HISTORY

OF THE

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NATURALISTS' CLUB

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NATURALISTS' CLUB

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HISTORY OF THE
BERWICKSHIRE NATURALISTS' CLUB

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HISTORY OF THE BERWICKSHIRE NATURALISTS' CLUB

A BRIEF HISTORY OF CLIMATOLOGY or CLIMATE OVER THE YEARS AND WHAT HAPPENS NEXT?

being the Anniversary Address delivered by Mr J. Logan McDougal, President of the Club, on 15th October, 1991.

With so much talk of weather and climate and of ice-ages and the greenhouse effect, I often feel that a brief look at what we know of the climate of past eras and how we know it would be of interest. I started to read about these matters many years ago and as I am one of the volunteer observers for the Meteorological Office I persevered and have become very interested in the subject, probably to the extent of sometimes being a bore!

Ten or twenty years ago the talk was all of the new ice-age creeping up on us, but quite suddenly that all changed. To-day the talk is all about the greenhouse effect and global warming. Did someone make a mistake or has something new really turned up to change the picture?

Weather is what happens each day and what we all talk about. Climate is the general picture of the weather over a longer period so that one bad day or even one bad winter does not mean a change of climate. A change in climate usually takes place very slowly, over decades and centuries; but recently it does seem to be happening more quickly and we must wonder why.

To look at changes of climate now, we must have basic information about past climate for as far back as possible in time and have some idea of how this knowledge is obtained.

Sources of information vary depending on how far back in time one goes. In so doing, different sources may at first appear to disagree but usually after much scientific argument a reasonable picture of past climates emerges.

Geological information is clearly available from the remotest times. Rock studies show that some rock formations are composed of older material broken down by wind and made into desert sandstones even in areas which are now very wet; some are made from silts and gravels laid down in fresh or salt water; some are made exclusively from animal remains such as limestone, and some from vegetable remains such as coal.

Each rock can now be dated and tells its tale of the climate at the time of its formation in that area, and tells it with some certainty. This leads to the specialist field of geology, the study of fossils. These tell the story of what lived where and when and so give a much clearer picture of the climate at that time.

Usually the picture is of slow evolution of species or slow change to different species. But occasionally, as with the Dinosaurs, the change was sudden. The dinosaur groups died off very suddenly and their dominance was replaced by completely new and different groups. Changes of that scale are thought to be caused by a dramatic change of climate over the whole world stemming from a large meteor collision or a series of very large volcanic eruptions. Either of these could produce so much dust in the upper atmosphere that a period of permanent winter would set in. This still happens on a small scale with Mount St Helena or Pinatubo in the Philippines or El Chino in South America. Satellites can show the trail of dust and sulphur dioxide at about 20 miles up in the atmosphere. This sort of layer causes cooling and could cause a drop of up to 2 degrees C. in some parts of the world.

It is easy to think of Geology as old and un-changing but it is still with us, causing change and leaving a record.

From Geology we move to Botany, Archaeology and Literature which slowly merge one into the next over time, and show how plants and people lived and reacted to changes in climate. Early botanical studies can be made of fossils in rocks and then of actual plant remains which have been preserved in silts or muds for millions of years. Pollen is one of the best surviving parts of plants and the study of pollen is now a very precise science. It is possible to date accurately the layers of pollen in a deposit using radio carbon dating methods and to define the exact species of plants by microscopic analysis.

This makes it possible to identify the plants that grew at a particular time and place and by the associations of plants it becomes possible to define the climate and its changes and even the rate of change.

In more recent times actual trees and remains of trees are used to build a detailed record of the succession of tree rings in some

species such as the bristle-cone pine of the South-west United States which goes back several thousand years. In Britain it has been possible to use oak trees and oak beams in old buildings which, with computer analysis of the succession of tree rings, shows growth conditions and therefore the climate for at least two thousand years.

This study, dendro-chronology, is done using very thin cores which can be taken from trees without damaging them, studying these with fine microscopes to pick up the detail of each ring and interpreting the story of hot or cold springs or summers or years of drought.

The next source of knowledge is ice. In Greenland and East Antarctica the ice is so deep that radio carbon and oxygen dating tells us that the ice was formed from snow which fell over 150,000 years ago. Trapped in the ice, there is enough oxygen and carbon dioxide to give a fair picture of the atmosphere at the time it was frozen. These ice sheets are several thousand feet thick and so contain vast detailed information.

We can move on to Man, in Archaeology, where we can see by his remains how he lived and what he lived on. Soon he started to leave better evidence with cave drawings and then writing on stone, clay and later on scrolls of skin and paper. This should lead to greater accuracy, but, alas, man is a very biased and subjective reporter; and sometimes leaves a slightly confused record.

