from that of Swindon. At the former locality, however, there has occurred at places within this marl, the penecontemporaneous introduction of epigenetic lenticular gypsum. The geochemical conditions seem to have favoured silicification, which must here have been largely selective. The freshwater fossils are well preserved, and their presence in a rock full of pseudomorphs would seem at first sight to be anomalous. This appears to be due to the intercalation of the freshwater marl in an evaporitic succession marginal to the main gypsum deposits. These main gypsum deposits were rarely less than 6 ft. thick in the Broken Beds of the Lulworth region, where the 'Caps' were also very gypsiferous; at Portsdown and Henfield, anhydrite is dominant in the lower part of the Lower Purbeck[2].

At Swindon the freshwater nature of the greater part of the 'Swindon Series' has long been clear and they can be correlated with the Purbeck Beds of the Aylesbury district; but their correlation with the Purbeck Beds of Dorset has not previously been possible. A very thorough and painstaking investigation of these beds by Sylvester-Bradley[3] led to the realization that the fauna and flora, although differing in detail, were of a facies which at that time was known from Dorset only in the Middle Purbeck Beds. Twenty years ago Arkell and Sylvester-Bradley[4] discussed the age of the 'Swindon Series'. Arkell was convinced the evidence pointed to a Middle Purbeck age, but the view that the new discoveries strikingly support was that put forward by Sylvester-Bradley, who considered that the absence of *Cypridea granulosa* (Sow.) and *Cypridea fasciculata* (Forbes) suggested Lower Purbeck age.

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CHEMISTRY

Activity-based Diffusion Coefficients for Liquid Solutions

WHETHER an equilibrium concept is applied to a consideration for diffusion in liquids or whether the methods of irreversible thermodynamics[1,2] are used, it is clearly established that the driving force for molecular diffusion in liquids, such as occurs in the well-known diaphragm cell, is the gradient of the chemical potential. However, it has been the common practice to report diffusion coefficients calculated on the basis of concentration gradients as the driving force rather than the gradients of the chemical potential.

For the case of a binary (components A and B) non-ideal liquid system, the usual barycentric diffu-