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Aspects of a Stratigraphic System: the Devonian

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Contents

<i>Preface</i>	<i>vii</i>
1 INTRODUCTION	1
The Devonian System	6
The Stratigraphic Column	7
Stratigraphic Procedures	12
Breaks in the Succession	13
Palaeontology	16
Palaeogeography and Sedimentary Environments	18
2 THE MATERIALS OF STRATIGRAPHY	20
Sedimentation Rates and the Stratigraphic Record	22
Devonian Rocks	24
Sedimentary Facies and Environments	27
3 STRATIGRAPHY AND THE WORLD TECTONIC MODEL	30
Sedimentation and Subsidence	32
Sedimentary Basins	32
Cratonic Sedimentary Sequences	36
Plate Tectonics and Marine Faunal Diversity	38
An Expanding Earth?	42
Oceanic and Atmospheric Repercussions	43
4 TIME IN QUESTION: THE DEVONIAN	45
Devonian Marine Facies	49
The European Standard	53
The Lower Devonian	55
The Middle Devonian	55
The Upper Devonian	55
The U.S.S.R.	56
China	58
Continental Facies	59
Radiometric Ages	61
5 BIOSTRATIGRAPHY	63
Devonian <i>Dramatis Personae</i>	66
Correlation	75

Biogeographic Provinces	83
Devonian Faunal Provinces	84
6 MANY KINDS OF OLD RED SANDSTONE	88
General Facies Characteristics	90
The Devonian Continental Biota	93
Distribution of Old Red Sandstone Facies	96
7 PARALIC AND CRATONIC FACIES	112
Shelf Morphology	113
Paralic Shelf Facies	114
Devonian Shelf Communities	118
Cratonic (Epeiric) Deposition	118
Black Shales	121
The Spread of Shallow-water Facies	124
Epicontinental Successions outside North America	125
8 WARM WATERS, CARBONATES AND EVAPORITES	136
Carbonate Stratigraphy	138
Devonian Carbonate Buildups	142
Distribution of Devonian Carbonate Facies	144
Evaporites	149
A Saline Giant	150
9 DEEP-WATER SUITES	155
Deep-water Diagnostics	156
Devonian Basins	159
Central and Western Europe	159
The Appalachian Basin	162
The Cordilleran Geosyncline	163
The Franklinian Geosyncline	164
The Ural Geosyncline	166
The Central Asiatic Complex	167
The West Pacific Geosyncline	168
The Samfrau Geosyncline	168
10 DEVONIAN GEOGRAPHY	174
Continents Located	175
Devonian Orogeny and Continental Collisions	180
The Oceans and the Epicontinental Seas	181
Palaeoclimatic Clues and Discussions	181
Devonian Days and Years	186
<i>References</i>	<i>190</i>
<i>Author Index</i>	<i>203</i>
<i>Fossil Genera and Species Index</i>	<i>206</i>
<i>Subject Index</i>	<i>210</i>

Preface

The beautiful county of Devon has lent its name to an important and widespread stratigraphic system. The title was proposed by two of the most active and widely experienced geologists in Victorian Britain, men who also influenced numbers of like-minded scientists in Europe, North America and elsewhere. Sedgwick and Murchison would, no doubt, be pleased to see how the sciences of palaeontology and stratigraphy have prospered since 1839 when the term Devonian was given a stratigraphic meaning. They would also perhaps, with their truly Victorian firmly held views and sense of purpose, be eager to debate the relevance of these advances to the newer fields of sedimentological, palaeomagnetic and tectonic studies (and vice versa). They would appreciate the many aspects that a stratigraphic system has and how these change while science advances.

The geological sciences indeed advance rapidly on all fronts and our knowledge of the world as it was in the distant past increases at an ever quickening pace. Much of the new information soon finds its way into lecture courses and textbooks and these tend to follow a pattern that is recognisably conservative and rather predictable. The present volume was prompted not by the wish (or need) to produce an exhaustive or reference treatise on the Devonian system for the scholar or researcher, nor by the desire to produce yet another textbook. It seeks to illustrate the ways in which the different disciplines or interests within geology assist in a general understanding of how things may have been 350 million years ago or thereabouts. It is intended as a book for the interested but not very advanced student of historical geology, and, unintentionally, it no doubt illustrates the difficulties that the writer familiar with one aspect of geology has when he has to try to understand the importance another aspect may have for a theme as big as this one.

A practice among scientists is to prefer the simplest explanation for a collection of facts or events—usually this turns out to be inadequate and more complicated explanations are called for. Thus almost certainly the models of the Devonian world and its inhabitants are naive and even inappropriate. Each of the general subject areas covered in the following chapters makes a contribution to the description and assessment of what took place far back in a specific period of geological time. Each is of importance to one or more of the others and each can be dealt with only briefly here. Some fields of study have been completely neglected in what follows: Devonian volcanism is an example. Others will become apparent.

Comparisons with the state of knowledge and interpretations of other geological systems may be obvious, but the Devonian is nevertheless important in several unique aspects. It was a period of profound, even violent, geological and geographical events

on the surface of the earth. Plant and animal life responded vigorously. Terrestrial vegetation evolved rapidly to cover more of the land surface than ever before and the vertebrates followed a conquest of both salt and sweet waters by crawling off into the undergrowth. There were also great extinctions and changes in the marine invertebrate world and we are still far from explaining all of these events.

The need for a proper understanding of the way the earth works, and worked then, is paramount and, for the scientifically curious, the 50 million years of the Devonian period are as good as any against which to test new ideas. This account must be brief; it is of necessity incomplete and tentative.

Several points might be nevertheless emphasised here. Palaeomagnetic studies seem to abound in inconsistencies. Those of Devonian rocks are no exception and the accuracies of palaeogeographic reconstructions probably suffer because of possible palaeomagnetic overprinting on the widely distributed Devonian outcrops throughout subsequent geological ages. Palaeomagnetic reversals, similarly, do not seem as yet to offer much help in Devonian correlation. Debate about the extent to which plate-tectonic theory satisfactorily explains all Palaeozoic palaeogeography still goes on. The pangeic view of the Palaeozoic (as distinct from the 'wandering continent' or kaleidoscopic view) has its ardent adherents and the 'expanding Earthers' are not silenced. In the ensuing pages an essentially orthodox 'steady-state' plate-tectonic view of the earth during Phanerozoic time is maintained. Problems about Devonian faunal and floral distributions remain despite the means of dispersal and isolation being more convincingly depicted in recent publications. The remarkable rise and spread of the vertebrates that are normally regarded as typical of non-marine Old Red Sandstone areas calls for further study. And withal it must be remembered that the Devonian period of some 50 million years lasted almost as long as has the Cainozoic era. The extent of the movements of continents and the extent of changes in the living world in the Devonian were probably not very different from those of the Cainozoic. And both may be called an 'Age of Fishes' though the differences are fairly obvious!

My early contacts with Devonian studies were much encouraged by Dr E. I. White and by the late Professor L. J. Wills. I have since been fortunate in many friends who have helped, by discussion and encouragement, in the writing of this book and I would like to thank them all. In particular my gratitude goes to Professor T. S. Westoll, P. F. Friend, H. G. Reading, E. J. Loeffler, K. C. Allen, B. P. J. Williams, H. H. Tsien, Liu Yuhai, Hou Hong-fei and J. W. Cowie. I would also like to record thanks to members of the I.C.S. Subcommittee on the Devonian System who have been so helpful on numerous occasions. Mrs J. D. Rowland turned my manuscript into typescript and Mrs A. Gregory provided the draughting from my sketches—all to my great satisfaction. The blemishes that remain are mine alone.

D.L.D.
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