Excursion 29 Upper Stinchar Valley and adjacent areas

Key details

Author	J. Keith Ingham
Themes	To examine elements of the Lower Palaeozoic cover sequence and faunas of the Girvan district, particularly its oldest part in the Stinchar Valley. To contrast some of the shallower water facies and faunas preserved in the Barr Group on the north side of the valley with some of the deeper water facies represented in the partly equivalent Albany Group to the south of the valley.
Features	Balclatchie Mudstone and Balclatchie Conglomerate at Balclatchie Bridge; Kirkland Conglomerate, Auchensoul Bridge Mudstone, Confinis Flags, Stinchar Limestone, Superstes Mudstone and Benan Conglomerate in, and to the north of, the Stinchar Valley; Doularg Formation (Albany Group) south of the Stinchar Valley; trilobites, brachiopods and other fossils; evidence of basement faulting controlling facies distribution; conglomerates in successive fan delta cycles of a trangressive proximal fore-arc regime.
Maps	O.S. 1: 25 000 Sheet NX 29 / 39 Barr 1: 50 000 Sheet 76 Girvan B.G.S. 1: 50 000 Sheet 7 Girvan
Terrain	Some rough moorland walking and scrambling (short distances).
Distance and Time	About 12 km, mostly by car, from the first to the last locality, taking perhaps 5–6 hours depending on the time spent at each locality.
Access	This excursion is really only practicable by car or similar vehicle. Adequate parking facilities are available throughout but a tight hairpin bend on the B734 BarrPinmore road near its junction with the A714 makes any vehicle larger than a minibus impracticable. The excursion is best followed in the order given partly because the hairpin bend is much easier to negotiate downhill from the E and also because of access angles from the rather narrow B734.

Locality 1. Balclatchie Bridge [NX 256 969]

Balclatchie Mudstone and Balclatchie Conglomerate, trilobites, brachiopods (Figure 25.1). Leave Girvan northwards on the A77, passing under the railway bridge. Almost immediately, take the B734, on the right, to Old Daily, a distance of about 4 km. At Old Dailly take the first road uphill to the right (still the B734) which leads to Barr. At the top of this initial hill, another small road from Old Dailly joins from the left and shortly thereafter the road forks. The right hand, unclassified road leads to Tormitchell, Pinmore and Pinwherry, crossing the valley of Penwhapple Burn. Follow the left hand road (still the B734) to Barr and continue for a distance of about 3 km. The narrow, tree-choked gorge incised into the fairly featureless moorland area some distance to the right of the road indicates the course of Penwhapple Burn. Over much of its length it is a dark, dank and dismal place which, unfortunately, some local farmers have tended to use for farm refuse for many years. It is difficult of access, with very steep sides and is dangerous in places, not least because of

virtually invisible strands of rusty barbed wire. It tends to be visited only by particularly keen geologists and palaeontologists and for the reasons mentioned above most of it has not been included in the formal excursion itinerary. Nevertheless, nearly continuous exposures there reveal a much faulted and thrust, largely inverted sequence, dipping to the SE, of Ordovician and Silurian rocks, among which the Ardwell Group, Lower and Upper Whitehouse groups and Shalloch Formation, are represented.

As stated above, after about 3 km of the moorland tract of the B734 has been followed, the road crosses Penwhapple Burn at Balclatchie Bridge. A short distance before this is reached, a fenced pumping station on the right, opposite Penwhapple reservoir (invisible on the uphill side of the road) is the most convenient place to park [NX 256 969].

The succession hereabouts is much faulted and the beds, although locally overturned, young consistently to the NW. Scattered exposures over the fence on the uphill side of the road are of Balclatchie Mudstones, as are the much more extensive exposures in the adjacent section of Penwhapple Burn. Upstream, the mudstones pass down into a thick conglomerate. Originally thought to be the Benan Conglomerate, careful mapping (Williams 1962) has revealed this to be a quite separate local conglomerate tongue (one of several) almost at the base of the Balclatchie Group, named the Doon Hill Conglomerate. Downstream, the muds tones pass up into another such conglomerate tongue, the Balclatchie Conglomerate, above which are siltstones and mudstones of the Ardwell Group. Large fossil collections have been made in the past from the Balclatchie Mudstones hereabouts and from the matrix of the Balclatchie Conglomerate (see Williams 1962, Tripp 1980a). Deeper water forms predominate in the mudstone facies and the fauna is comparable with that from the mudstones at Dow Hill (Excursion 28, Locality 1) with which it broadly correlates. Some elements, particularly from the Balclatchie Conglomerate are transported shallower water forms and suggest the relatively rapid deposition of such conglomerates down a palaeoslope from shallower water environments. Apart from a very few deeper water trilobites from the mudstone facies, the vast majority of the fauna is profoundly North American (Appalachian) in aspect and the beds correlate essentially with part of the Edinburg Limestone and its deeper water shaley facies in Virginia and Tennessee. Both sequences contain a number of common species of both trilobites and brachiopods.

Locality 2. Brockloch [NX 256 951]: Confinis Flags, upper Stinchar Limestone, Superstes Mudstone, basal Benan Conglomerate, brachiopods, trilobites, 'Chazy' facies (Figure 25.1)

Cross Balclatchie Bridge and continue along the B734 towards Barr for a little over 2 km watching out for a farm track leading off to the right to Brockloch Farm. After about 1 km, this track leads to an old limekiln and a group of four small quarries. The succession here consists, in outline, of honeycomb-weathered, pale green, calcareous, pebbly sandstones and siltsones, seen in the third quarry, which have yielded brachiopods suggesting their equivalence to the Confinis Flags of the Stinchar Valley to the south (Locality 6), followed by rubbly blue-grey and grey-green limestones (Stinchar Limestone), passing up into grey-green siltsones and mudstones (Superstes Mudstone equivalent), in turn followed by calcareous conglomerate (Benan Conglomerate). The whole sequence here (Figure 29.1) is mappable southwestwards for a distance of over 2 km towards Dupin Farm. Its disposition is along the north-western flank of the Benan Syncline in the core of which is the thickest development of the Benan Conglomerate in the whole Girvan district. The occurrence of small partly faulted areas of serpentinite (Ballantrae Complex) near the quarries suggests that the Kirkland Conglomerate, so well developed at the base of the Barr Group over much of the upper Stinchar Valley (see Localities 4 & 5), is not represented here. To the NW of the quarries, the succession is thrust over another tract of Benan Conglomerate (Dupin Thrust) and, less than 1 km across strike to the NW around Pinmery and Tormitchell, the Stinchar Limestone and associated beds are repeated before again being substantially thrust over the Balclatchie and Ardwell groups (Tormitchell Thrust).

One of the members in the limestone succession in the quarries (Figure 29.1) is particularly fossiliferous and, although containing some trilobites (Tripp 1979), has yielded a rich brachiopod fauna (Williams 1962) containing a number of species which are conspecific with forms from the Pratt Ferry and Little Oak formations of Alabama, indicating that the Barr Group broadly correlates with the upper Whiterockian Series (shallow water Chazy fades) of eastern N. America. This equates essentially with the upper Llanvirn and Llandeilo Series of southern Britain.

