Excursion 20 Trearne Quarry

Key details

Authors	C.J. Burton with mineralogy by J.G. Todd
Themes	Fossil faunas and their ecologies in a complete transgression-regression sequence in the Lower Carboniferous.
Features	The ecology of a marine transgression and the relationships within fossil communities, and between fossil communities and rock types. Coal, seat-earth, mudstone, shale, limestone, dykes, fossils, minerals.
Maps	O.S. 1:50 000 Sheet 63 Firth of Clyde 1:25 000 Sheet NS35 (1st edition) Kilbirnie Sheet NS25/35 (2nd edition) Largs & Kilbirnie B.G.S. 1:63 360 Sheet 22 Kilmarnock
Terrain	Exclusively within the quarry. Trearne is a working quarry with a safe, flat floor. Keep clear of haulage roads and unstable working faces.
Distance	Trearne quarry is situated 24 km (15 miles) SW of Glasgow. It lies 2.5 km (1.5 miles) east of Beith.
Approach	Trearne from Glasgow via Barrhead (Figure 20.1) and Lugton village on the A736. At Lugton village turn onto the Beith road (B 777) at the Paraffin Lamp Inn. After about 4.0 km (2.5 miles) take the by-road to Trearne quarry, an inconspicuous left turn just before a small brick house is reached on the right hand side of the main road. The quarry entrance lies 0.4 km (0.25 mile) along this road opposite a bungalow. There is abundant parking opposite the bungalow, or within the quarry itself.
Time	Within the quarry walking distance is minimal and the itinerary can be accomplished in around 3 hours, although keen fossil and mineral collectors will require far more time.
Access	(SSSI) Apply to: James Reid & Co. (1947) Lugton Lime Works, Lugton, Kilmarnock KA3 4EB Tel: 8751 435 If it does not prove possible to telephone prior to arrival at the quarry, then contact the quarry foreman at the bungalow by the entrance for permission to enter the workings. Hard hats should be worn. Recently, the owners have become increasingly reluctant to allow access to large parties, except those local groups which visit the quarry annually.

Introduction

Trearne quarry lies within the upper Brigantian Stage of the Lower Carboniferous, (Figure 20.2) and the rocks within the quarry belong to the Lower Limestone Group of the Kilmarnock Basin. Below this Group lies the Strathclyde Group (Paterson & Hall 1986), the base of which is formed by the basaltic lavas of the Clyde Plateau Volcanic Formation. These lavas appear in the prominent hills to the west and north of the quarries. Above the lavas, going towards the centre of the basin, are beds of the succeeding Lawmuir Formation, rich in volcanic detritus at the base and having, higher up, shales, seat-earths and sandstones representing terrestrial deposition, and limestones representing occasional marine incursions. On entering the Lower Limestone Group, marine incursions become more widespread, evidence for these being seen in the many limestones and shales within the Group. The Dockra Limestone of Trearne is one of the oldest of these limestones, although current opinion is divided as to whether it should be correlated with the Hurlet Limestone (Whyte 1981) or the higher Blackhall Limestone (Wilson 1979). Traditionally (Richey et al. 1930), and with some justification, the Dockra Limestone is equated with the Hurlet Limestone of the Paisley area and as such forms the base of the Lower Limestone Group. In North Ayrshire the Lower Limestone Group is, on this basis, 38 metres (124 feet) thick, compared to 90 m (300 feet) near Hurlet and 180 m (600 feet) in west Midlothian. The Dockra Limestone follows a marine transgression, and was deposited in the shallow, tropical waters of the North Ayrshire Shelf. The general geography of these waters was of a wide marine channel open to the SW and communicating with the Glasgow Basin to the north. The limits of this channel are supplied by the thinning out of the Dockra Limestone against the underlying lavas (Richey et al. 1930). At Trearne the limestone is about 7.5 m (25 feet) thick, but 8 km (5 miles) or so to the east it thins to zero against a contemporary land area which seems to have been a large island, and of low relief–judging by the lack of anything more than clay-sized detritus in the limestone. Similarly the limestone thins to the NW, indicating a western land area which was probably the margin of the Laurussian continent.

Itinerary

Trearne Quarry [NS 372 533] (Figure 20.3)

In this quarry two major patterns of variation may be seen within the Dockra Limestone and the beds immediately below it. These patterns are in the horizontal and the vertical aspects of the quarry respectively. In the horizontal it is clear that massive and irregularly bedded limestones are dominant in the southern bay of the quarry, but that towards the central bay these beds become thinner and less massive and thin dark shale horizons are intercalated between them. By the time the north-western and northern bays are reached limestones, in thin, regular beds, have become subordinate to dark shales, thus confirming an overall and rapid decrease of limestone content from south to north.

The vertical succession (Figure 20.4) begins, quarrywide, with a pale seat earth, followed by a coal horizon, then marine marginal, and finally marine, black shales, signalling a marine transgression. Above, in the southern half of the quarry, lies a marine limestone succession, whereas, in the northern half of the quarry, above the black shales, lies an initial limestone followed by an alternation of dark shales and limestones. Both successions culminate in a final limestone, the top of which shows a Carboniferous weathering surface and, rarely, the imprint of stigmarian roots. Both trees and weathering signal a regression to terrestrial conditions. Within this major cycle are minor cycles of emergence and submergence marked by faunal changes and hard grounds.

These variation patterns, and the environmental changes behind them, acted as cues for the prolific local fauna, since the dark shales and the limestones each have their own well-defined fossil communities which supplant one another when the environment changes (Shiells and Penn 1971). The basal black shales also contain a fauna transitional between the fluvial and the marine environment. Within both limestones and dark shales minor environmental variations in both the horizontal and the vertical senses, as well as variations in sea bed topography and thus energy levels, have led to the establishment of strongly localized variants of the major communites, as well as a detailed chronicle of changes in time as reflected in the succession of the communities and their variants.

Mineralization is widespread within the Dockra Limestone (Todd 1989) and at Trearne can be found in three situations. Firstly, in fissures in the limestone, especially where doleritic dykes have caused minor faulting; secondly filling the interiors of fossil brachiopod shells, and thirdly as nodules and mineralized shells in the basal black shales.

