

Chapter 23

South Munster Basin C.N. WATERS & I.D. SOMERVILLE

South of the platform carbonate successions of South Central Ireland (Chapter 22), the South Munster Basin of southern Ireland (Fig. 23.1) is dominated by deeper water terrigenous sedimentary rocks comparable to those present in the Culm Basin of southwest England (Chapter 4). The basin is divided into a western Bantry Sub-basin and eastern Kinsale Sub-basin, separated by the Glandore High upon which an extremely attenuated succession developed (Naylor *et al.* 1989).

The South Munster Basin was affected by four distinct phases (Naylor *et al.* 1989). During the Late Devonian to early Courceyan, subsidence rates in both sub-basins were rapid and associated with deposition of relatively shallow marine sand and mud. During the Courceyan there was a reduction in both influx of sand and rates of basin subsidence, but with a net deepening of the basin. During the late Courceyan to Brigantian the basin became starved of sediment. During the Namurian, a renewed influx of sand resulted in the filling of the basin.

The Tournaisian and Visean succession consists of a single Cork Group, which in the Kinsale Sub-basin comprises three formations: Kinsale Formation at the base, followed by the Courtmacsherry and Lispatrick formations of Courceyan-Brigantian age. In the Bantry Sub-basin the Kinsale Formation, and laterally equivalent Ardnamanagh Formation, are overlain by the Reenydonagan Formation of Courceyan to Arundian age.

Tournaisian

The lower Tournaisian Kinsale Formation (Sevastopulo & Wyse Jackson 2001) extends across the Kinsale Sub-basin, the Glandore High and southern part of the Bantry Sub-basin (Fig. 23.2, Cols. 2–7). Succeeding the grey sandstone, dark mudstone and heterolithic facies of the Devonian Old Head Sandstone Formation at the Old Head of Kinsale (Fig. 23.2, Col. 6), south Co. Cork is the basal Castle Slate Member of the mud-dominated Kinsale Formation. This is the basal stratotype section for the Courceyan (George *et al.* 1976; see Chapter 2) and marks the LN/VI miospore zonal boundary ¹, which coincides with the Devonian/Carboniferous boundary. The Kinsale Formation comprises three members (Naylor 1966). The basal Castle Slate Member is the most laterally persistent member throughout the region and comprises cleaved dark grey mudstone with thin silt laminae and common phosphatic and pyritic nodules. Miospores of the VI Zone have been recorded from just above the base of the Castle Slate Member ¹ (Higgs *et al.* 1988a). The overlying Narrow Cove Member comprises interbedded and interlaminated sandstone and mudstone. The VI/HD miospore biozonal boundary occurs within this member, towards the base at the Old Head of Kinsale (Fig. 23.2, Col. 6 ²) and at higher levels within the member further to the east (Sevastopulo & Wyse Jackson 2001). The uppermost Pigs Cove Member, comprising dark grey mudstone with subordinate sandstone straddles the HD/BP miospore Biozone boundary ³ (Sevastopulo & Wyse Jackson 2001). The Kinsale Formation represents a gradual deepening from near-shore tidally influenced sandstone and mudstone of the underlying formation.

In the Kinsale Sub-basin the overlying mud-dominated Courtmacsherry Formation (340 m thick at the Old Head of Kinsale) includes conodonts of the *Siphonodella* Biozone from

the base ^{O4} and miospores of the PC Zone from near the base ^{A5}. PC Zone miospores have also been recorded within Member 2 (Naylor *et al.* 1988; Fig. 23.2, Col. 5 ^{A1}). The formation thins toward and is absent over the Glandore High, near Galley Head (Fig. 23.1; Fig. 23.2, Cols. 5 & 4, respectively).