Some of the rubbly limestones in these quarries have been brecciated and occasionally the fragments show signs of abrasion and therefore transport. Many fit together like a jigsaw puzzle but are now set in an anastomosing network of mudstone veins. The feature has been ascribed to 'tremor brecciation' (Williams 1962, p.14; see also Henderson 1935, p.492). Submarine earthquakes must have been a common occurrence during Ordovician and Silurian times in the Girvan district for evidence of this kind is frequently seen.

The lower part of the Benan Conglomerate here is worthy of note. Parts of it are best described as pebbly limestone and some sections show a profusion of limestone clasts which must have been scoured up from local Stinchar Limestone substrate as the first debris-loaded currents came in from the north or NW. One limestone clast has been discovered here, however, which is quite foreign to the Girvan District. The rock is undeformed and yielded fossils, again of North American type, which indicate an earliest Canadian [= early Tremadoc], i.e. earliest Ordovician, age (Rushton & Tripp 1979). It was transported from the north and presumably originated in the northern part of the Midland Valley of Scotland from whence other Early Ordovician shallow water carbonates are known (see Ingham et al. 1986, p. 482). At Girvan during Early Ordovician times, the rocks of the Ballantrae Complex were being generated and accreted to the Midland Valley terrane from an oceanic or marginal setting and in the Central Highlands (Grampian terrane) the climax deformation and metamorphism of the Dalradian rocks (Grampian event) was still underway. This single clast therefore tells us a great deal about the subsurface geology of the northern part of the Midland Valley terrane and of its distinctiveness in Early Ordovician times. Higher up the succession the Benan Conglomerate assumes its typical lithology with its profusion of igneous clasts (see Excursion 28 , Locality 5).

Locality 3. Plantation Burn, E of Doularg Farm, S side of the Stinchar Valley [NX 269 928] Doularg Formation of the Albany Group, trilobites, brachiopods, 'Whiterock' facies

(Figure 25.1), (Figure 29.2), (Figure 29.3), (Figure 29.4); (Figure 29.5), (Figure 29.6)

Proceed back to the road (B734) and follow it down into the village of Barr. Immediately after the road bears sharply left into the village it crosses the River Stinchar and follows its tributary, the Water of Gregg, on the right. A little further along the main street a narrow bridge takes the B734 sharply to the right over the stream. Follow this road out of Barr for rather more than 1 km. You will shortly pass Alton Albany Farm on the right. The road skirts the partly tree-lined lower slopes of Doularg Hill and for some distance keeps very much to the floor of the Stinchar Valley. If you reach Doularg Farm on your left, you have gone too far!

Watch out for a wooded stream descending steeply to the road from the left, to the left of which is a gate. The road is a little wider here and it is possible to park quite safely although the surface can be rather muddy. Negotiate this gate and then another one a short distance beyond it and climb the hill for about 0.5 km keeping fairly close to the wall bounding the stream to your right. After crossing a drainage gully, eventually you will see a step-type wooden stile over the wall, both of which have seen better days and in front of them is a relatively new mesh wire fence (Figure 29.3). Negotiate the wall at this point and follow it for a short distance, making your way through a cluster of gorse bushes. Beyond these you will see a fence coming in from the right. You need proceed no further.

The succession in the Plantation Burn is a critical one for it is unlike the 'standard' Barr Group succession on the north side of the Stinchar Valley and it contains beds which constitute the most south-easterly (i.e., across strike), richly fossiliferous rocks in the Girvan district. The rocks seen here are the finer-grained calcareous silts and mudstones of the Albany Group — broadly a lateral equivalent of the Barr Group to the north. The Albany Group consists largely of a fairly thick succession of greywackes, silts and conglomerates and in this section, although sometimes slightly overturned, the beds young largely to the NW. The finer-grained calcareous beds exposed at this locality constitute the Doularg Formation, the disposition of the various members of which are shown in (Figure 29.3), (Figure 29.4). It was thought that they represent the 'down slope' tailings of the Stinchar Limestone and associated beds on the northern side of the Stinchar Valley but this is now known not to be the case for there are good faunal reasons to believe that they are the time equivalents of some part of the Benan Conglomerate–a little younger than the Superstes Mudstone Formation and a little older than the Balclatchie Group (Ingham & Tripp 1991 and (Figure 29.5), (Figure 29.6).

The lowest fossiliferous unit within the Doularg Formation is the Gorse Member, a calcareous mudstone containing small decalcified carbonate nodules. It is exposed in two small bluffs close to the fence, in the gorse bushes on the east side of, and overlooking, the stream. The fossils from the nodules here are small and fragile, consisting of internal and external moulds largely of trilobites and brachiopods; they have been listed and described (Williams 1962, Tripp 1965, Ingham & Tripp 1991). The fauna is very large and diverse. Amongst he trilobites, it is dominated by *Lonchodomas pernix*, *Bumastoides*? *scoticus*, *Dimeropyge hystrix*, *Sphaerexochus* cf. *arcuatus*, *Encrinuroides obesus* and, above all, the pliomerid *Quinquecosta williamsi*. (Figure 30.7)

The latter genus is known only from the Stinchar Valley at Girvan. The assemblage falls broadly within the fairly shallow water illaenid–cheirurid association but the relative abundance of *Lonchodomas* and *Dimeropyge* suggest a rather offshore, outer shelf environment such as has been well documented for rocks of similar age and fauna in the Mackenzie Mountains of western Canada (Chatterton & Ludvigsen 1976, Ludvigsen 1978).

Following the Gorse Member is the Jubilation Member, exposed sporadically downstream for about 20 m but best examined in and around a small excavation on the west bank of Plantation Burn below the fence. A little preparation of the site may be necessary but the lithology can clearly be seen to consist of calcareous mudstones and fine siltstones in which the carbonate concentrations occur in well-defined seams. The beds here dip upstream and are inverted. The fauna is again a large one and collecting is best attempted from the weathered rock (internal and external moulds). Brachiopods are relatively few, the most common one being *Ptychoglyptus* cf. . *virginiensis* but the trilobite fauna is dominated by four or five common forms—*Nileusteres*, *Pteraspis* sp., *Bronteopsis matutina*, *Sphaerexochus lanei* and the spectacular encrinurid *Cybelurus expansa*; complete specimens are fairly frequent. (Figure 30.7) The association is widely known from the Middle Ordovician in a deeper water 'slope' facies commonly associated with the periphery of the N American (Laurentian) palaeocontinent and its outboard arcs. It has often been referred to as the typical 'Whiterock' association and the Jubilation Member occurrence is probably the youngest one known, of upper Whiterockian [=Llandeilo] age.