The minerals themselves can be grouped into five major classes -carbonates, sulphides, sulphates, silicates and halides, with the majority of crystal specimens being fine but small, and best studied under the microscope, or with the hand lens. It seems likely that the fossil brachiopod minerals (quartz, dolomite, barite, strontianite and fluorite) are the result of later mineralising solutions percolating through the rocks rather than forming during diagenesis of the original sediments. Inspection of a large number of specimens suggests the paragenetic sequence calcite (first generation brown crystals)–quartz–calcite (second generation large white crystals)–dolomite–chalcopyrite/ millerite–fluorite–chalcopyrite–strontianite. The faulting of the limestone by doleritic dykes has caused fissuring with the emplacement of chalcopyrite, pyrite, barite and fluorite, the crystals of the latter being much larger than in the fossil cavities.

Trearne is a working quarry and it must be emphasised that the itinerary which follows deals with localities as they exist at the time of publication. Thus some localities will disappear, others will be better exposed and new areas will appear as quarrying goes on.

Locality 1

This lies within a lengthy, shallow pit in the floor of the quarry immediately to the right of the main entrance. The marine transgression is recorded in a section 2.9 metres thick, below the Dockra Limestone, in this pit. Along the eastern wall of the pit and in the deeper parts of the western wall the following succession can be seen (Figure 20.4). Firstly a pale, grey-white clay approximately I m thick. This clay is crumbly when dry and contains comminuted, blackish plant material, and has a layer of calcareous nodules at its base. It forms the seat-earth (soil) in which grew the plants which formed the succeeding coal. This coal, probably the Hurlet Coal, is of variable thickness, ranging from thin, carbonaceous partings in black shale to a seam 12 cm thick, interbedded with black shales and thin, fine-grained limestone beds. Within the coal and on the carbonaceous partings are plant fossils, including the bark of *Lepidodendron* and its root *Stigmaria* (Figure 2.3). The coal is a bright, bituminous coal with occasional nodules of pyrite and numerous thin calcite veins. The presence of limestones and the variable thickness of the coal suggests a location very close to the sea, with patches of peat surrounded by, and interspersed with, the lime-mud precipitated from marine waters.

Immediately above the coal are 21.5 cm of grey to black, very fine-grained mudstones with scattered plant remains, mainly the twigs and straplike leaf fragments of *Lepidodendron*, and occasional small fish. Succeeding this is a thicker bed (53.5 cm) of splintery, black shale with irregular clays tone nodules. This shale contains large numbers of two species of the brachiopod *Lingula*, (Figure 4.3) these being *Lingula squamiformis* and *Lingula mytiloides*. In this locality *L. squamiformis* is concentrated near the base of the bed and *L. mytiloides* is not seen. Elsewhere in the quarry *L. mytiloides* is common near the top of the bed. Lingula squamiformis can occasionally be found in life position.

At this point the marine transgression has progressed to a position at which brackish water has spread over the site of the coal swamp. At the top of the Lingula bed is a black shale 1 m thick, forming the last bed before the Dockra Limestone. Within this bed the sediments become fully marine, heralded at the base by the presence of the rhynchonellid brachiopod *Pleuropugnoides*. The fauna of the bed is very rich and of various life styles–infaunal (buried), vagrant benthos (free-moving seabed forms) and epifaunal (attached)–the whole representing a thriving community dominated by brachiopods and bivalves, together with gastropods, bryozoans and crinoids (Figure 20.5), (Figure 20.6). The dominant brachiopod is the small to medium-sized *Antiquatonia insculpta*, but others are also present in some numbers including *Eomarginifera precursor*, *Martinothyris*, *Spirifer* (sometimes colonized by the inarticulate brachiopod Crania), *Composita*, *Dielasma* and *Orbiculoidea*. Among the bivalves are *Edmondia*, *Sanguinolites* and *Polidevcia* of the burrowers and free-movers, and the dominant, smooth or slightly ribbed *Pernopecten* of the attached forms. Gastropods include the flat-coiled *Straparollus* and, rarely, the minute *Glabrocingalum*. (Figure 4.3). The stick-bryozoan, *Rhabdomeson*, is common as are the broken stems, arms and, occasionally, cups of crinoids. Rare goniatites also exist at this level. The preservation of brachiopods with intact spines, and the cups of crinoids suggest very low energy levels and quiet waters.

About 50 cm above the base of the bed there is a horizon in which pyritization of the brachiopods has taken place and where pyrite nodules up to 8 cm in diameter have formed. The individual crystals in these nodules are octahedral.

The beds seen in full section at Locality 1 may be seen as partial exposures in other parts of the quarry, especially at Locality 1A, where weathered shales from the heaps release many fossils.

Locality 2

This comprises the face immediately above Locality 1 and is variably accessible from that locality at its southern and northern ends. The section thus exposed includes the entire thickness of the Dockra Limestone (7.5 m) with, at the base, a 1 mthick horizon in which calcareous shales alternate with thin limestone horizons or bands of calcareous nodules. The shales, best exposed at the southern end of the locality, close to the quarry entrance, are considerably more calcareous than the black shales of Locality 1 below them, and have a distinctly different fauna. Bivalves are rare in these shales, the fauna being dominated by a rich, though restricted, community of crinoids, brachiopods and bryozoans which lived in quiet waters. Several crinoid genera are present and the scatter of semi-intact stems, arms and even cups suggest that minimal post-mortem movement has taken place. The genera range in size from forms up to I m tall to forms of much less than half that height, suggesting a layered community rather like a forest. Commonly found are the large stems and intricately ornamented plates and arms of *Rhabdocrinus scotocarbonarius*, as well as the distinctive stems of *Ureocrinus* with their alternation or semi-alternation of large and small ossicles. The dominant brachiopod, found in large numbers is *Eomarginifera precursor* a tiny and very common fossil here, the thin metallic-looking spines of which are common in the shales.

Growing among the crinoids was the stick-bryozoan *Rhobdomeson*, a sure indicator with its branching tree-like shape of a quiet low-energy environment. Other bryozoans encrust shell fragments and fallen crinoids on the sea bed. The small solitary coral *Zaphrentis* is also commonly present. The community, its layering and the maximum size of the larger crinoids all suggest that water depth was of the order of ten metres over the area.

The thin or nodular limestones accompanying the shales represent times at which input of clastic mud was restricted and limited carbonate deposition was possible–the nodules representing local patches of lime mud. These limestones are detrital and above them are thicker limestones which represent a period during which clastic muds were rarely present in the area. However, in this section, and elsewhere in the quarry some limestone beds have very thin, unfossiliferous shales between them. Such shales do not represent original deposition, but are stylolitic in origin, being the result of pressure-solution between beds of limestone, in which calcium carbonate is removed and a deposit of the clay originally in the limestone is left behind.

