matters arising

Function of byssus threads in young postlarval *Mytilus*

STUDY of the settlement of postlarvae of *Mytilus adulis,* which live attached to filiform algae and hydroids, has shown that they migrate frequently[2,3]. They detach themselves from their byssus, leave the substratum, are transported again by the water and re-attach on a new substratum. Like Sigurdsson *et al.*[1], we observed long mucous threads on young mussels and compared the drifting at the end of a long thread with the gossamer flight of young spiders, but believed that the aberrant primary byssus thread[4] was involved chiefly in the settlement of the young. We tested this assumption. We placed a tuft of the alga *Polysiphonia* with many attached mussels in a transparent annular tank (diameter 1 m) in which a constant rotating current was generated. Four small racks with 1.5 m of nylon thread wound around them were placed perpendicular to the current. After 1 d some of the mussels, usually some hundreds, had resettled from the alga on to the threads.

Of the young mussels carried along by the current, occasionally one remained at the spot 2–10 cm downstream a nylon thread, apparently connected by the byssus thread, which had trailed behind and made contact with the substratum. At this anchored stage the elastic mucous thread protruded from between the valves at a point near the apex. Then the animal made swinging movements around this point over an angle of 60°, and in doing so pulled in the byssus thread, again behaving like a spider. Frequently a mussel was able to reach the substratum in this way, but the connection could also be lost. It seemed to be especially difficult for the mussel to grip the substratum with its long motile foot. Sometimes the substratum was abandoned again after short inspection. In such cases time was needed to perform a new anchoring procedure, and this corresponded with the time needed to secrete a new thread.

When nylon threads with diameters in the range 120–1,000 μm were stretched on racks in the sea, the thicker threads caught significantly larger mussels ($P<0.001$), but such a difference consistently found in the tank was never significant. The average length of the young mussels caught on nylon threads varied in different experiments between 900 and 1,500 μm, the smallest measuring 240 μm (metamorphosis), the largest 2,000 μm or more.

The behaviour of the migrating postlarvae may explain the high resettlement rates found at sea—600 specimens in 5 d—per metre of nylon thread stretched perpendicular to the direction of the current in midwater. In the tank a current of 20 cm s^{-1} was most effective. In the sea the water movement in waves is possibly more important for settlement than are tidal currents.

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Liquid immiscibility in K_2O–FeO–Al_2O_3–SiO_2

VISSER and Koster van Groos[1] present a new phase equilibrium diagram for the plane leucite–fayalite–SiO_2 in the quaternary system K_2O–FeO–Al_2O_3–SiO_2, in which the field of immiscibility differs significantly from that which I presented earlier[2], and from that presented by Greig on the binary FeO–SiO_2 (ref. 3) (Fig. 1). Here I suggest the reason for the discrepancy, as no discussion or explanation is given by Visser and Koster van Groos.

The few details presented on the laboratory procedures used in the new work[1] suffice to indicate that their results should differ somewhat from mine. First, the oxygen fugacity during their work was slightly higher, as they note, because they used molybdenum rather than iron containers. The resulting presence of more Fe^{3+} in the melts would almost certainly expand the field of immiscibility[4]. I am assuming that they were able to overcome the difficult problems of obtaining adequate transfer of oxygen through their evacuated system to achieve PO_2 buffering. Second, the use of a vacuum during the runs in their work might cause loss of potassium which would also increase the degree of oxidation of the charges. Third, the molybdenum containers must have put some molybdenum into the charges, either as Mo^{4+} or Mo^{6+}, both of which might be expected to increase the field of immiscibility[5]. I do not believe, however, that these three effects, even though additive, are adequate to explain the major differences found in the extent of the field of immiscibility.

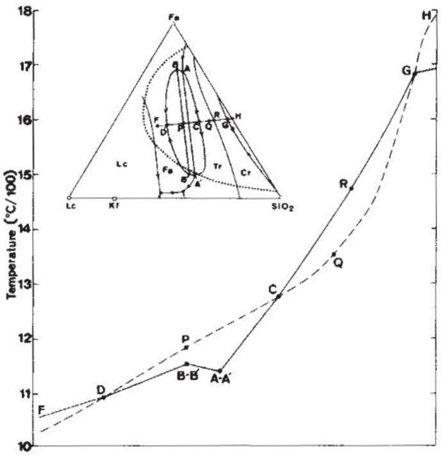

Fig. 1 Phase relations in the system K_2O–FeO–Al_2O_3–SiO_2 (inset), showing two fields of stable immiscibility (shaded), projected on the plane leucite (Lc)–fayalite (Fa)–SiO_2, plotted in wt. %, from the early work of Roedder[2]. The outline of the larger field of immiscibility newly reported by Visser and Koster van Groos[1] is also shown (dotted). Tr, tridymite; Cr, cristobalite; Kf, K-feldspar. The T–X section along the line F–H is based on early work of Roedder[2], plus the work of Watson[11] (point P) and Irvine[10] (point Q). Two immiscible liquids exist in stable equilibrium along D–P–C and G–H.

Neither the work of Visser and Koster van Groos, nor my work gives the compositions studied nor the temperatures of the individual runs, but the numbers involved—~500 runs on 26 compositions in my work and >150 runs on an unspecified number of compositions in theirs—would both seem adequate to delineate the phase boundaries. (Although my diagram was presented as "preliminary" at the time, it has since been corroborated by additional data[6].)