Between the Gorse Member and the Jubilation Member is a thin (15 cm) decalcified sandstone, the 'Separation Sandstone Bed'. It is not now exposed but was originally seen well down at the left hand margin of the excavation. It is interesting in that the sparse fauna collected from it is intermediate between that from the Gorse and Jubilation members.

Quite clearly, the Doularg Formation as a whole records a deepening (transgressive) event and this probably relates to basement foundering probably along a fault line just to the north, approximating to the present line of the large Upper Stinchar Valley Fault.

About 15 m downstream of the excavation is a small waterfall over rather sheared Jubilation Member rocks and the stream turns sharply to the right, following the line of a fault which is exposed above the next sharp bend in the stream. Beyond this, conglomerates are seen which are believed to be higher in the succession and which are probably the lateral equivalent of some higher part of the Benan Conglomerate to the north of the Stinchar Valley.

The view to the north and NW across the Stinchar Valley reveals something of the disposition of the various formations of the Barr Group developed in that direction. The main mass of Benan Hill is, as might be supposed, formed of a very thick Benan Conglomerate sequence disposed in the core of a broad syncline whose axis, plunging north-eastwards roughly parallels the Stinchar Valley. The northern slopes of the valley reveal features formed by the underlying formations, particularly that of the Stinchar Limestone which makes a positive, scarp-like feature descending into the valley towards the NE. Lower units appear on the valley slopes progressively to the SW and the prominent 'bump' made by the basal Kirkland Conglomerate can be seen some distance to the west, above Benan Farm (Locality 5).

Locality 4. River Stinchar at Auchensoul Bridge [NX 259 929]

Kirkland Conglomerate, Auchensoul Bridge Mudstone, trilobites, brachiopods (Figure 29.2), (Figure 29.5), (Figure 29.6).

Return to the road and continue westwards for a short distance watching out for the River Stinchar approaching the road from the right. Stop by the footbridge leading to Auchensoul Farm. Cross it and at reasonably low water extensive low

exposures will be seen in and adjacent to the river.

Here, three lithological units are seen. The dip is to the east and the lowest unit, the purple-tinged Kirkland Conglomerate is exposed for about 40 m upstream of the bridge and consists of the uppermost 16 m or so of the formation. It is capped by a brecciated pale blue limestone, the fragments being set in a calcareous siltstone. This is taken as the basal unit of the Auchensoul Bridge Mudstone Formation (see Ince 1984), previously referred to the Auchensoul Limestone of Williams (1962). After an exposure gap covering several metres of strata the succession continues with about 15 m of largely calcareous strata, basically blue-grey or maroon mudstones and siltstones but with limestone lenses and bands [NX 246 924]. Fossils are best extracted from the limestone lenses where they are decalcified. The brachiopod *Valcourea confinis* is known throughout the succession here and indicates that the Auchensoul Bridge Mudstone Formations the lateral equivalent of part of the Confinis Flags Formation, more typically developed towards the west.

The trilobites known from the Auchensoul Bridge Mudstone have been described by Tripp (1979–as Auchensoul Limestone fossils, see also Ingham & Tripp 1991, fig. 4). *Remopleurides ateuchetos* and *Isotelus* sp. are the most common forms.

Locality 5. Benan Burn: Kirkland Conglomerate, Confinis Flags, Stinchar Limestone, Superstes Mudstone, Benan Conglomerate, brachiopods, trilobites, other fossils

(Figure 29.2), (Figure 29.5), (Figure 29.6).

Continue westwards for about 1.5 km along the B734 and take the access road to the right leading to Kirkland and Benan farms, crossing the River Stinchar near Kirkland Farm [NX 246 924]. The tributary flowing down to the Stinchar from the north here is Kirkland Burn and not Benan Burn as it is labelled on the O.S. 1:50 000 map. Continue along the track to Benan Farm [NX 240 920] and park after first seeking permission from the farm owners. A track leads into Benan Burn which again flows from the north and deeply dissects the flank of Benan Hill. There are extensive exposures hereabouts of the Kirkland Conglomerate Formation, particularly on the hillside between Benan and Kirkland burns and it is estimated that the minimum thickness of the formation must be in the order of 260 m. Although the base is not seen, regional mapping suggest that it rests =conformably on the Ballantrae Complex. It is a massive purple and grey conglomerate commonly reddish-weathering and contains pebbles and cobbles of Ballantrae rocks and also acid igneous types not known from the Ballantrae Complex. Derivation was from the north or NW. The Kirkland Conglomerate forms the first fan-delta cycle of Ince (1984) (see also Ingham & Tripp 1991, fig. 3).

In Benan Burn some 15 in of this lithology is seen followed by about 7 m of rubbly weathering, cross-bedded, calcareous sandstone with occasional large pebbles. This unit forms part of the 'Transitional Sandstone' of Ince (1984) and it is followed by the Confinis Flags Formation. Although in this section there is an exposure break covering about 35 m of succession, typical Confinis Flags Formation is then exposed in the stream and along the paths. About 45 m of purplish-brown weathering, fine calcareous sandstone is seen. Weathering effects occasionally give the rock a slightly honeycombed appearence. Small pebbles are sometimes found. Fossils occur throughout and are dominated by a shallow water trilobite-brachiopod association. The relatively common Appalachian brachiopod Valcourea confinis gives the formation its old, well-established name. Although the shelly fauna is N American in its affinities, conodont studies have shownconclusively that this part of the Girvan succession is, in Anglo-Welsh terms, of late Llanvirn age (Bergstrom 1990).

Further along the valley, the lower beds of the Stinchar Limestone are encountered. They consist of rubbly, grey muddy limestones with some greenish mudstones and weather with a honeycombed surface and a yellowish-brown colour. Brachiopods and the alga Girvanella can be found. The Stinchar Limestone succession is complicated in this section by some faulting but overall the thickness appears to be in the order of 60 m. The higher beds, beyond the confluence with a tributary from the north, become more thinly bedded and 'platy'. Although still honeycombed and weathering to a bright yellowish tint, the highest Stinchar Limestone here is richly fossiliferous, the largely trilobite and brachiopod fauna occurring as friable moulds. The described fauna from this horizon at a variety of localities in the Stinchar Valley is considerable (Williams 1962, Tripp 1967): again it is a shallow water, platformal assemblage of N. American aspect.

Conodont biostratigraphy (Bergstrom 1990) indicates that the Llanvirn-Llandeilo boundary of the Anglo-Welsh chronostratigraphical scheme falls within the Stinchar Limestone.

Further upstream, in both Benan Burn and its tributary, scattered exposures of the Superstes Mudstone Formation are seen, estimated to be some 40 m thick here: the rock is a finely-bedded alternation of dark, greenish, nodular weathering, graded siltstone and mudstone. Fossils are few, consisting mostly of occasional inarticulate brachiopods and poorly preserved graptolites including the eponymous *Didymograptus superstes*. A much deeper water environment is indicated and it has been suggested that the successional changes are due to contemporaneous faulting along lines to the north or NW of the immediate area ((Figure 29.5), see also Ingham & Tripp 1991, fig.3).