These massive limestones themselves reflect changing environments, and for the first 2 m it can be shown that water depth had diminished and that the water itself had become clearer, although the area was still below wave-base in this area. The evidence lies within the many patches of the colonial coral *Lithostrotion* (Figure 20.6) found in this area. These patches, still in life position, formed a series of branching bushes of coral up to a maximum of 1 m high and perhaps 3 m in diameter, scattered across a wide area and separated from one another by flat areas of sea-bed. In these spaces between the coral 'bushes' flourished several genera of small, bushy bryozoans, including *Septopora*, a few small fenestellid bryozoans and crinoids. Distributed throughout the lower two-thirds of the limestones, as well as between the corals, are the productid brachiopods *Eomarginifera longispina*, *Pugilis scoticus*, *Krotovia spinulosa* and *Echinoconchus punctatus*, as well as the distinctive spiriferid *Brachythyris*. Many of these fossils are closed and contain a small amount of fine mud, infiltrated into the cavity, layered gravitationally and capped by minerals. These geopetals indicate the original attitude of the shell to the horizontal, and the fact that the vast majority of the geopetals do not now conform to bedding horizontal suggests that after deposition the shells were disturbed by bioturbation. On numerous lower bedding surfaces are the brown, now calcareous and sugary-looking tethering strands, up to 1 mlong, of the siliceous sponge *Hyalostelia smithi*. Dense grey mudclots within the limestones are associated with the remains of these sponges, and may be algal precipitates. More certainly, horizontal and sub-horizontal grey banding reflect the former presence of algally bound lime-muds at the sea-bed.

At five or more distinct levels within the limestones, the first about 2 m above the base, are horizons where it is clear that massive destruction of the corals and other members of the fauna has taken place. Some of these horizons are in the form of large, irregular lenses of debris, up to 7 cm thick, draped in the lee of large groups of coral colonies. The debris consists of smashed *Lithostrotion* branches, broken solitary corals and brachiopod fragments and appears to be due to either storm damage or a period of shallowing above wave-base–the former being the more likely.

The upper 3.5 m of the limestones reflects a change in environment from an occasionally disturbed but relatively quiet environment to one which was at first quieter and then more agitated. Quieter conditions are signalled by a decrease in the number and size of *Lithostrotion* colonies, although in the southern part of the locality these do persist up to the top of the limestones, and also by the incoming of numerous solitary corals of the genera *Dibunophyllum*, *Caninia* and occasionally the clisiophyllid *Aulophyllum*. (Figure 20.6). These are sometimes found rolled together in 'nests' by current action in brief episodes of higher energy.

As the top of the succession is approached evidence for more agitated conditions is found, firstly in a horizon rich in the extremely large productid *Gigantoproductus* (Figure 20.5), but poor in all else but rolled and broken debris. The huge brachiopods, of mature size, are upside down and appear to have been moved by powerful currents. Secondly, above this level, and forming limestone pavements at the top of the face is a thick horizon of crinoidal grainstone, visible over much of the southern and central bays of the quarry. The crinoidal debris includes long, but randomly oriented lengths of stem, locked together with an extensive meshwork of the spines of *Eomarginifera*. On this pile of debris grew extensive colonies of the bryozoan *Fenestella*, a fenestrate form common in agitated water (Figure 20.6). The anomalous length of the crinoid stems, unbroken in the agitated water, is explained by the fact that they were joined to each other by cirri, in large forests, fell joined together and were locked into place by the bryozoans and brachiopods. Occasional examples of the flattened, but sharp-edged, mollusc-crushing teeth of the shark-like fish *Petalodus* can be found here (Figure 20.5).

In the northern part of this locality, close to the steep quarry road running east, mineralization is widespread in limestone fissures. In these fissures fluorite is found associated with 'dog-tooth' calcite. The cubic, pale yellow fluorite crystals are up to 1 cm across, and some have chalcopyrite inclusions. Occasionally, in the same area, veins of barite are exposed.

Locality 3

This is a face on the right of the entrance to the flooded area of the quarry, and is itself fringed by a marshy area. The base of this face is in Lithostrotion limestone, but a little higher up, perhaps 1 m above the base, is a horizon displaying every sign of extremely agitated water over a rough and bumpy seabed. This horizon is marked by masses of rolled and smashed corals and brachiopods sedimented as a hummocky surface on which are growing colonies of the sclerosponge group, the chaetetids. These form pancake-shaped patches which, in cross-section, look like miniature colonial corals and which effectively preserve the contemporary sea-bed. Their low aspect is a sign of powerful agitation well above wave-base, as is the presence of single gigantoproductid shells piled into one another like stacked bowls. This horizon is about I m thick and gradually fades out upwards into finer lime-muds with crinoidal debris. Its thickness suggests that rather than a storm-induced horizon, it marks a period of shallowing which, since it does not appear at Locality 2, also suggests that sea-bed topography was marked by sharp rises and depressions of a very local nature.

Please do not hammer this locality.

Locality 4

Now go northwards along the line of faces into the northwestern bay of the quarry and approach the northern face of this bay. This actively quarried face, which should be approached carefully, reveals the first evidence of a series of facies changes which bring in muds to alternate with the limestone horizons. The advent of muds suggests, and the fossils bear out, quieter and perhaps deeper waters on what appears at first to be a regular alternation. However the limestones are grain-supported, i.e, the shelly materials within them touch and thus resist compression, and a closer look reveals that large areas of the limestone face show fossils which are uncrushed and smaller areas lateral to them where the fossils are crushed and flattened. This represents areas where diagenesis happened in two distinct phases, early and late; early diagenesis supporting the shells and resisting the later diagenetic flattening. Thus the limestones resist much of the crushing and may be as much as 70%-90% of their original thickness, whereas the muds tones have no such grain support, most of their fossils are crushed flat, and they represent perhaps 20% of their depositional thickness. The regular alternation is a diagenetic artefact and periods of mud accumulation are in the majority in this face. The fauna of these mudstones will be dealt with under Locality 6.

Within the limestones the dominant association is that of brachiopods and crinoids in relatively quiet water conditions. Brachiopod diversity is high, and among the smaller forms the productids are represented by the small and elongated Avon ia, together with *Promarginifera*, *Eomarginifera*, *Pugilis* and *Krotovia*, with its multitude of spine bases resembling the surface of a strawberry (Figure 20.5). The larger productids include *Buxtonia* and the rare, broadly flanged *Kochiproductus*. *Rugosochonetes* and *Martinothyris* are common and the small terebratuloid *Dielasma* appears. The most common bivalve present is the large, fan-shaped *Pinna*, living upright in the lime muds. The rare and enigmatic square, cone-shaped fossil *Paraconularia* is also present.