The Bible is one such record and tells of the succession of flood and storm; the seven fat years and the seven lean yeas, of deserts blooming and so on. Unfortunately, the timings are rather hard to define, but there is no doubt that these things happened and that evidence from other sources correlates to give a complete record.

The records of Egypt, Greece and Rome are all now available for study, and along with more recent writings, usually by monks, bring us to the next real change in the quality of evidence.

In the 17th century Galileo invented a practical barometer and one of his pupils, Toricelli, produced an accurate thermometer. From this time on, records became much more objective and accurate. But even now, the records can vary with the health or hang-over of the observer when he reads the instruments in the early morning; or the rainfall can be altered by a passing dog using the rain gauge for a lamp-post. Some days the weather station may be covered with snow and the observer may note some inspired guesses. I know that these things all happen because I have seen or done them myself.

From this time on the detailed figures grow and with hind-sight

can confirm ideas about earlier climates.

By 1820 weather maps of a sort were being made and when the telegraph arrived, it was possible to build up maps on a larger scale and look at weather over wide areas at one time. Scotland was well to the fore in this with the rise of the Scottish Meteorological Society in 1855, which was the same year that the Meteorological Office was set up. The Scottish Society was founded by many well known figures, among them Archibald and James Geikie, the geologists, Milne-Home of Milne-Graden, Thomson later Lord Kelvin, and Buchan, writer of the Handy Book of Meteorology and originator of Buchan's cold and warm spells. Stevenson, the Civil Engineer, was also a founder. He designed the Stevenson screen which is the beehive-like structure which you see on most weather stations. It is designed to give a standard level of shade and shelter from wind and sun for the instruments inside, so making it easier to compare figures from different sites.

This Society built and ran the Ben Nevis Weather Station from 1883 to 1904. This station was visited almost every day from Fort William which is an amazing record of dedication. The information gathered there contribited greatly to the understanding of clouds and variation of both temperature and rainfall with elevation.

This was an era of great natural discovery. Darwin and the "Beagle", the survey ship "Challenger" and many others were recording as much as they could wherever they went. One ship sailing out from Canada found a temperature change of 20 degrees F. over the length of the ship, and so dramatically located the Gulf Stream with accuracy.

By 1930 balloons were being sent up with instruments and radios, by 1960 hundreds of stations sent up balloons twice a day, and now thousands of stations on land and sea and in the air report weather conditions to places like Bracknell where the Meteorological Office has one of the largest computer complexes in the world.

To-day satellites give a running commentary on the weather world wide and are now able to measure ground and sea temperatures and even wind speed and direction at sea level by using a form of radar to analyse the shape of waves and ripples on the water. Soon we may know how the huge ocean currents like El Nino, the Gulf Stream and others work; where they start and end and perhaps what drives them.

Without computers all this information would be almost unusable. With computers it is possible to construct three-dimensional models of the weather as it changes and develops; this

is the basis of the longer range forecasts, which are getting better apart from the odd rogue event and the parochialism of London forecasters.

From all the evidence now available we can be reasonably certain of some fairly consistent rhythms and patterns in the climate of the world.

Full ice-age cycles seem to last about 100,000 years and have done for some millions of years. Into each cycle is incorporated an inter-glacial phase of about 10,000 years and it seems that we should be nearing the end of this phase and be moving towards the next ice age. There are shorter cycles within this of 20,000 and 40,000 years. These were defined by a Jugoslav, Milankovitch, so his name is usually applied to them.

There are many theories attempting to explain these cycles. The most likely are based on astronomic work which shows asymmetries in the rotation of the earth on its axis, a slight movement in axis relative to the sun and a slight ellipse in the earth's orbit round the sun. These vary the amount of solar heating reaching the earth.

There are also short-term cycles of 2, 11, 80 and 200 years which show up in tree rings and recent history.

The last ice age started to retreat about 12,000 years ago, a short cold snap 9,000 years ago, then a really warm period when civilisations developed and spread from the more tropical regions to the cooler parts. This was the case up to the early middle ages when the Norsemen could sail to Greenland and, it is thought, to North America. But by the 15th century the climate was moving into the Little Ice Age, these settlements were cut off and mostly died out, the Thames froze and there was great hunger. The early part of this century was the warmest since the 1300s. But, alas, it should be getting colder if the Milankovitch rhythms are correct. It did up to the seventies but since then it has got warmer again.

Should we be worried? And if so, worried about what?

There must appear to be a new heating effect countering the well established rhythms which would show a general trend to cooling.