Above the Superstes Mudstone Formation lies the Benan Conglomerate constituting Ince's (1984) second fan delta cycle. This formation is particularly thick in this area and, although its lowest beds are seen to interdigitate with the underlying mudstones in the Benan Burn–Kirkland Burn area, to the NE and, particularly to the SW of Benan Burn, the conglomerate channels down through the Superstes Mudstone to rest on the Stinchar Limestone. Four or five kilometres to the SW it has scoured to the level of the Ballantrae Complex and is thus clearly disposed in at least two broad channels. The lithological characteristics are typical of the whole area (see Excursion 28, Locality 5).

Locality 6. Minuntian Quarry [NX 220 911]

Confinis Flags Formation, lower and middle Stinchar Limestone, trilobites, brachiopods (Figure 29.2), (Figure 29.5), (Figure 29.6).

Return to the main road (B734) and proceed for a little more than 2 km, taking the service road to the right to Minuntian Farm. Ask permission at the farm for access to the old quarry which lies, together with its ruined kiln, less than 0.5 km west of the farm on the flank of the hillside and is reached by a path along the upper part of a field beyond the farm. The final part of the track leads obliquely up the bank to the old quarry entrance and exposures here of the upper part of the Confinis Flags Formation (see Locality 5) have yielded a particularly extensive trilobite and brachiopod fauna (Tripp 1962, Williams 1962). The brownish rock is largely decalcified and the fossils comprise rather friable internal and external moulds. Soft wrapping materials are essential.

At the mouth to the quarry, which is quite small, the abrupt change to typical Stinchar Limestone is seen (Figure 29.2). Most of the rock is unweathered and fossils are not easily extracted but cross-sections through the large gastropod *Maclurea* can be found. Fairly high on the back wall of the quarry (not very high, but take care), the rock is locally deeply decalcified and exquisite but very friable fossil moulds can be collected. Again the fauna is a large, relatively shallow water assemblage, dominantly of trilobites. The most common species encountered are *Remopleurides vulgaris*, *Ceraurinella* aff. *magnilobata* and *Hemiarges inghami*, the latter species (a lichid) being unknown from any other locality but closely resembling a species of about the same age from the Mackenzie district of western Canada (Tripp 1979; Chatterton and Ludvigsen 1976).

Locality 7. Aldons Quarry [NX 198 896]:

Ballantrae Complex, pebbly facies of the upper Confinis Flags-lower Stinchar Limestone, algal Stinchar Limestone, basal Superstes Mudstone, Benan Conglomerate, trilobites, brachiopods, other fossils (Figure 29.2), (Figure 29.5), (Figure 29.6).

Return to the main road (B734) and continue south-westwards for about 3 km to its junction with the A714 Girvan-Barrhill road, carefully negotiating the tight hairpin bend prior to crossing the R. Stinchar at the road junction. Turn left (south) and continue for less that 0.25 km. Park at the roadside layby. A short distance further down the road, a steep track to the right services Aldons Cottage and a small church and continues to the extensive old quarry workings. Ask permission for access at the cottage. Follow the rough track up over the brow and along to the main, northern, quarry (a short walk), passing to the right of the two old limekilns. As the quarry is reached, its floor, at least initially, will be seen to be something of a quagmire. Keep to the bank to the left of this.

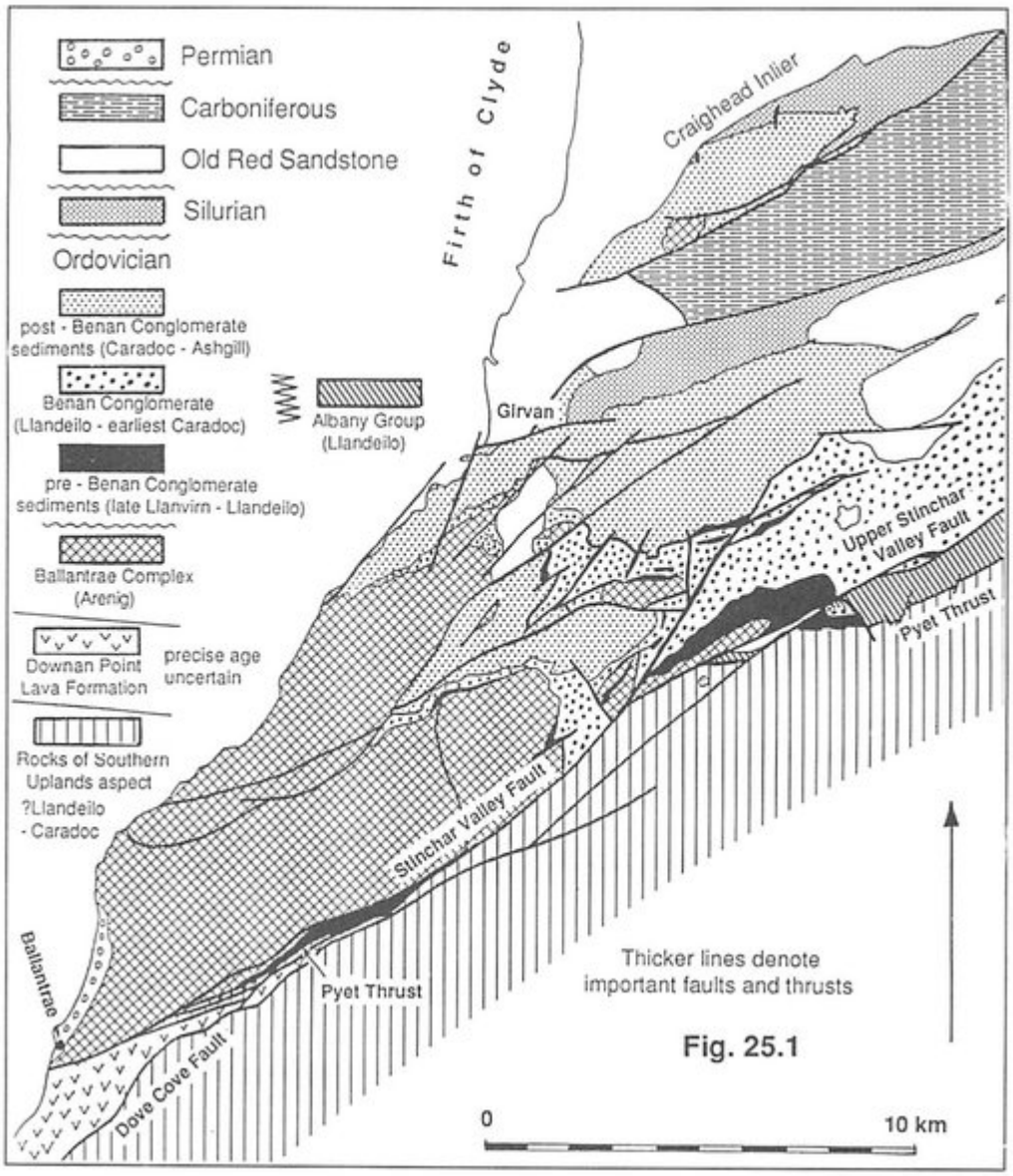
The succession revealed in and adjacent to the quarry at this locality is highly instuctive in that it reveals, not only the short distance successional changes in this part of the Stinchar Valley but is suggestive of the sedimentation controls. The beds dip to the ESE and are dpisposed on the south-eastern flanks of a major Girvan structure known as the Aldons anticline. The local structure is more complicated for, towards the smaller, south eastern quarry, the dip reverses forming a plunging syncline which is then truncated by a shear zone bringing in Ballantrae rocks. In the main quarry area, however, the succession is relatively straightforward and is dominated by limestones. The lower beds are exposed at and beyond the northwestern side of the quarry where, in this direction, the base to the succession can be worked out. Here spilites belonging to the Ballantrae Complex are overlain unconformably by a thin, dark green basal conglomerate, about 1.5 m thick, the angular pebbles consisting virtually entirely of spilite, followed by about 17 in of dark green pebbly sandstones. Grey, cobbly limestones with green sandy partings then come in, only about 1.5 m thick, followed by another 1.5 m of cobbly and pebbly limestone. This is the most clastic-rich part of the succession and not only do the limestone cobbles consist of algal nodules (*Girvanella*) and other organic debris but virtually all the pebbles and shell fragments are coated with growths of this alga. Following this are some 6 m of cobbly *Girvanella* limestone with green mudstone surrounds and about 28 in of pale, creamy-weathering, nodular and platy limestone, again very rich in *Girvanella* growths and this is capped by over 12 in of grey, thinly-bedded, platy limestones and calcareous mudstones before the next distinctive lithology is encountered on the southeastern wall of the main quarry. A large shelly fauna has been collected from the upper beds, particularly where it is weathered (e.g. Tripp 1967) and it is typical of the platy upper Stinchar Limestone of other localities in the Stinchar Valley. What is particularly notable, however, is that there is no trace of either the very thick Kirkland Conglomerate or the typical Confinis Flags Formation (see Localities 5 & 6), both of which are present only a few kilometres away to the NE. The pebbly basal beds at Aldons are probably equivalent to the lower part of the Stinchar Limestone and some upper part of the Confinis Flags Formation elsewhere. It is clear that there is profound, short distance overlap here and the most likely explanation is of contemporaneous basement faulting between Aldons and Minuntian.

