PART IV

Evidence from the Past

Our attention now turns to the past. What does the paleoecological record tell us about extinctions and climate change? We examine the answers to this question in time frames spanning from hundreds of millions of years to tens of thousands of years. In the first chapter of this section, Peter Mayhew looks at extinctions in deep time, from records 50 million years old and older. William Clyde and Rebecca LeCain then look at extinctions over the past 60 million years, focusing on two particularly instructive events. Barry Brook and Anthony Barnosky begin an exploration of the more recent paleoecological record, looking at Pleistocene vertebrate extinctions, and Mark Bush and Nicole Mosblech complete the section examining plant extinctions in the last few tens of thousands of years.

The picture that emerges from this paleoecological tour is of some clear associations between climate change and extinctions, but also some major climatic changes that are not associated with extinctions. The data limitations associated with events thousands or millions of years ago are evident. The deep time record comes mostly from marine fossils, leaving us to infer that events sufficient to wipe out a major proportion of marine life probably also had significant effects on land. As we move into the era of modern plants and into the Pleistocene, the record is clearer but still seldom definitive.

Most notably, recent extinctions have occurred during times of both climatic change and human impact, a possible harbinger for the future. The answers emerging from this section suggest that extinctions may be associated with major state changes in climate on the planet, but that subsequent change, even coming and going from ice ages, may have little subsequent effect. The past is a rich source of information about possible future effects, but there are no perfect past analogs to future human-caused climate change. The past offers many pieces of the puzzle, a valuable supplement to other lines of evidence.