The many crinoids occur usually as long lengths of current-stacked stems, although occasionally they may be found as large pockets of debris. These pockets appear to have formed by the rupture of an algal mat and the consequent current erosion of the loose underlying lime mud, this being replaced by rolled and disjointed crinoidal debris. Limestones higher up the face are often stylolitically bed ded, appea ring to have flat bedding planes. However close examination shows that the sea bed was far more uneven than it thus appears, with early diagenesis forming hard grounds of limestone rock which appear to have eroded to form an irregular topography of ridges and hollows with cavities of up to 30 cm height. The formation of such hard grounds suggests that at times the lime muds were above sea level where hardening and erosion took place. On later submergence the cavities were colonized by calcareous sponges and other fixed animals. A marked tendency in this bay, and to the north, is the development of a separate limestone facies which reflects a different environment with its own specialized faunas. The facies is represented by darker, more muddy limestones which break to form thin, flat slabs which weather to a pale surface. These limestones can be seen at higher levels in all faces of the bay. In the northern face these beds contain solitary corals (*Dibunophyllum*), probably in growth position, and the large coiled gastropod Straparollus. However in the western bay the fauna is better developed, and here large slabs, quarried from the upper levels, and large flat slabs on the quarry top, bear prolific assemblages of fossils which are certainly in life position.

The main component of these assemblages is the large, flat brachiopod *Brochocarina*, the semicircular shells of which, attached one to another, form large oyster-like colonies. On these shells, which may have hinge-line widths of 12 cm or more, *Crania* sometimes colonises. Around these colonies lived productids, including *Kochiproductus*, *Spirifer*, *Composita*, large numbers of *Martinothyris* and a variety of branching and small fan bryozoans. The waters were generally very quiet, evidence for this being seen in the remains of the sea-urchin *Archaeocidaris*, some of which are collapsed and unscattered individuals, and in the occasional complete crinoids also present. Meandering across the surfaces of some of the slabs are the long, thin, fluted coralla of the coral *Heterophyllia*, an unusual prostrate form. In the more muddy horizons are relatively rare specimens of the trilobite *Phillipsia* (Figure 20.5). The limestones of the northern parts of this bay contain many hollow brachiopods, these are lined with a first generation of brown rhombohedral calcite, followed by a second generation of clear 'dog-tooth' calcite, brown saddle-shaped groups of dolomite and micro-cubes of colourless fluorite. Some of the brachiopods are rich in strontianite which forms white, hemispherical aggregates to 2 mm, or minute, spiky, pseudohexagonal crystals. On the flat surfaces above the faces there are signs of extensive palaeokarst development subsequent to the marine regression and, very rarely, slabs of a yellowish crinoidal limestone can be seen, on the surfaces of which are large stigmarian roots.

Locality 5

This lies at the far north-eastern end of the quarry's northern bay. Here three NW–SE trending dolerite dykes crop out, a wide one and two narrow ones, all with horizontal columnar jointing. Minor faulting can be seen in the limestones here, associated with veins of calcite, and the cavities within the productid brachiopods often contain fluorite, minor strontianite and occasional sulphides, including hair-like needles of millerite. The large dyke has a considerable influence on the surrounding sediments, decalcifying the limestones and baking the mudstones. Some brachiopods near the dyke contain sugary white microcrystalline gypsum and yellow-brown siderite. Cubic calcite pseudomorphs after halite, or possibly fluorite, project from some dolerite surfaces at the contact zone. Flat golden marcasite 'pennies' are found in the coal seam below the main succession. At other places along the face the productids in the limestones contain flat, salmon-pink barytes crystals together with calcite and quartz.

An important feature here is the increasing dominance of mudstones over limestones, with the limestone beds becoming thinner, often as elongate lensoid units, and the mudstones becoming thicker and interpolating between the limestone units.

Locality 6

This locality covers the western face of the northern bay, within which the increasing dominance of the mudstone horizons, already noted in localities 4 and 5, can be seen as it develops northwards. The mudstones themselves contain a quiet water fauna with abundant small horn corals including *Zaphrentites* (Figure 20.6), *Allotropiophyllum* and *Fasciculophyllum*. The larger *Caninia* is also present, as are the brachiopods *Spirifer*, *Composita* and *Antiquatonia* (Figure 20.5). Molluscs include various bivalves and rare goniatites. *Lingula* occurs in some mudstone horizons, suggesting periods in which marine conditions may have been replaced by more brackish water conditions as the sea retreated temporarily.

The limestones are rich in many of those species of brachiopod noted at Locality 4, with the addition of *Gigantoproductus*. Solitary corals, such as *Aulophyllum* are present, but colonial corals are rare, only a few small colonies of *Lithostrotion* being visible in beds low down on the face.

Once again it is the slabby, pale-weathering, dark, muddy limestones which contain the most interesting fossils. Many such beds contain *Brochocarina* (Figure 20.5) and solitary corals as before, but in a series of beds just below the lip of the quarry, is a large and unusual fauna of molluscs. This fauna contains abundant cephalopods and large bivalves, the latter often with their valves either still tightly closed, or fully open as 'butterfly' fossils. Such groupings can only occur in the quietest conditions well below wave base, suggesting deeper than usual water, perhaps correlating with the penultimate quiet episode seen at Locality 2. The fauna consists further of a wide range of genera with unusually large adult forms and is atypical of the usual faunas of the quarry, but has much in common with those faunas to the south, especially those of Ireland. This may suggest a marine transgression opening up hitherto closed routes from the south west. The fauna is in the process of being described (by C.J.B.), but among a provisional list of forms are large examples of the straight cephalopod *Orthoceras* and the slightly curved *Campyloceras*, as well as the coiled nautiloids *Stroboceras* and *Vestinautilus*. Large beyrichoceratid goniatites may also be found. Among the bivalves are huge examples of *Pinna flabelliformis* and *Sedgwickia gigantea*, as well as large examples of *Limipecten*, *Myalina* and *Edmondia*.

The limestone in this area can contain bands of chert over 30 cm thick. Perfect hexagonal quartz crystals line the hollow interiors of brachiopods, while some fossil shells are completely replaced by chalcedony. Occasionally the familiar banded variety agate can be found. Between here and the spur separating the locality from the northern bay (Locality 4) fine specimens of scalenohedral calcite covered in lustrous cubic pyrites turn up in limestone fissures.