On the SE wall of the main quarry, immediately above the typical upper Stinchar Limestone there are less than 2 m of sheared mud-stones with calcareous nodules before typical Benan Conglomerate is seen. The best exposures of these mudstones are now unfortunately concealed beneath two large slipped blocks of Benan Conglomerate, immediately to the right of the main Benan outcrop. Again, a substantial shelly fauna has been described from the weathered nodules (Williams 1962, Tripp 1976) which is similar in many respects to that known from the Jubilation Member of the Doularg Formation (Albany Group) (see Locality 3) and is indicative of deepening marine conditions, again probably brought about by contemporaneous basement faulting. These beds constitute the transitional basal part of the Superstes Mudstone Formation. Shearing in these higher beds is related to slight thrusting, brought about by the local folding of competent and incompetent strata at the base of the Benan Conglomerate but not much succession can have been cut out and the Benan Conglomerate here seems to have channelled through almost the entire Superstes Mudstone. Not far to the north of the quarry, the Benan is seen to have transgressed the entire Stinchar succession and for some distance it rests directly on the spilites of the Ballantrae Volcanic Complex. This major channelling overstep has already been referred to above (Locality 5).

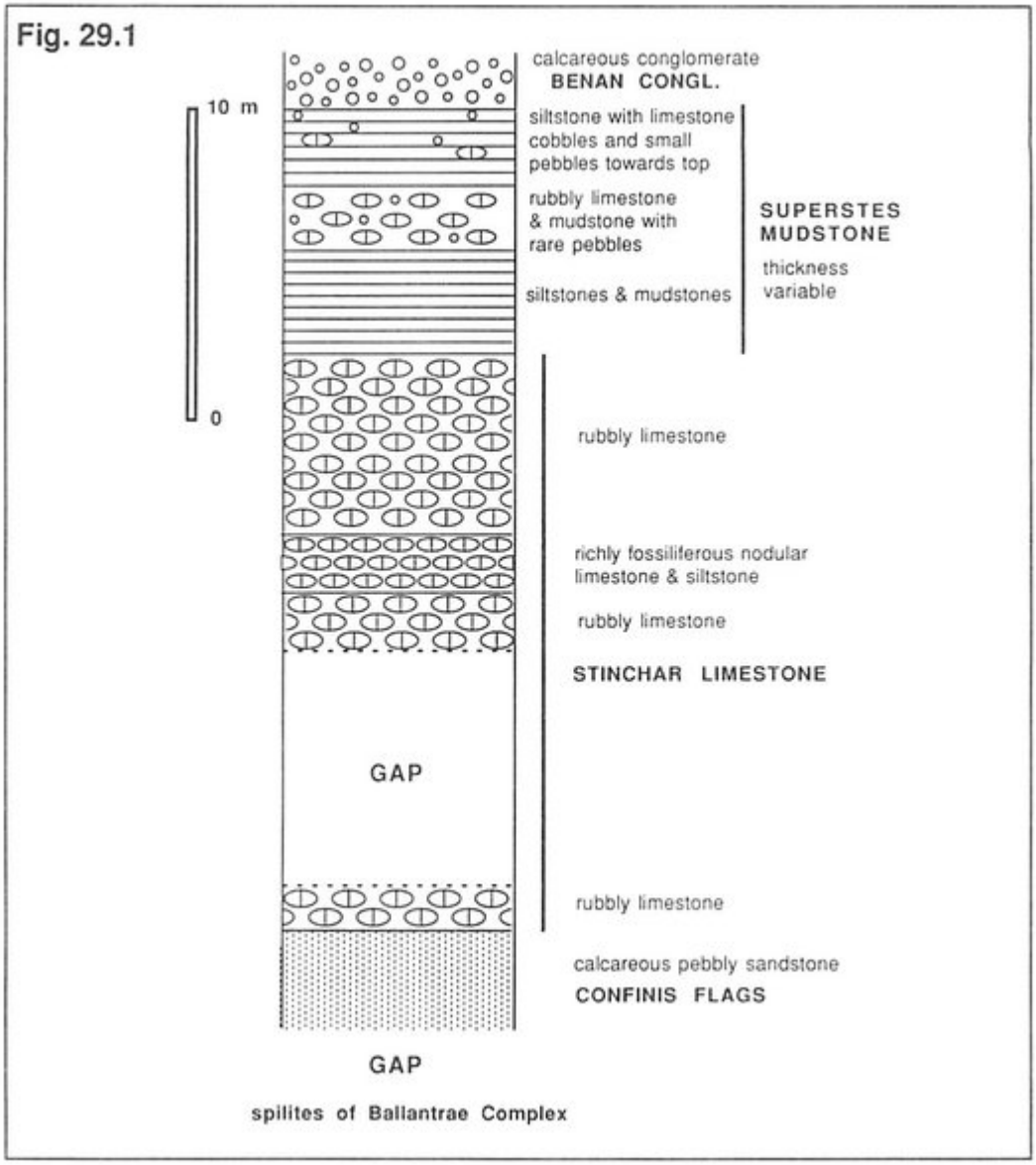
Return to the main road (A714) and turn left (northwards). Girvan is reached after a drive of about 9 km.

