EXAMPLES OF COMPLEX STRUCTURAL RELATIONSHIPS

11.1 LOCAL STRUCTURE SUCCESSIONS COMPRISING SEVERAL SETS

11.1.1 INTRODUCTION

Discussion of the procedures for the resolution of overprinted relationships is continued in this chapter by further consideration of structural associations, this time of greater complexity. It begins with a re-examination of some structures already looked at, followed by cases of increasing complexity, and then examines cases of more extensive successions comparable to that comprising the structure seen in Figures 11.1 and 11.2. The approach used in resolving the overprinted relationships is fundamentally the same as before, but the successions determined are ‘formalized’ here with the structure sets listed for the most part in the form of ‘stratigraphical’ columns.

Firstly, as a reminder of how daunting first impressions can be when examining exposures of complicated structural relationships, consider the complexity of the interference patterns of Figures 11.1 and 11.2.

11.1.2 PROCEDURE WITH EXAMPLES

In spite of the initial impression of disorder and confusion and of a total absence of regularity, the structural relationships shown in Figures 11.1 and 11.2 can, and have been, resolved. Careful, ‘step-by-step’ consideration of the relationships between structures when these are examined in detail, inevitably leads to the determination of the structural succession and hence to the establishment of the deformational sequence. Initially one must avoid attempting to deal with the total complexity of the pattern produced by multiple folding (as shown in the examples above) and concentrate on the study of the relationships between only parts of the whole structure. At any one time the structure in only small areas, each time exposing the relationships between just two or three folds, should be considered (see section 8.1.5).

The example of extreme structural complexity shown in Figure 11.2 is almost certain to suggest the term ‘wild folds’ (see the discussion in section 1.1.1). However, although they are very complicated, the structural relationships shown at this outcrop have been determined, and the structural succession established using the methods described in Chapter 8. An analysis of the structure in the photograph of Svecofennian (formerly named Svecokarelian) migmatites of Figure 11.2 is shown in the series of sketches comprising Figures 11.3a to 11.3c. These show form lines drawn from the structure shown in the photograph. In Figure 11.3b the hinges of recognizable folds are emphasized and in Figure 11.3c these hinges are labelled in accordance with the fold sets identified in the succession (Hopgood, 1984).

The procedure can best be explained by working systematically through particular cases in a manner similar to that used in Chapter 10. The following 14 examples illustrate the approach used to establish a structural succession. The succession (an objective,
Figure 11.1  Patterns resulting from multiple folding in migmatites. (a) Interference pattern stemming from overprinting between three fold sets. Lewisian complex, Isle of Barra, Outer Hebrides, Scotland. (b) Interference pattern stemming from overprinting between at least five fold sets. Rona, Inner Hebrides.

Figure 11.2  An example of complex refold relationships in Svecofennian migmatites. Structure such as this has given rise to expressions such as ‘wild migmatites’ and so-called ‘wild’ folds. South shore of Djupkobbarna, Jussarö area, southern Finland. The 15 cm pencil on the left is aligned E–W. From Figure 21a, Hopgood, 1984. Reproduced with the permission of the Royal Society of Edinburgh. Compare Figure 10.4.