Only in 1974 the B.B.C. ran a series ''The Threat of Ice'' but on the last page there was mention of a possible ''Joker'' in the pack. This was what is now called the greenhouse effect. The cause is fairly certain and is an increase in the level of certain gases in the upper atmosphere, which reflect heat back to earth.

Carbon dioxide is the largest and most talked of but there are others such as methane, nitrogen oxides and chlorofluorocarbons

(C.F.C.s). These are less in quantity but are actually much stronger in effect weight for weight. The C.F.C.s have another effect at a much higher altitude, that of damaging the ozone layer which filters out some of the more harmful radiations of the sun.

As usual, nothing is simple, each system feeds on the others and once man has introduced the odd "dark horse" we cannot tell if the older rhythms will over-ride the greenhouse or not. It does seem to be thought there will be some temperature rise but before everyone cheers, we should note that higher temperatures often mean more violent weather, more droughts and more floods. Ice ages had cold deserts, warm periods had great bogs, steamy forests and hot deserts, so no era is perfect.

Some scientists feel that the temperature rises may well be no greater than at some times in the past, but the danger is in the rate at which the changes take place. The earth may not adjust smoothly.

The significance of all this for Mankind is not in our comfort but in our food and water. It does not really matter if our roads do or do not get blocked in winter. It does matter if the crops fail or the reservoirs do not fill. Britain is not self-sufficient and many of our imports come from fairly sensitive areas. England is not even self-sufficient in water but imports heavily from Wales. A slight change in the Gulf Stream could take the rain clouds away and the big cities would be in trouble. No matter what people like to think, there is no civilisation without water and food.

That is a small example of a world where population is very finely balanced against resources and even small changes in climate must have dramatic effects on populations.

This is just as true for an approaching ice age as for a greenhouse. In past ice ages, mobile populations moved to more equatorial lands but those which could not move fast enough faded out. To-day the world is so full that large migrations of any species will not be possible and so there is a vast potential for trouble. That is why any dramatic change of climate is so serious. It may change faster than the world as we know it can cope with it.

It is not a time for panic or for listening to some populist semi-scientists whose main aim sometimes seems to be publicity. Nor is it a time for rushing into things which may actually be counter-productive. There is, for instance, a school of thought which thinks that exhaust catalysers may do more harm than would taking time to design more efficient engines. That is because

catalysers use power and therefore more fuel is used and so overall pollution increases rather than decreases.

Slow, careful study without political posturing is what is needed. But nature may well be in charge and have other weapons in the armoury which man has not yet discovered. As I said earlier, Geology is still happening with earth-quakes and volcanoes which can instantly affect climate whilst we may watch and sweat or shiver, feast or starve.

HANDLED DISC STONE MOULD

Mr George McKendrick of Berwick upon Tweed has taken advantage of unemployment to become a keen amateur archaeologist with a remarkable number of finds of artefacts to his credit.

The sculptured stone illustrated was found by him in 1984 in what appeared to be a heap of stones discarded by a farmer near the site of a mediaeval homestead near South Middleton, Wooler (OS NT 98 52 31). The full length of the stone is 16 cm, about 2 cm across the bowl, and incised about 15 mm deep. The stone was identified by Miss L. Allason-Jones, Newcastle University Department of Archaeology, as a ''handled disc'' stone mould of a type known from the northern part of Scotland and the Islands. None is known like it from the North of England, apart from two moulds each with two handles from Romano British settlement sites at Hartburn and Tower Knowe in Northumberland. Scottish crusie lamps were made from similar types of moulds in the 19th century.

THE SEAWEEDS OF BERWICKSHIRE

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The coast of Berwickshire is one of the most unspoilt stretches of coastline in the British Isles. Its high cliffs and exposed and rocky (rather than sandy) shores makes access very difficult and there has been very little human development or usage. There is a very active fishing port at Eyemouth, and very small harbours at Burnmouth, St Abbs and Cove from which boats go lobster potting. Access to the shore is relatively easy adjacent to these areas and local fishermen collect winkles (*Littorina littorea*) on a large scale. Coldingham and Pease Bay, with their sand beaches, are very popular with holidaymakers but largely devoid of seaweeds, which require a firm substratum for attachment. South of the former a sewage outlet high on the shore is the source of considerable pollution, severely restricting the light available for photosynthesis by seaweeds as well as being a health hazard for bathers. In 1988 the cliffs backing Hilton Bay, towards the south end of the county, were in danger of collapsing and an operation to shore them up was carried out very sensitively by contractors associated with British Rail (whose east coast main line runs along the top of the cliffs at this point).

