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Introduction

The Sahara is vast. From the Atlantic Ocean to the Red Sea (map 1), it extends across a distance of 5000 kilometres. Its southern limit is at roughly 16° N and its northern limit at about 30° N, equivalent to a distance of about 3000 kilometres. It covers an area of roughly 9.2 million square kilometres, or almost four times that of the Mediterranean, which has an area of 2.5 million square kilometres. The Sahara is so big that any generalisation about it can be unwise. However, a glimpse at a rainfall map of North Africa (fig. I.1) shows that if we ignore the Saharan uplands, the lines of equal rainfall (*isohyets*) run parallel to one another and show a rapid decrease in rainfall with distance from the northern and southern coasts. The vegetation zones of North Africa (fig. I.2) also run parallel to the northern and southern coasts and, except in the uplands, which have their own microclimate and upland ecosystems, become increasingly adapted to aridity with distance inland. At present, the summer and winter rains do not penetrate very far into the Sahara, so that much of that vast desert is largely devoid of vegetation except in sheltered uplands and sporadic desert oases where groundwater comes to the surface. Between about 15,000 and 5000 years ago the situation was very different. The tropics received more radiation from the sun, the summer monsoon was accordingly stronger, and both summer and winter rains reached as far as the present-day arid heart of the Sahara. As a result, the vegetation belts also moved further inland, so that Mediterranean winter rainfall plants colonised the northern Sahara and tropical summer rainfall plants colonised the southern and central Sahara. In effect, the vegetation zones that we see today had at that time shifted more than a thousand kilometres further inland along both northern and southern margins of the Sahara—the time when the Sahara was green.

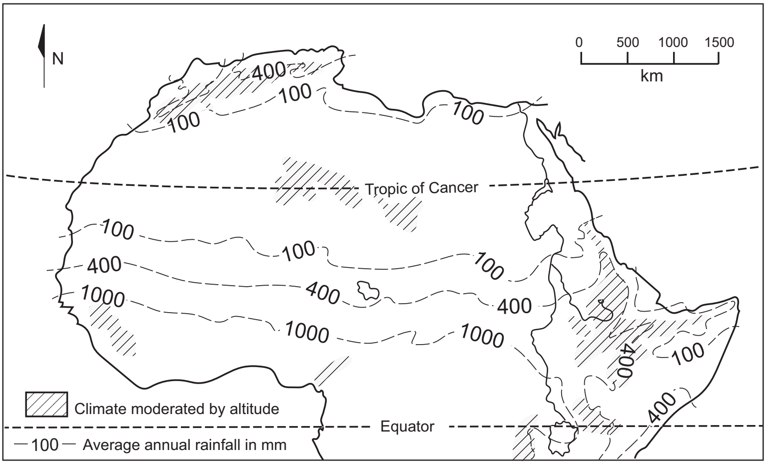


FIGURE I.1. Present-day rainfall zones in North Africa, after Williams (1988), fig. 3.4, adapted from *Atlas of Africa* (1973), p. 35.

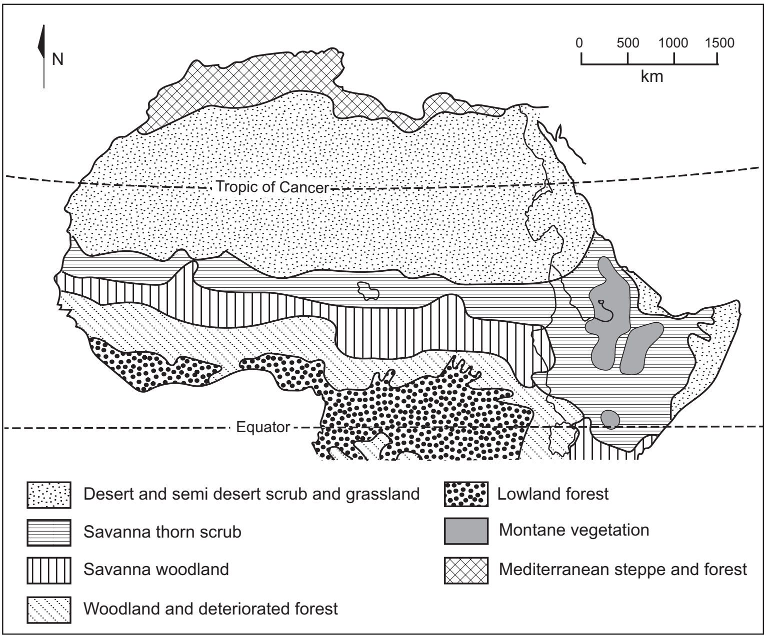


FIGURE I.2. Present-day vegetation zones in North Africa, after Williams (1988), fig. 3.5, adapted from *Atlas of Africa* (1973), p. 39.