References

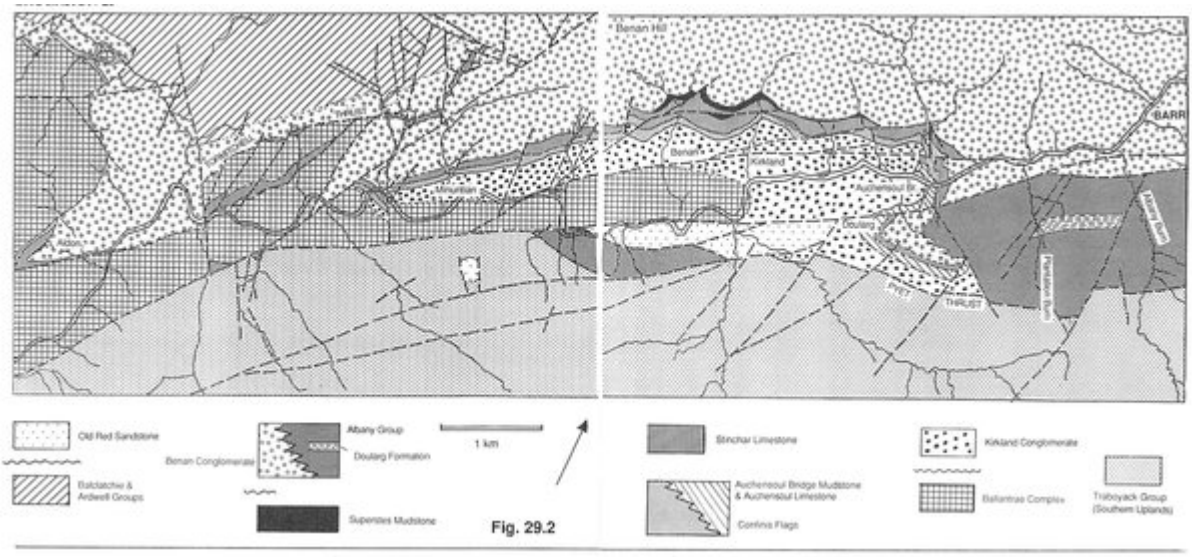
References for excursion 25–31



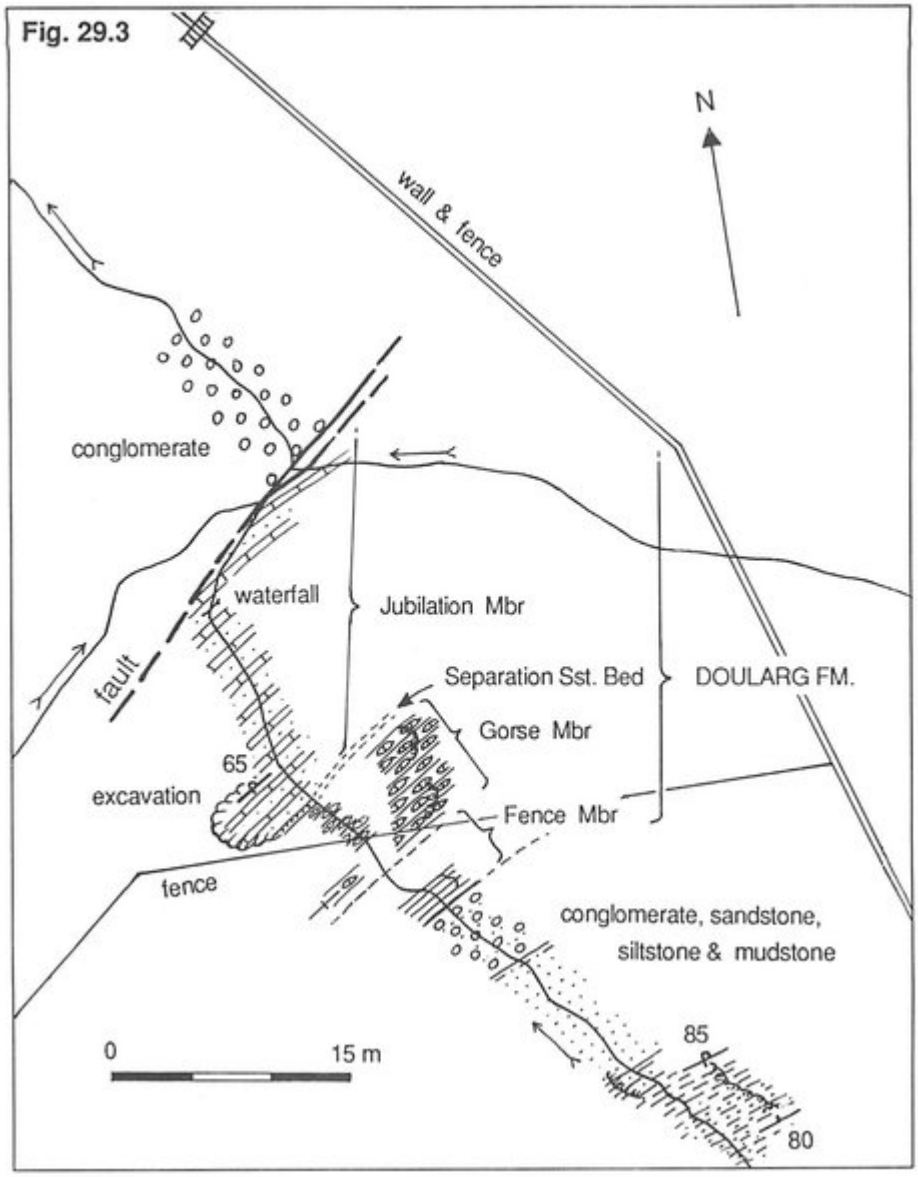
(Figure 25.1) Simplified geological map of the Girvan district showing the relationships between the major rock units.