Locality 7

This locality lies in the western part of the southern bay, near the edge of the flooded area. Here, in the upper parts of the low cliffs on the north side of the track can be seen the last stages of the history of the quarry. These consist of dense crinoidal grainstones in the top 2 metres or so of the succession. These grainstones occupy the same horizons as the quiet water areas of Locality 6 but, as relatively high energy crinoid forests, are likely to have developed on a submarine mound well above wave base. However the topmost beds here, and almost everywhere else in the quarry are similar crinoidal limestones, suggesting a general shallowing as part of the final retreat of the sea in this area.

Locality 8

This is within the flooded area, but can be approached by going to the quarry entrance, taking the short, steep wagon road up the southern face, and walking west along the quarry rim. On the promontory are two small dolerite dykes around which minor faulting has led to some mineralisation including iron pyrites and chalcopyrite.

References

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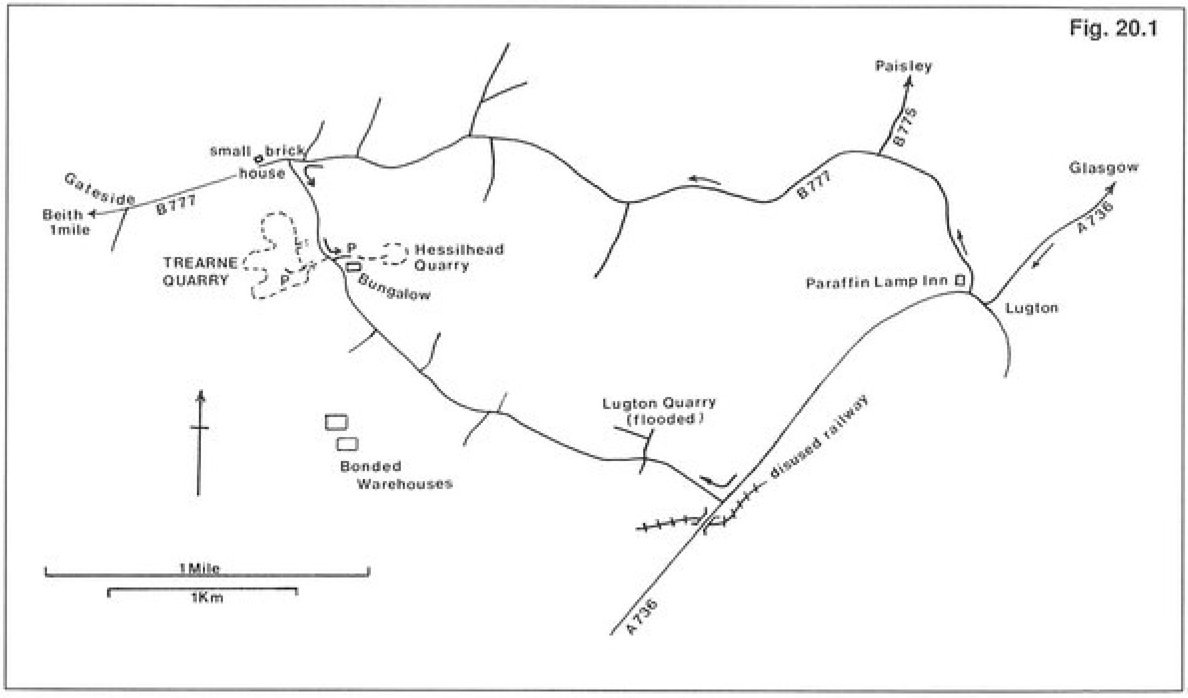
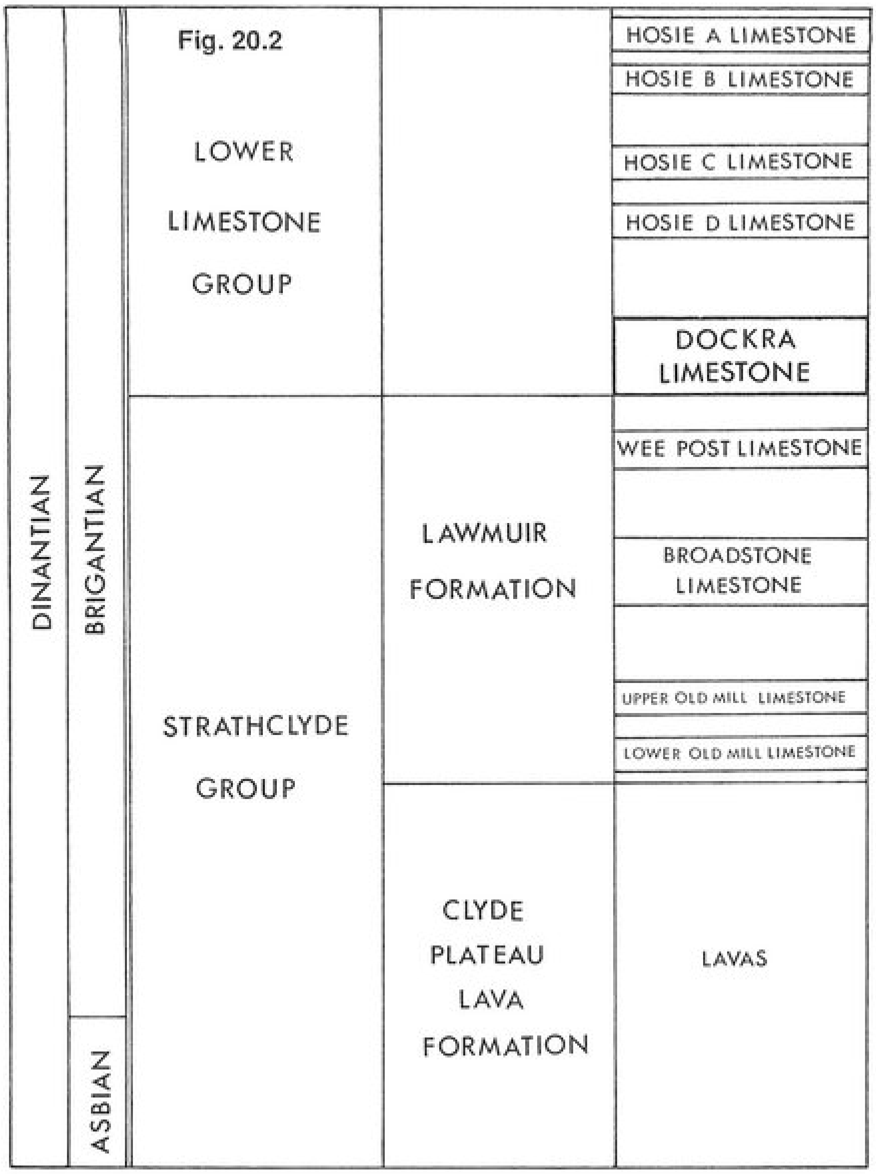
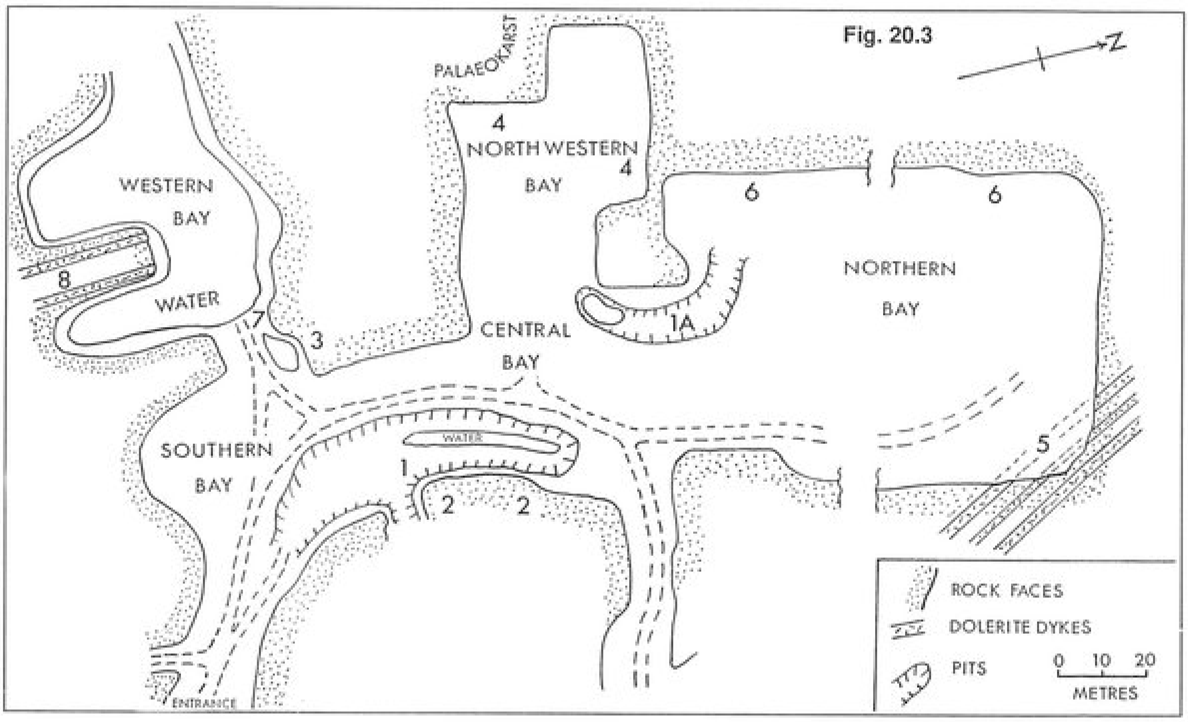