Despite the considerable natural beauty of the region, it is only relatively recently that its importance has been recognised, prompting close study of the area. In the nineteenth century phycologists studied intensively Northumberland and Durham (particularly A. Amory, E. A. L. Batters and G. S. Brady), and East Lothian (west of the county) was studied by G. W. Traill. Rather surprisingly, Berwickshire itself was largely ignored. Local naturalists, such as G. Johnston, studied the flora of Berwick upon Tweed (in Northumberland). Whilst many records may come from Berwickshire (there are various citations of "coast north of Berwick") they are indefinite and could easily (and most probably) come from the short stretch of coastline north of that town before reaching the England-Scotland border.

In the present century, fieldwork on the Berwickshire coast has concentrated primarily on St Abb's Head. Research students from the University of Durham went collecting there in the 1960s, the British Phycological Society visited the area in 1972 (together with

Cove, at the extreme west end of the county) and the Nature Conservancy Council has made detailed studies in the early 1980s.

The present study was begun in September 1986, following on from a detailed study of the marine flora of Northumberland and Durham. The idea has been to carry out a very detailed and intensive programme of field work and to back this up with a study of the published literature for the area (which has now, as far as can be ascertained, been exhaustively reviewed), as well as a study of herbarium specimens originating from the county. The herbaria of the Royal Botanic Garden, Edinburgh, of the University of Durham, and the Hancock and Sunderland Museums have all been studied. In addition, specimens have been located in private herbaria (for example, that of Dr David John, Natural History Museum, London, a former research student at Durham in the 1960s). Further to studying the marine algae of the area, the general topography of the shore and records of its marine fauna have been noted and these records constitute a contribution towards the Nature Conservancy Council's Marine Nature Conservation Review. The flowering plant flora on the coastal cliffs has also been studied, and all records have been transmitted to, and confirmed by, the vice-county recorder. Some observations on seabirds have also been forwarded to the relevant authorities collating these records.

The field work has tended to fall easily into two sections. Visits have been made in May to Burnmouth, and the stretch of shore from Meg's Dub (at the England-Scotland border) to Hurker's Haven (near Fancove Head) have been studied intensively from that base. Visits have been made each year, with the result that it has been possible to build up a very comprehensive picture of the seaweed flora present and to observe any changes in this flora with the passage of time. In July and August visits have been made to a variety of sites along the whole length of the Berwickshire coast so that, even in areas where access is very difficult, all rocky shores within the county have now been surveyed.

Publication of the results will be in the form of two major, and a number of minor papers. The major publications include an introduction concerning the Berwickshire coast and a history of the study of its marine flora, and a detailed checklist of the 170 or so species found there. The former paper has been published in the *Botanical Journal of Scotland* (Hardy, 1992) and the latter has been accepted by the same journal. The first of the minor papers was published in 1990 (Hardy, 1990), being a survey of the occurrence of the green seaweed *Codium fragile* in the county.

One of the most interesting finds of the 1990 field season was a rare stalked jellyfish (*Haliclystus auricula*) attached to a large

brown seaweed, the serrated wrack (*Fucus serratus*) at Meg's Dub, the southernmost point of the Berwickshire coast. This brown seaweed acts as a host to various epiphytic algae (such as *Elachista fucicola*) and to animals (such as the tube worm *Spirorbis spirorbis*).

The thong weed (*Himanthalia elongata*) is particularly common on rocky platforms, where its reproductive receptacles, up to six feet in length, drape over the rocks at low tide. Extensive populations of this brown seaweed are found at Lamberton Beach. *Himanthalia* is colonised by another species of epiphytic alga (*Elachista scutulata*) and this was frequently encountered on the receptacles of specimens growing at Lamberton. A varied fauna is also present there including the starfish *Henricia sanguinolenta*. Wild, feral, mink live amongst the rocks at the top of the shore and prey on a range of animal species.

Of particular interest was the green siphonaceous alga *Codium fragile* subsp. *tomentosoides*, found in an isolated rock pool near Fancove Head in May 1988. Since then the species has spread along the length of the Berwickshire coast and may be recorded from rock pools in several localities (but was absent from its original location in 1991). Near the Maiden's Stone, south of Ross Point, Burnmouth, is one of the sites (along with Partanhall) where the red seaweed *Chondrus crispus* (Irish moss) has been observed fluorescing a vivid electric blue in deep rock pools. The fauna of this stretch of shore is particularly varied and includes chitons (*Lepidochitona cinereus*), sea lemons (*Archidoris pseudoargus*), squat lobster (*Galathea squamifera*), brittle stars (*Ophiothrix fragilis*) and star ascidians (*Botryllus schlosseri*). In the bed of a stream running down the cliff backing the shore at this locality is a population of the great horsetail (*Equisetum telmateia*).