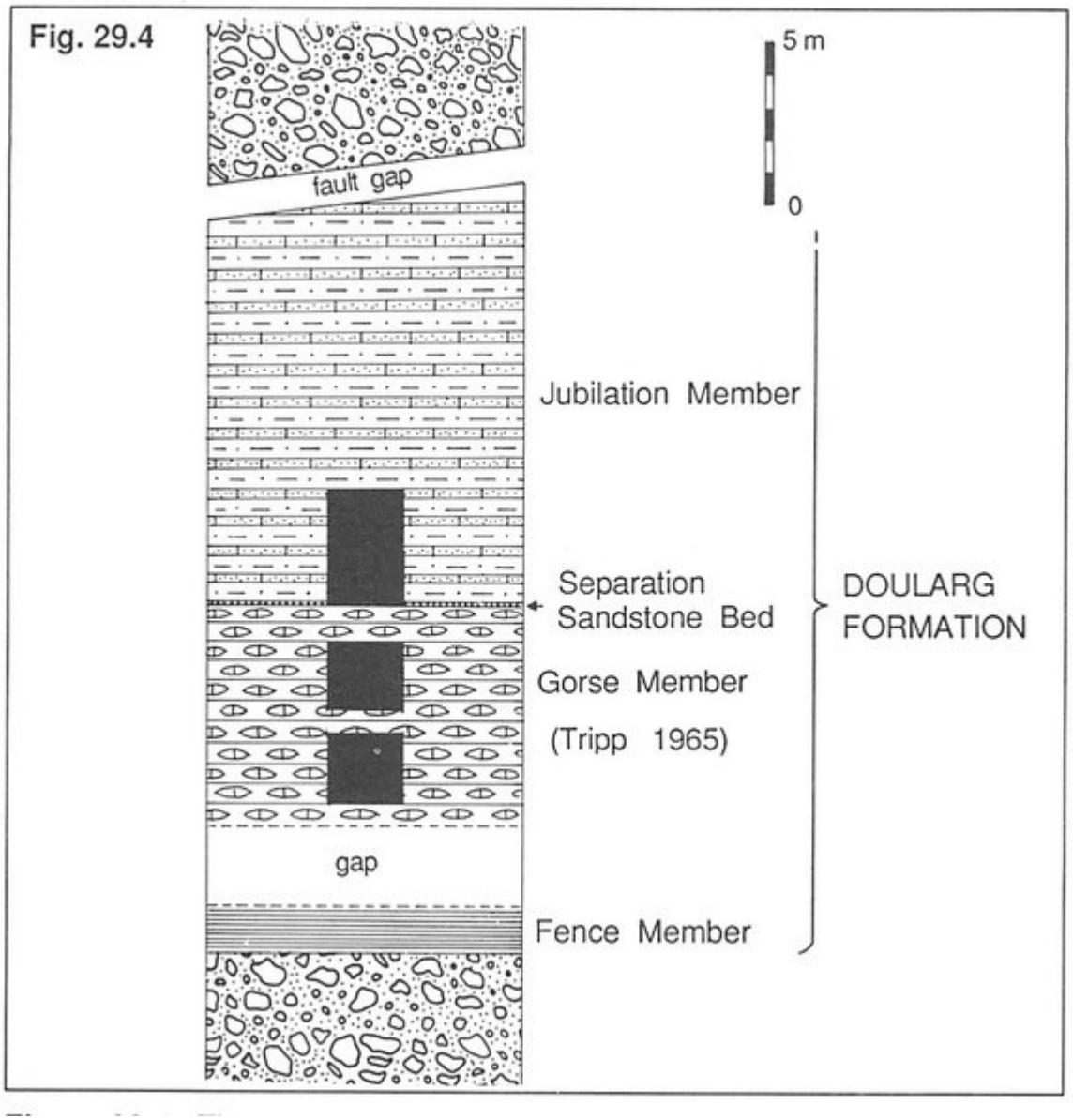
(Figure 29.1) Generalised succession in the Brockloch area.



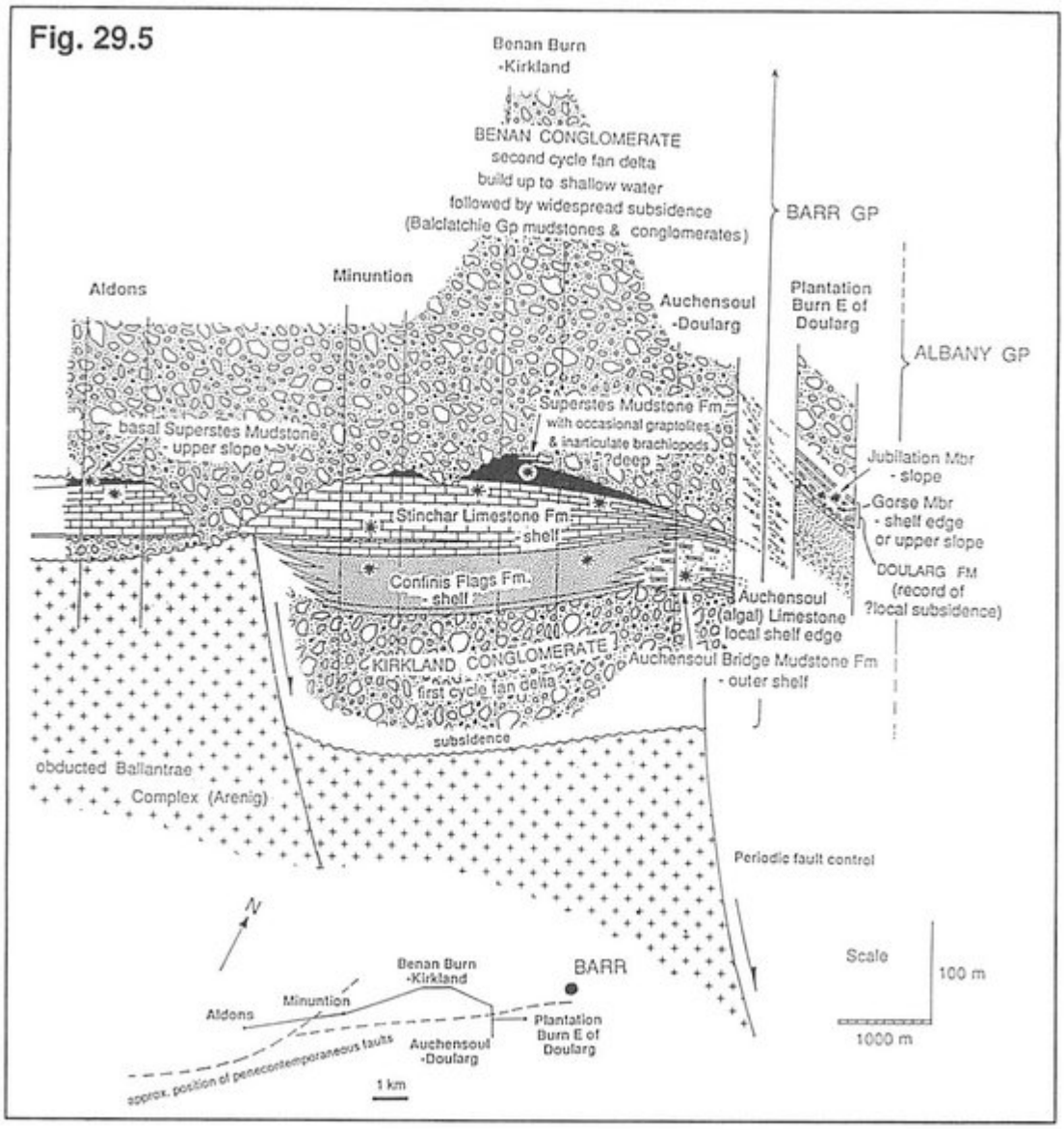
(Figure 29.2) A geological map of the upper Stinchar Valley.



