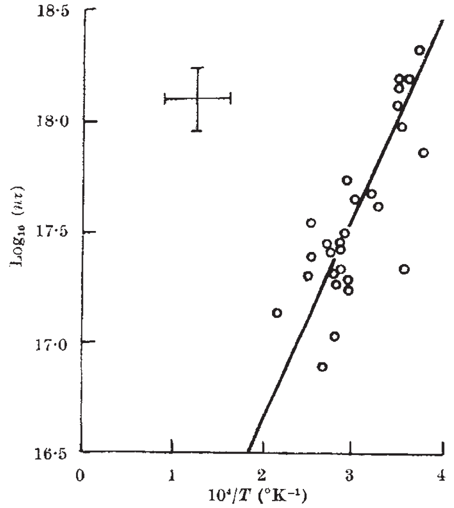

Fig. 2. Ionization times in shock-heated potassium vapour

argon[1,7] are extrapolated according to expression (1) to our values of n and T, values of τ some 10^9 times greater than for potassium are obtained. This is reasonable considering the much lower potentials and higher cross-sections of the alkali metals. Though experiments have previously been performed on argon seeded with small amounts of alkali metal[8] these experiments are, so far as we know, the first of this type to be made in a pure metallic vapour.

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METALLURGY

Interconnexion of Silicon in Modified Aluminium–Silicon Eutectic

When the aluminium–silicon eutectic is rapidly frozen, or when sodium is added in small quantities ($< 0{\cdot}017$ wt. per cent), the structure apparently is modified from an acicular form to a globular form of the silicon phase[1–7]. The reason for the modification is still a matter of controversy[8], and a review of present-day theories is given by Chadwick[1].

All the theories presented so far claim that the fine dispersion of silicon particles is produced by an increased nucleation frequency of silicon particles at a temperature lower than the equilibrium eutectic temperature. The lowering of the temperature is attributed to either a reduction in the initial nucleation frequency[1,3,6,9–12] or restricted growth[2,4,7,13–15].

All present theories assume that each of the silicon particles in the modified structure is separate from, and not connected to, a neighbouring particle. The work reported here shows that this assumption is not valid.

A rapidly cooled sample of high-purity aluminium–silicon eutectic was polished metallographically to reveal the modified structure. The sample was then etched for 24 h in a 10 per cent hydrochloric acid solution, and for 1 h in a solution of 2·5 c.c. hydrochloric acid, 2·0 c.c. nitric acid, 0·75 c.c. 40 per cent hydrofluoric acid, and 40 c.c. water to dissolve the aluminium phase and leave the silicon untouched.

The silicon phase in this modified structure was found to be interconnected in any one grain, even when the grains were 2 mm in diameter. The same result was obtained when the structure of the sodium-modified alloy was examined.

From these observations, it is apparent that in the aluminium–silicon eutectic the silicon phase grows from a common nucleus in each eutectic grain in both the rapidly cooled and sodium-modified structures. In fact, the structure has not been 'modified' in the normal usage of this word. There is no change in the basic growth mechanism, and the structure is not globular. The silicon takes up a very fine interconnected acicular structure.

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GEOLOGY

Re-classification of the Ethiopian Cainozoic Volcanic Succession

Recent exploration and field-work in Ethiopia, in particular gravity–geology surveys made by Prof. P. Gouin, Dr. A. S. Rogers and me, have shown the Cainozoic volcanic succession in association with the Ethiopian Rift System to be more complicated than previously suspected.

The classic work of Blanford[1] established the existence of an older, extensive, pre-rift series of lavas, the Trap Series, covered by a younger, post-rift series of lavas, the Aden Series, the latter largely confined to the rift-system itself. Furthermore, Blanford divided the Trap Series into an earlier group of basalts, the Ashanghi Group, unconformably overlain by basaltic and silicic lavas and tuffs, the Magdala Group. This classification was generally accepted until the work of Merla and Minucci[2], who denied the existence of Blanford's unconformity, considering the tilting of the Ashanghi Group basalts to be due to post-Trappean tectonic movements. Merla and Minucci's revision of the nature of the Trap Series succession has been largely accepted by later workers, including Dainelli[3] and myself[4], though Blanford's terminology has been retained on the basis of lithology.

However, the recent discoveries of unconformities within the Trap Series in various parts of Ethiopia, by Jepsen and Athearn[5], Rogers[6] and me[7], have led Rogers and me to a reconsideration of Merla and Minucci's arguments and a re-examination of the critical Ashanghi–Magdala region. The results of this new work (details to be published elsewhere[8]) have included the re-establishment of Blanford's unconformity, and the implications of this finding together with additional data from recent studies in the Ethiopian Rift System are summarized here.