Viewed from the top of the cliffs at Burnmouth, Ross Point and the flat rocky platform between there and Burnmouth Harbour are seen particularly clearly. This locality has a varied flora and fauna and the coastal cliffs have a particularly interesting flora, especially in the spring, with large populations of primrose (*Primula vulgaris*), cowslip (*Primula veris*), common oxlip (*Primula veris x vulgaris*), early purple orchid (*Orchis mascula*), thrift (*Armeria maritima*) and sea campion (*Silene vulgaris* subsp. *maritima*). In the summer, large plants of wood vetch (*Vicia sylvatica*) flower at the base of the cliffs.

In 1987 specimens of blue-rayed limpet (*Helcion pellucidum pellucidum*) were found on *Laminaria* but they had not been recorded in subsequent seasons (until 1991 when they were seen frequently). Red seaweeds are typically found most abundantly in deeper water, but frequently become detached and are washed up in the drift. Two such species are *Callophyllis laciniata* and

Phycodrys rubens. Sea urchins (*Echinus esculentus*) are abundant on the Berwickshire coast, and may frequently be encountered in Kelp forests. Other very interesting animals found on the stretch of coast near Partanhall include a spider crab (*Hyas araneus*) and a lump sucker (*Cyclopterus lumpus*) amongst the kelp, and green sea urchins (*Psammechinus miliaris*). Also found were the dead remains of another species of spider crab (*Inachus dorsettensis*). Scot's Lovage (*Ligusticum scoticum*) is found amongst the rocks at the top of the shore at several localities in Berwickshire including near Partanhall and a slow worm was found near this point in 1988, 1990 and 1991.

Wherever a shore is very exposed one expects a considerable amount of wave splash, and the Berwickshire coast is no exception to this. The splash zone of such shores is colonised by extensive growths of lichen species. At the foot of Breeches Rock and Gull Rock there are a number of shallow rock pools which are the habitat for a particularly rich flora and fauna, often lined with the encrusting coralline red alga *Lithophyllum incrustans* with individuals of several other species, including the large brown seaweed *Halidrys siliquosa*. The Berwickshire coast has a rich flora of coralline algae, and other species found within these pools include *Lithothamnium glaciale, Phymatolithon lenormandii, Phymatolithon purpureum* and *Titanoderma pustulatum* (epiphytic on the red seaweed *Mastocarpus stellatus*). Deeper rock pools in the area contain fine specimens of such species as the common lobster, *Homarus gammarus* and squat lobster (*Galathea strigosa*).

One of the most spectacular stretches of coastline in Berwickshire is to be found at Hurker's Haven, between Burnmouth and Eyemouth. Low spring tides reveal very extensive populations subtidally of the kelp *Laminaria hyperborea* often with red seaweeds (especially *Palmaria palmata*) growing epiphytically. The red seaweed *Dilsea edulis* is also found at this point. Many of the rocks have extensive coverings of breadcrumb sponge (*Halichondria panicea*) and, amongst coralline encrusted rocks, the dahlia anemone *Urticina felina*, with striped tentacles and its body covered in fragments of gravel, broken shells and debris, was found. In 1990 the rock pools contained large numbers of comb jellies (*Boroe cucumis* and *Bolinopsis infundibulum*).

On the shingle at the top of the shore at Lumsdaine (and also near Cove), there are a few plants of the yellow horned-poppy (*Glaucium flavum*), the most northern localities on the east coast. Beyond Lumsdaine, the shore at Brander is particularly impressive due to the rugged topography with enormous plate-like rock formations.

Meikle Poo Craig is a flat platform of red sandstone towards the western boundary of the county. It is of particular interest because

the buttons of *Himanthalia elongata*, instead of being flat, stalked, concave discs, have become inflated like vivid yellow-green golf balls. The pools are littered with dead shore crabs (*Carcinus maenas*). Whether these occurrences are related to the proximity of the Torness Nuclear Power Station in East Lothian is a matter for conjecture.

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A CONTRIBUTION TOWARDS A MARINE FAUNA OF BERWICKSHIRE

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Between 1986 and 1991 a detailed programme of fieldwork was carried out on the Berwickshire coast in order to prepare a flora of the marine algae of the county, and this work is now appearing in published form (Hardy, 1990, 1992a, 1992b). As this research was financed, in part, by the Nature Conservancy Council as a contribution towards the Marine Nature Conservation Review, a study of the littoral fauna was included in the work.