(Figure 20.1) Location map for Trearne Quarry.



(Figure 20.2) The Carboniferous stratigraphy of North Ayrshire.



(Figure 20.3) Trearne quarry and localities within it.

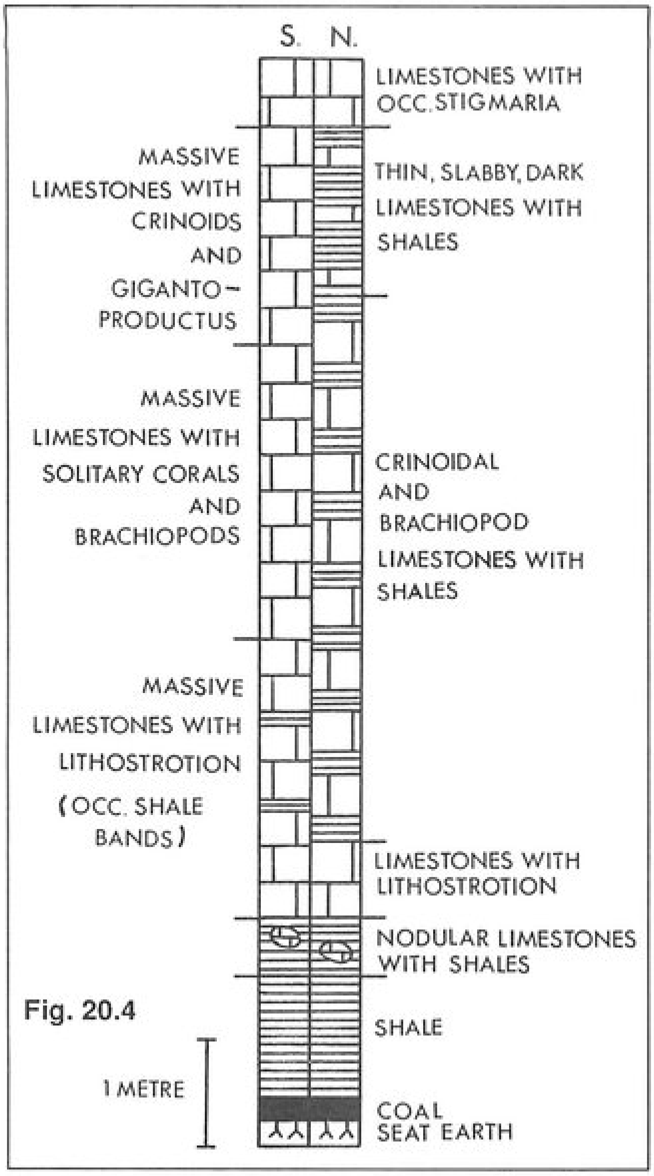
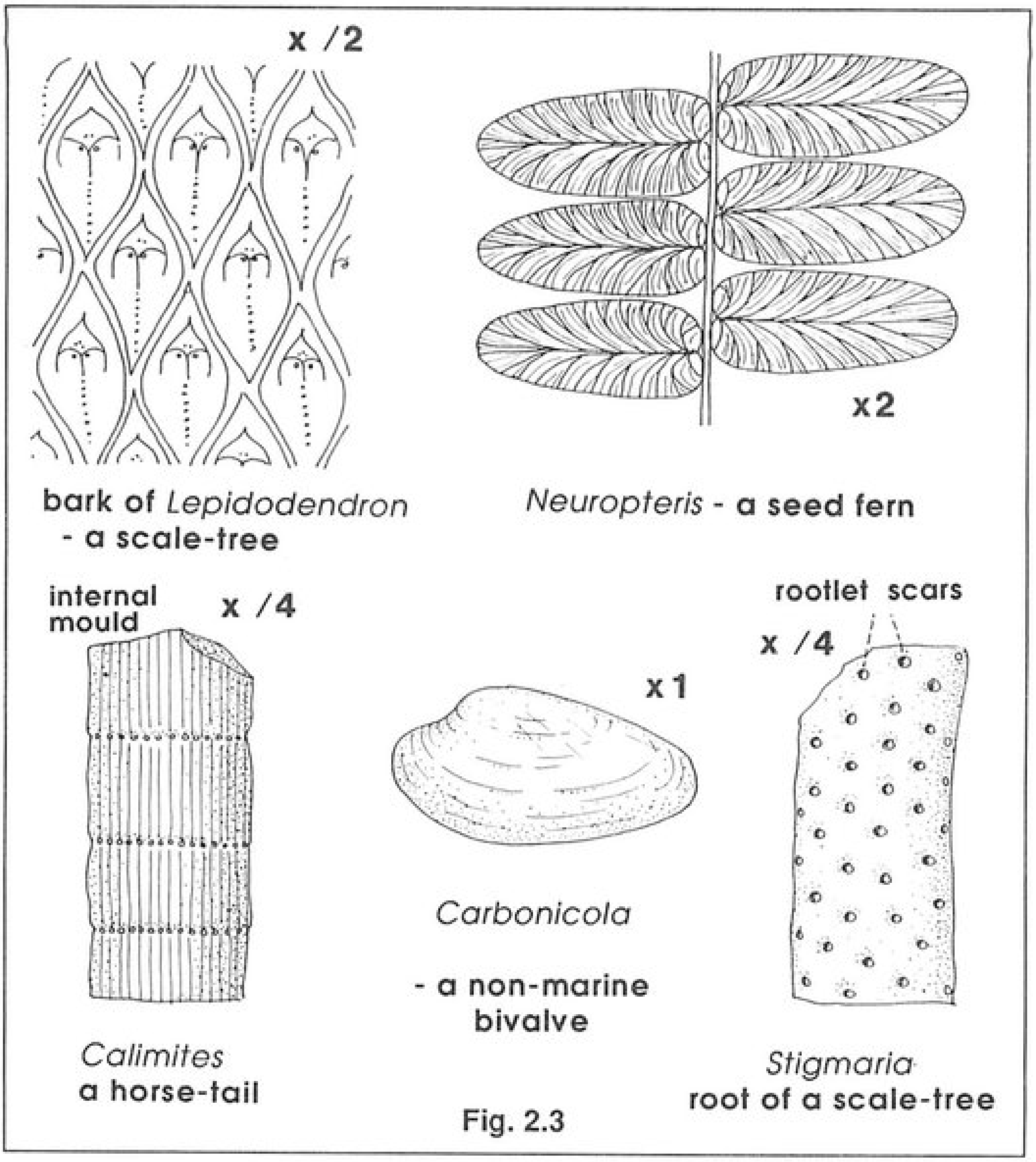
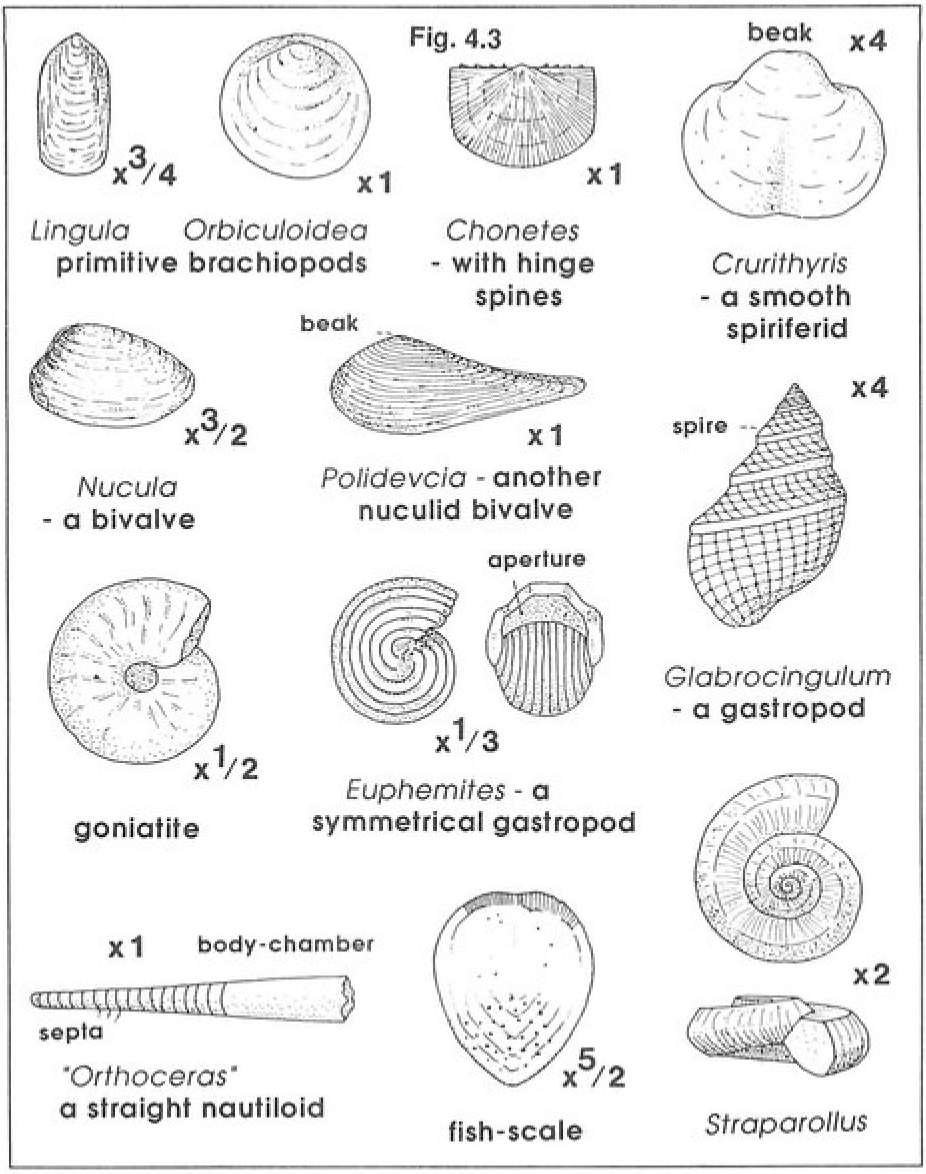