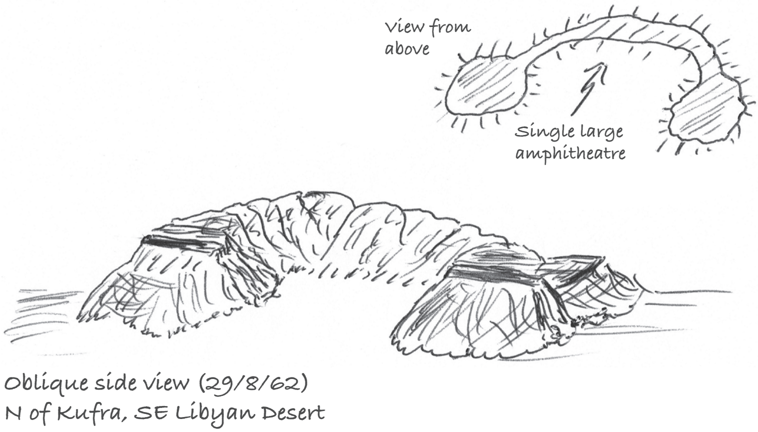


FIGURE I.3. Sketch showing how prolonged erosion of an initially flat sandstone mesa in the Libyan Desert near Kufra has changed it into a single large amphitheatre (29 August 1962).

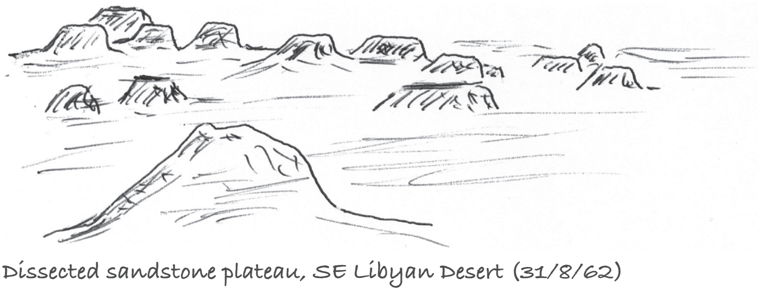


FIGURE I.4. Sketch of a dissected sandstone plateau in the SE Libyan Desert (31 August 1962). The low sandstone mesas were originally part of a single continuous plateau.

My first visit to the Sahara in the northern summer of 1962 to the southeast Libyan Desert gave me the impression of being on another planet. Not a blade of grass for hundreds of miles. Stark black hills (figures I.3–I.7) rising from endless plains with a thin surface layer of fine gravel. Great humpbacked sand dunes aligned in seemingly endless rows parallel to the wind. Sand, dust, and wind; wind, dust, and sand. And yet it had not always been so. Hard to believe, but in all suitable

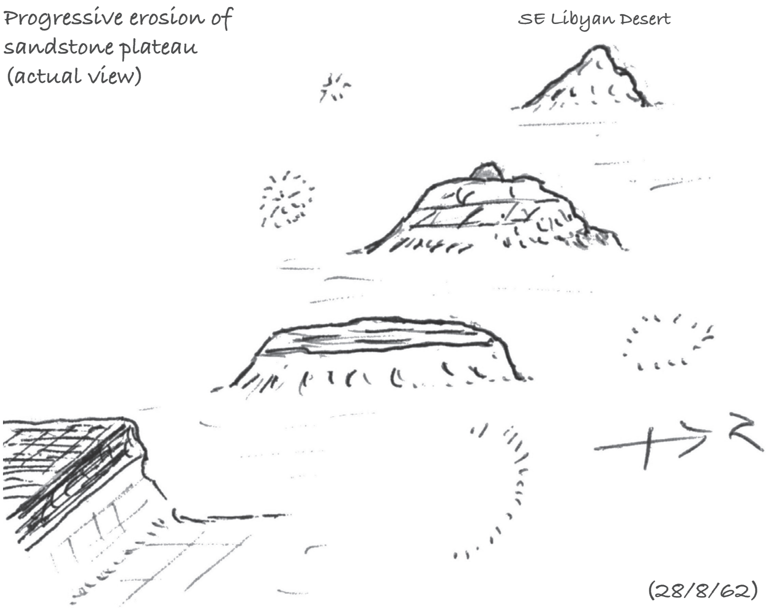
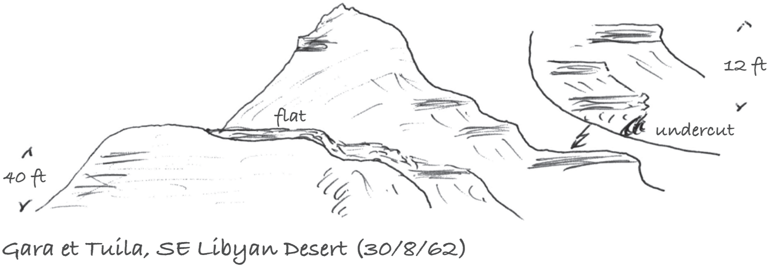