The Berwickshire coast is largely composed of rocky shores, ranging from bedrock (almost vertical in some places, in flat platforms elsewhere) to shores covered in boulders and cobbles. This sort of environment provides a range of habitats: large boulders with crevices and overhangs, rock pools, kelp forests. Considerable efforts were made, often using a collecting net, to find and identify the animals found in the littoral zone and in the upper sublittoral. With the exception of a very few areas which proved to be completely inaccessible from land, the coast was studied along the entire length of the county (from Meg's Dub in the south to Bilsdean in the north-west).

The Berwickshire coast was the site of intense marine biological activity, particularly subtidally by SCUBA divers, in the early 1980s. The Nature Conservancy Council commissioned several studies around the St Abb's Head area preparatory to declaring this as a Marine Consultation Area (Nature Conservancy Council, 1990), and these studies were summarised in a series of reports (Earll, 1981, 1982; Pagett, 1983; Smith & Gault, 1983). The last cited report gives a particularly detailed account of the marine fauna from Burnmouth to Redheugh concentrating on the mollusca. The work of the Nature Conservancy Council in the area was summarised by Bennett (1991).

In the present study, identifications were made initially using the standard field guides (Barrett & Yonge, 1958; Baxter, 1990; Campbell & Nicholls, 1976). These were later confirmed, and the nomenclature updated, using the *Marine Fauna of the British Isles and North-West Europe* of Hayward and Ryland (1990). No claim

is made for this study being in any way comprehensive: it simply sets out to record the species of animals found on the shore of Berwickshire during the period for reference by future workers and to encourage others to study this fascinating habitat.

Porifera (Sponges)

This group of organisms includes a number of species which are particularly difficult to identify. The following list are of those species for which determinations have been made.

Clathrina coriacea. Lamberton Beach.
Leucosolenia complicata. Hurker's Haven.
Sycon ciliatum. South of Ross Point; Cove.
Scypha compressa (Purse Sponge). On overhanging rocks. Lamberton Beach; South of Ross Point; Partanhall; Burnmouth; Gull Rock; Hurker's Haven; Pettico Wick. St Abb's Head.
Suberites domuncula (Sulphur Sponge or Sea-orange). Partanhall, Burnmouth.
Halichondria panicea (Breadcrumb sponge). Common on the undersurface of boulders along the entire coast of the county, this is a very variable species. Colour ranges from bluey-green, through olive-green, to honey; morphology ranges from being almost flat to having oscular openings on craterous cones.

Cnidaria (Jellyfishes and Sea-anemones)

Haliclystus auricula (Stalked Jellyfish or Sessile Jellyfish). This interesting, and unusual, scarlet-coloured animal was found in May 1990 on the thallus of *Fucus serratus* (saw or toothed wrack) in the upper sublittoral of Meg's Dub.
Cyanea lamarckii. Trapped in rock pools, and in open sea. Partanhall, Burnmouth; Fancove Head; White Heugh and Pettico Wick, St Abbs's Head.
Cyanea capillata. Trapped in rock pools, and in open sea. Partanhall, Burnmouth; Fancove Head.
Aurelia aurita (Common Jellyfish). Trapped in rock pools, and in open sea. Lamberton Beach; Partanhall, Burnmouth; Fancove Head; Hurker's Haven.
Actinia equina (Beadlet Anemone). This species is abundant in the littoral zone along the entire coast of the county. All the specimens seen were of the red form, with vivid blue acrorhagi (individuals of the green form may be found on the east coast at Whitby, North Yorkshire).
Urticina felina (Dahlia Anemone). This very distinctive species of anemone, with its column covered with gravel and broken shells, is frequently found on the shore (from Partanhall, Burn-

mouth to Brander).
Metridium senile (Plumose Anemone). Shore east of Coldingham.
Sagartia elegans var. *venusta*. Wuddy Rock, St Abb's Head.

Ctenophora (Sea-gooseberries and Comb-jellies)

A number of species of ctenophora were recorded in 1990, trapped in rock pools (often in considerable numbers) or in the open sea. The movement of fused cilia in the animal's comb-rows is one of the most fascinating sights to be seen on the shore.

Pleurobrachia pileus (Sea-gooseberry). Hurker's Haven.
Bolinopsis infundibulum. Hurker's Haven.
Beroe cucumis. Lamberton Beach; Fancove Head; Hurker's Haven; Pettico Wick, St Abb's Head.

Annelida (True worms)

Arenicola maritima (Lugworm). Casts present on sand at low tide. Cove Harbour.
Nereis pelagica. South of Ross Point.
Eulalia viridis. (Green leaf worm). Partanhall, Burnmouth.
Amphitrite gracilis Gull Rock.
Pomatoceros triqueter. Tube encrusting on stones. Lamberton Beach; Pettico Wick, St Abb's Head.
Spirorbis spirorbis. On *Fucus serratus*. Meg's Dub.