Fig. 20.4

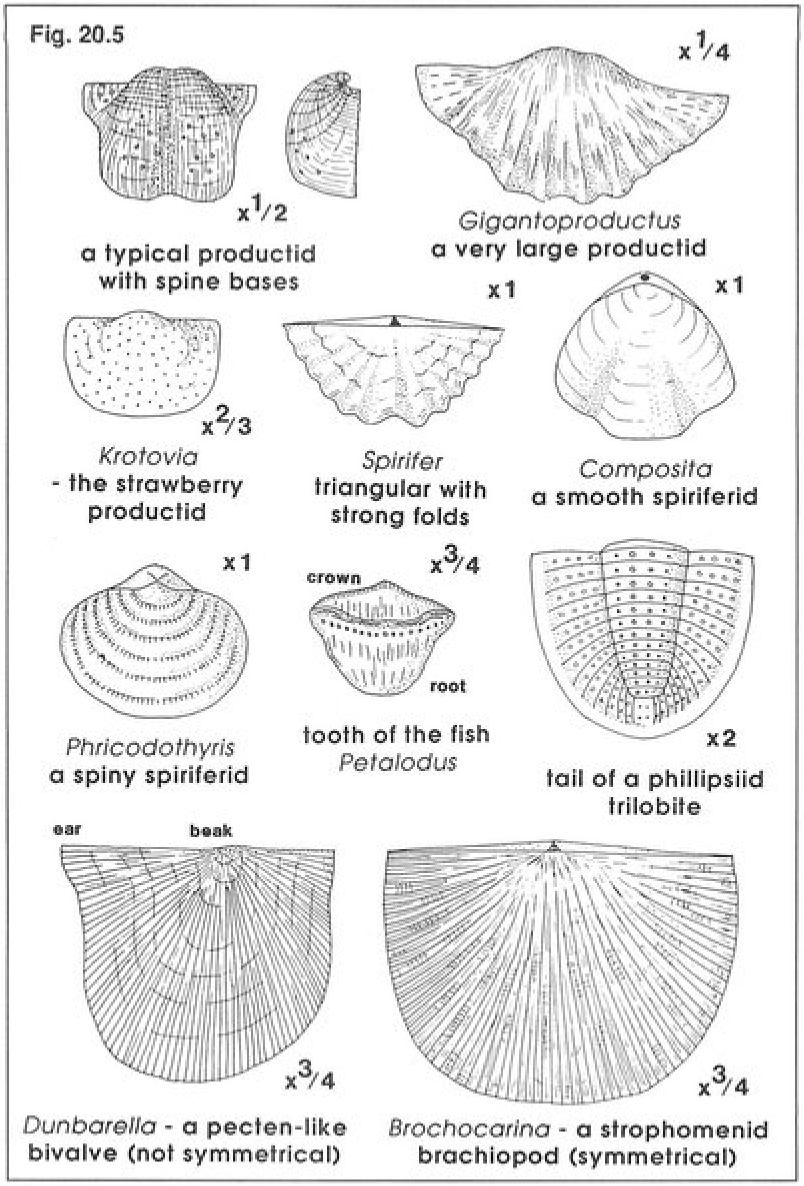
(Figure 20.4) Stratigraphical column for Trearne Quarry.



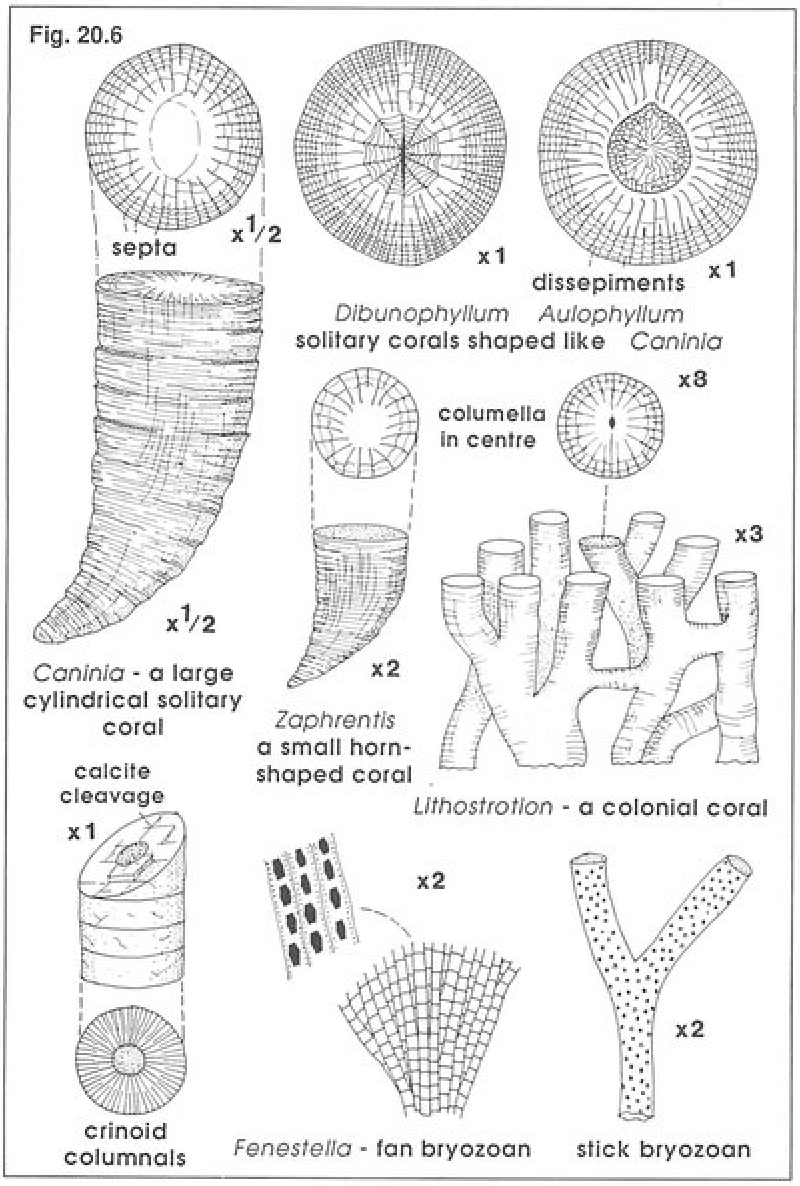
(Figure 2.3) Carboniferous non-marine fossils.



(Figure 4.3) Some fossils from Blairskaith Quarry.



(Figure 20.5) Fossils from Trearne Quarry.



(Figure 20.6) More fossils from Trearne Quarry.