In the northern part of the Bantry Sub-basin (Fig. 23.2, Col. 1) the lower Tournaisian succession is represented by the Ardaturrish, Reenagough and Ardnamanagh formations (Jones 1974). However, recognition of the Castle Slate Member within the Ardaturrish Formation has resulted in reassignment of the lower part of the formation to the Devonian Old Head Sandstone Formation (Sevastopulo & Wyse Jackson 2001). The Reenagough and Ardnamanagh formations have miospore biozonal ages of VI ^{A1} and HD ^{A2} to BP ^{A3}, respectively (Sevastopulo & Wyse Jackson 2001). The base of the overlying Reenydonagan Formation coincides with the base of the PC miospore Biozone ^{A4}. The basal succession (Member 1) is dominantly bioclastic limestone in Bantry Bay, fining and thinning southwards in the Dunmanus Syncline (Sevastopulo & Wyse Jackson 2001). This is overlain by black, carbonaceous, phosphatic and pyritic shale (Member 2) of probable *carina* conodont Biozone (Naylor *et al.* 1996). The overlying succession of dolomitised limestone, siltstone and sandstone interbedded with pyritic mudstone (Member 3) has yielded conodonts from basal beds assigned to the *anchoralis* Biozone ^{O5}.

Visean

In the Kinsale Sub-basin the succeeding Lispatrick Formation comprises condensed black pyritic and carbonaceous mudstone. At Old Head of Kinsale (Fig. 23.2, Col. 6), the basal part has yielded conodonts no younger than Arundian ^{O6} and an upper part containing ammonoids of Brigantian P_{1d} Biozonal age ⁺⁷ (Pracht 1997; Sevastopulo & Wyse Jackson 2001). Over the Glandore High, faunas of Brigantian age appear near to the base of the formation, suggesting a non-sequence extending through much of the Visean (Naylor *et al.* 1985).

In the Bantry Sub-basin (Fig. 23.2, Col. 1) the uppermost part of the Reenydonagan Formation (Member 4) comprises interbedded chert, dark grey mudstone and bioclastic mudstone, with the presence of the foraminifer *Uralodiscus* sp. indicating an age as young as Arundian ^{O6} (Naylor & Sevastopulo 1993; Naylor *et al.* 1996).

Namurian

The Namurian rocks conformably succeed the upper Visean rocks at the Old Head of Kinsale and have been referred to as the White Strand Formation (Naylor *et al.* 1985). In the type section at the Old Head of Kinsale (Fig. 23.2, Col. 6) it consists of interbedded fine-grained sandstone and mudstone with *Eumorphoceras* sp. recorded close to the base ⁺⁸. The succession is also known from the Cloyne Syncline (Sleeman 1987) and in the Carrigaline Borehole (3203-1) where miospores of the NC Zone (late Brigantian-Pendleian) have been recorded from this formation (Somerville *et al.* 1996; Fig. 23.2, Col. 7^{A1}). Further to the southwest at Seven Heads, west Co. Cork (Fig. 23.2, Col. 5) a very thick Namurian succession (346 m) is recorded (Naylor *et al.* 1988), where the base of the White Strand Formation is probably Pendleian in age (Sevastopulo 2001). The youngest beds preserved in the formation are determined from miospores to be Chokierian to Alportian in age (Higgs 1990; Fig. 23.2, Col. 5 ^{A2}).

At Whiddy Island, Bantry Bay (Fig. 23.2, Col. 1) there is a succession comprising, in ascending order, the East Point, Middle Battery and Kilmore formations. The oldest, black,

carbonaceous mudstone-dominated formation has yielded ammonoids of Arnsbergian age ⁺⁷ (Naylor *et al.* 1978), with highest beds of E_{2b} age. The overlying formations include turbiditic sandstone (Middle Battery Formation) and shallower water tabular and channelled sandstone (Kilmore Formation).

Fig. 23.1 Geological map showing the distribution of Carboniferous strata from South Munster Basin, adapted from GSI (1972), with modifications from Sevastopulo and Wyse Jackson (2001) and Sevastopulo (2001).

Fig. 23.2. Correlation of successions in the South Munster Basin region. Col. 1 from Jones (1974); Naylor & Sevastopulo (1993); Col. 2 from Sevastopulo and Wyse Jackson (2001); Col. 3 from Sevastopulo and Wyse Jackson (2001); Col. 4 from Naylor *et al.* (1985); Col. 5 from Naylor *et al.* (1988); Col. 6 from Naylor *et al.* (1985); Col. 7 from Sleeman (1987); Somerville *et al.* (1996).