Crustacea

Semibalanus balanoides (Acorn Barnacle). Common on rocks in the littoral zone along the entire coast of the county.
Praunus flexuosus (Chameleon Shrimp). In rock pools. Ross Point; Lumsdaine Shore.
Idotea baltica. Among plants of *Laminaria*. Partanhall, Burnmouth; Hurker's Haven; Pettico Wick, St Abb's Head.
Homarus gammarus (Common Lobster). Whilst obviously present in numbers in the area (the local fishermen set pots) this animal resides in crevices under boulders at low tide. One specimen was examined in detail at Breeches Rock, Burnmouth, and others were seen to be present at Yellow Craigs, Coldingham.
Pagurus bernhardus (Common Hermit Crab). Common in rock pools along the entire coast of the county, inhabiting the old shells of *Buccinum undatum* (Common Whelk).
Galathea squamifera. In rock pools. South of Ross Point; Meikle Poo Craig; Cove.
Galathea strigosa. This spectacular, and aggressive, squat-lobster lives in crevices underneath boulders (at low tide). Breeches Rock, Burnmouth.

Porcellana platycheles (Porcelain Crab). Undersides of boulders in the littoral zone. Ross Point; Partanhall, Burnmouth; Cove.

Hyas araneus (Spider Crab). In deep rock pools low on the shore, and amongst plants of *Laminaria* in the upper sublittoral. One large specimen at Partanhall, Burnmouth; one small specimen, densely covered in camouflaging marine algae, at Lumsdaine Shore.

Inachus dorsettensis (Spider Crab). One dead specimen found on top of a rock (left by a bird?) at Partanhall, Burnmouth.

Cancer pagurus (Edible Crab). Found in rock pools, under stones, from south of Ross Point to Brander.

Carcinus maenas (Shore Crab or Green Crab). Abundant in rock pools along the entire shore of the county.

Mollusca

Lepidochitona cinereus. On rocks in pools from Lamberton Beach to Pettico Wick, St Abb's Head.

Acanthochitona crinatus. Cove.

Acmaea virginea (White Tortoiseshell Limpet). South of Ross Point; Hurker's Haven.

Patella vulgata (Common Limpet). Abundant on rocks (both uncovered and in rock pools) in the littoral zone along the entire coast of the county.

Helcion pellucidum pellucidum (Blue-rayed limpet). The electric blue lines on the shell make this species immediately recognizable. On fronds and stipes of *Laminaria digitata* (Oarweed or Tangle). Partanhall, Burnmouth; Hurker's Haven.

Gibbula cineraria (Grey Topshell). On *Laminaria*. Meg's Dub; Lamberton Beach; south of Ross Point; Partanhall, Burnmouth; Lumsdaine Shore.

Littorina littorea (Edible Periwinkle). Common in rock pools. Meg's Dub to Lumsdaine Shore.

Littorina obtusata (Flat Periwinkle). A distinctive yellow shell, clearly visible on plants of *Fucus vesiculosus* (Bladder Wrack). Meg's Dub; south of Ross Point; Partanhall, Burnmouth.

Littorina saxatilis (Rough Periwinkle). Common in rock pools from Meg's Dub to Brander.

Trivia monacha (European Cowrie). South of Ross Point; south of Burnmouth Harbour; Partanhall, Burnmouth.

Nucella lapillus (Dogwhelk). Egg capsules found on undersurface of overhanging boulders and wedged in crevices. Lamberton Beach to Brander.

Onchidoris muricata. Hurker's Haven.

Cadlina laevis. Partanhall, Burnmouth; Hurker's Haven.

Archidoris pseudoargus (Sea-lemon). On *Halichondria panicea* in rock pools and on undersurface of boulders. Ross Point to Brander.
Jorunna tomentosa. South of Ross Point; Hurker's Haven; Pettico Wick, St Abb's Head.
Mytilus edulis (Common Mussel). Abundant on rocks (with *Semibalanus balanoides* and *Patella vulgata*) along the shores of the entire county.
Sepia officinalis (Common Cuttlefish). No living specimens were observed, but a number of 'cuttle bones' were found washed up on the top of the shore at Partanhall, Burnmouth, in May 1991.

Bryozoa (Sea Mats)

A number of these colonial animals are to be found in Berwickshire, often on marine algae.

Flustra foliacea (Hornwrack). This distinctive species is often mistaken for seaweed. North of Burnmouth Harbour (Drift).