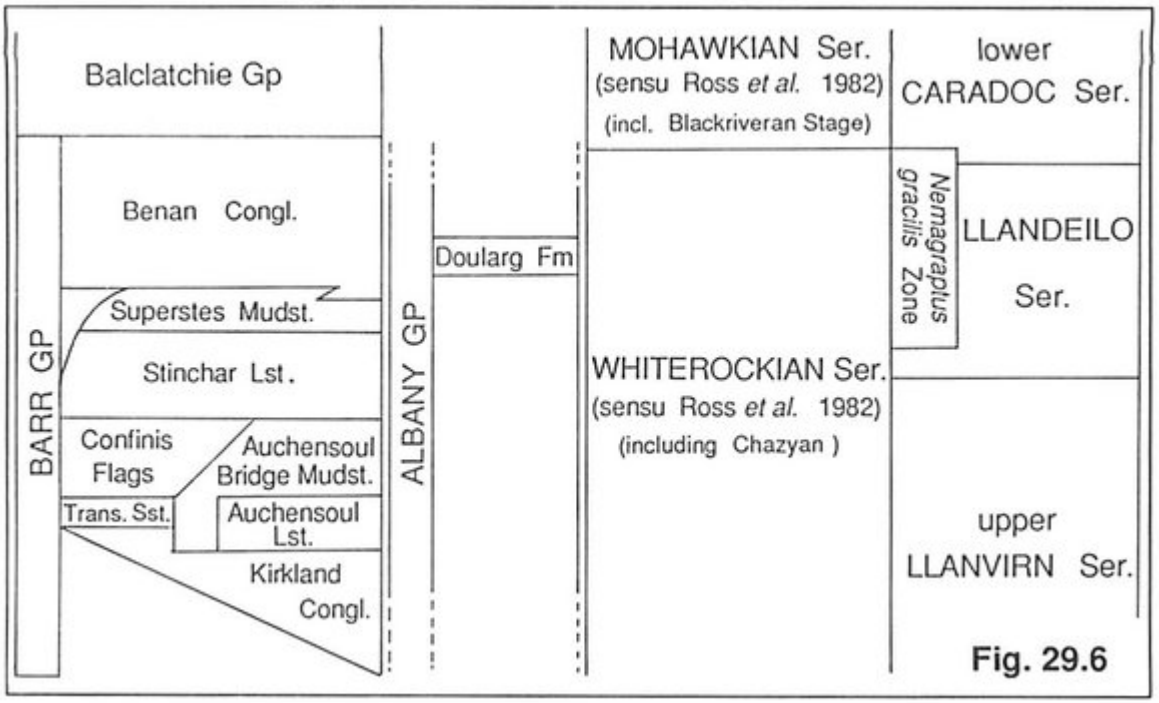
(Figure 29.3) A detailed locality map of the Doularg Formation and its members in the Plantation Burn, east of Doularg Farm.



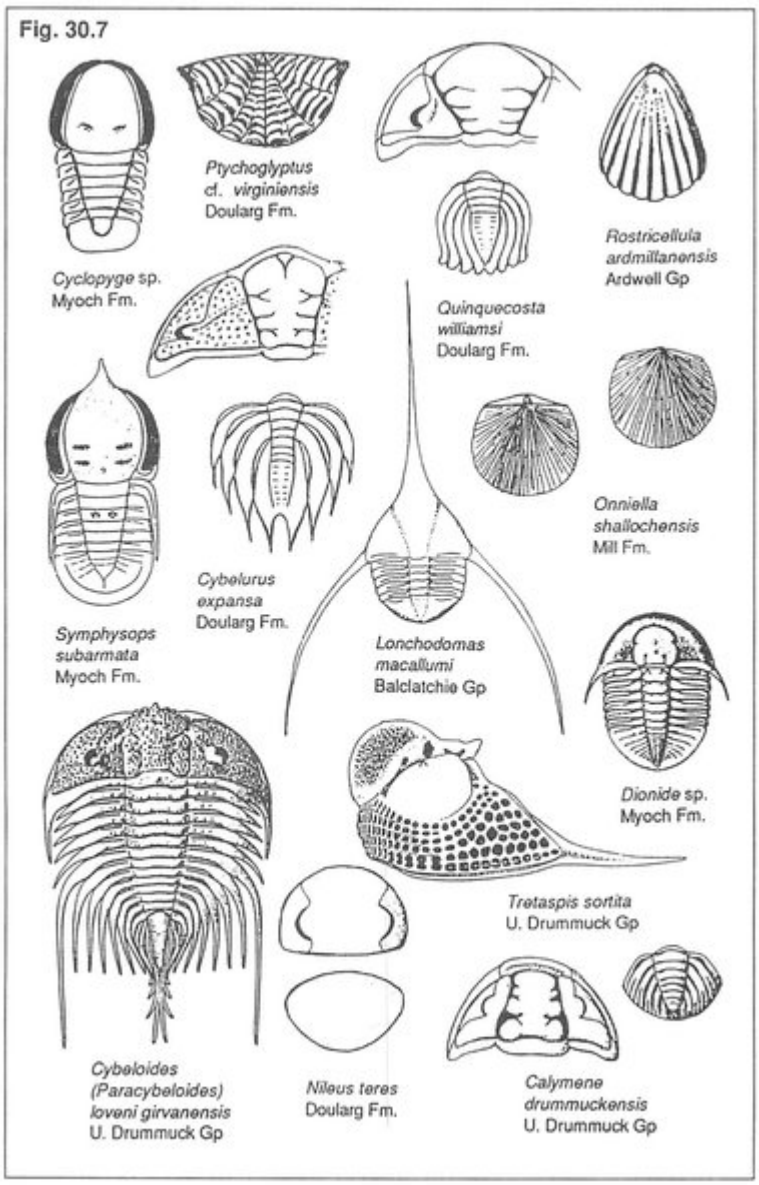
(Figure 29.4) The succession in the Plantation Burn, east of Doularg Farm.



(Figure 29.5) Local correlation within the Barr and Albany groups in the upper Stinchar Valley, showing depositional environments.



(Figure 29.6) Chronostratigraphical correlation of the upper Stinchar Valley successions.



(Figure 30.7) A selection of trilobites and brachiopods from various horizons in the Ordovician strata of the Girvan district.