PART II

TYPICAL OPHIOLITE COMPLEXES

INTRODUCTION

Ophiolites were first perceived as a formation repeatedly encountered at the Earth surface, and composed of the same elements, organised in a constant manner. The uniqueness of ophiolites is a concept which began to be broken down by geochemical studies showing that the nature of the lavas could be different from one complex to another. This led to the idea that ophiolites could be derived from different oceanic environments (Miyashiro, 1973 ; Pearce and Cann, 1973 ; Beccaluva et al., 1979). It was also found that a diabase sill swarm could replace the more common dike swarm (Hopson and Frano, 1977 ; Girardeau and Mercier, 1985), and that the layered gabbro section could be variously developed and locally absent (Nicolas et al., 1981 ; Le Sueur et al., 1984). Major differences also stemmed from structural studies showing that the internally layered structure in the crustal formations could be altered and those formations sheared, evoking a transform fault origin (Karson, 1984). Similar shearing could also affect the peridotite formations, leading to the same genetic conclusions (Prinzhofer and Nicolas, 1980 ; Reuber, 1985). The lherzolitic rather than harzburgitic nature of some peridotites was also noted and interpreted in terms of incipient rifting (Menzies, 1976 ; Boudier and Nicolas, 1985) and/or transform environments (Abbate et al., 1980 ; Nicolas and Dupuy, 1984). Systematic studies in the ultramafic section, mainly structural in nature, confirmed the diversity of ophiolites and contributed to introduce some rationale into this diversity (chapter 8).

In the present state of ophiolite studies, diversity appears as a prominent feature of ophiolites, a fact which is obviously related to the diversity of possible oceanic environments of origin. Therefore, the ophiolite complexes which are described in this part have been selected to illustrate the principal ophiolite types which are presently known. These complexes are among those which are the least dismembered and for which extensive descriptions have been found in the literature.

This selection of a few complexes out of the nearly forty for which descriptions are available does not reflect their relative abundance. The Oman ophiolite, taken here as an archetype, sharing many similar features with classical complexes such as Bay-of-Islands or Cyprus, in particular a harzburgitic ultramafic section, corresponds to the most common type and will be extensively described. After the Oman case, the Xigaze and the Trinity complexes will be described under the same heading (chapter 4) because they represent a distinct ophiolitic trend characterised by a thin mafic section and a lherzolitic ultramafic section. The case of ophiolites displaying features evoking oceanic fracture zones will be considered in chapter 5 and finally chapter 6 will discuss Canyon Mountain, an ophiolite with unusual structural and geochemical signature, evoking an island arc environment.

Although differences of opinion persist as to the geological history of some of these ophiolites, including the modes of formation and of emplacement, it was felt necessary to include this controversial section in the following chapters, otherwise devoted to descriptions, in order to delineate the currently outstanding problems.