FIGURE I.5. Sketch showing stages in the conversion of a flat-topped sandstone mesa to a conical sandstone butte, SE Libyan Desert (28 August 1962).

rock exposures, prehistoric artists had engraved or painted scenes of cattle camps and herds of giraffes and elephants. They left behind their stone arrowheads, grindstones and polished axe heads, ostrich eggshell beads, and the bones of fish, turtles, even crocodiles and hippos. How was this possible? The answer lay partly buried beneath the ever-shifting sands in the form of now dry lakes and defunct river channels. Their former presence prompted the questions: when, why, and how had the present desert once been able to support such an abundance of life? My attempt to answer these questions provides the reason for this book.

The book is intended for the nonspecialist reader interested in the natural world. My aim is to reveal how the Sahara Desert came into being and to show that, on a number of occasions in the past, it had been 'a green and pleasant land' well able to sustain an abundance of plant



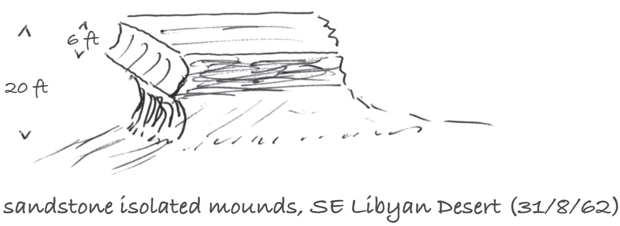


FIGURE I.6. Sketches of a sandstone hill near Kufra in the SE Libyan Desert showing undercutting of the softer beds of isolated sandstone remnants (30 and 31 August 1962).

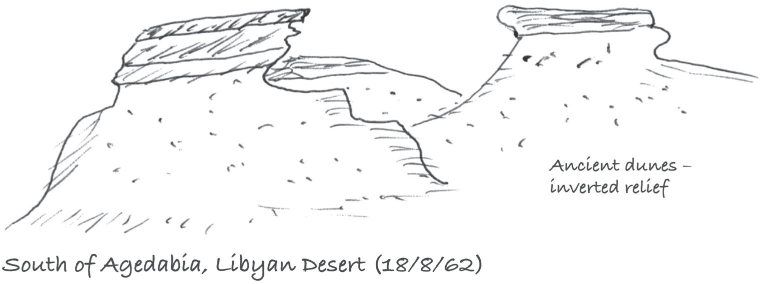


FIGURE I.7. Sketch showing relief inversion of ancient dunes in the northern Libyan Desert (18 August 1962). The resistant beds acting as caprocks on the top of the dunes today were initially deposited in the hollows between the former dunes and were cemented by calcium carbonate in the groundwater. Later wind erosion removed the former dunes and resulted in progressive inversion of relief.

and animal life and to attract diverse groups of prehistoric hunters and herders until it became too dry to support much life. Questions raised and answered in this book include why the Sahara was previously much wetter, why it became dry, and whether it will become wetter once more. A related question is whether human activities might have caused the Sahara to become a desert. I also consider the impact upon prehistoric and modern human societies of extreme climatic events such as prolonged droughts.

The book is divided into three parts and concludes with a short epilogue. Part One provides a concise account of how the Sahara came into being and explains when and how the Saharan highlands and lowlands were fashioned, culminating in a description of the time when it was last a land of lakes and rivers and was aptly called the Green Sahara. Part Two looks at how the Sahara became progressively drier, with sand dunes developing from the alluvial sands brought down from the uplands by desert rivers. This was a time of constant tug-of-war between flowing water and wind-blown sand. Part Three looks at the Sahara today and considers how extreme climatic events such as prolonged droughts affect human societies and how human activities can aggravate (or minimise) the impact of such extreme events. The epilogue asks whether the Sahara could become green once more and what humans can do to live in harmony with our greatest desert as well as with the drier regions of the earth more generally.

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