Echinodermata (Star-fishes, Brittle-stars and Sea Urchins)

Henricia sanguinolenta. Common among *Laminaria* in the upper sublittoral along the entire coast of the county.
Asterias rubens (Common Starfish). Common along the entire coast of the county.
Ophiocomina nigra. Under stones in rock pool. South of Ross Point.
Ophiothrix fragilis (Common Brittle-star). Common under stones in rock pools along the coast of the entire county.
Amphipholis squamata. Partanhall, Burnmouth.
Psammechinus miliaris (Green Sea-urchin). Under stones in shallow rock pools along the coast of the entire county. Occasional.
Echinus esculentus (Edible Sea-urchin). Abundant, especially on *Laminaria*, from Lamberton Beach to Meikle Poo Craig. Particularly large populations were seen in the upper sublittoral at Partanhall, Burnmouth, in May 1991.

Chordata: Tunicata (Sea-squirts)

Botrylloides leachi. On undersurfaces in rock pools. South of Ross Point.
Botryllus schlosseri (Star Ascidian). On undersurface of stones in rock pools. Ross Point; Partanhall, Burnmouth; Cove.

Chordata: Euchordata (Vertebrata): Pisces (Fish)

A number of species of fish are recorded from the shore, mainly having been trapped in rock pools as the tide recedes.

Anguilla anguilla (Common Eel). South of Ross Point.

Conger conger (Conger Eel). Lumsdaine Shore.
Zoarces viviparus (Eelpout or Viviparous Blenny). Cove.
Gasterosteus aculeatus (Three-spined Stickleback). Lamberton Beach; Linkim Shore, Coldingham.
Myoxocephalus scorpious (Bull Rout or Father Lasher). Partanhall, Burnmouth (four specimens seen).
Cyclopterus lumpus (Lump Sucker or Sea Hen). Lamberton Beach; Partanhall, Burnmouth.
Lipophrys pholis (Shanny). Lamberton Beach; Linkim Shore, Coldingham; Brander; Reed Point, Bilsdean.
Pholis gunnellus (Butterfish). Lamberton Beach; Partanhall, Burnmouth.
Pleuronectes platessa (Plaice). One very small specimen (*c.* 1 cm) in rock pool, Hurker's Haven.

The animals found in the littoral zone and the sublittoral exhibit a wide range of forms and colours, and a very interesting study has been made by Stephenson (1944). For a general account of the natural history of the shore and the relationships which exist between the organisms to be found there, reference should be made to the classic works by Lewis (1964) and by Yonge (1949). A substantial proportion of the animals either live in, or feed on, marine algae and a study of these creatures has recently been published by Hayward (1988), which includes an invaluable guide to identification.

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LIME KILNS OF NORTH NORTHUMBERLAND

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Mishaps

It was two hours before midnight on the 18th December 1810 as H.M. ships *Pallas* and *Nymphe* moved into the Firth of Forth at ten knots an hour. The two frigates were fine warships, the *Pallas* of 32 guns, and the *Nymphe* of 36, with combined crews of 600. It was pitch-dark as the two vessels passed the feeble but reassuring light of the coal-fired lighthouse on the Isle of May, at the entrance to the Forth. All was well on both vessels and a pilot had been taken on board the leading ship; suddenly, one warship crunched to a stop and, some time later, a second. They had both run aground on rocks that were, in the hours of darkness, to reduce them to total wrecks. As the 19th December dawned the southern shore of the Forth was a scene of devastation and it was eleven that morning before the first boat mounted a rescue operation. Amazingly, only nine sailors perished.

The cold light of morning also revealed one wreck to be a mile below Dunbar and the other three miles away. One of them was only a cable's length from the shore. The loss was estimated at not less than £100,000. An immediate explanation given was that those navigating the warships had mistaken the flare from a lime kiln at Broxmouth for the Isle of May light, and the May-light for the Bell rock.[1] Working kilns could be an impressive sight on the darkest nights, though those on board the *Pallas* and *Nymphe*, the night they were wrecked, doubtlessly thought otherwise. Perhaps the flares of kilns were safer markers for cross-country travellers who are known to have relied on them.

In the period of numerous working kilns tramps also slept near them, in preference to workhouses that could be notoriously cold in winter.[2] This use of lime kilns to provide warm nightly shelter for homeless people in the 19th century appears to have been widespread and a report[3] of 1874 described how scores of Bedouin Arabs slept nightly on and around the kilns of the Carrieres d'Amerique, near Paris. This, unfortunately, could be hazardous, as a report[4] of 1st November 1835 made clear:

> The body of a young man about 19 years of age, named Thomas Thorsby, was found lying on the edge of a lime kiln at the Skinners burn, near Newcastle, quite dead, and with one of his legs completely burned off. He was addicted to intemperance and frequently went to the lime kilns to sleep.

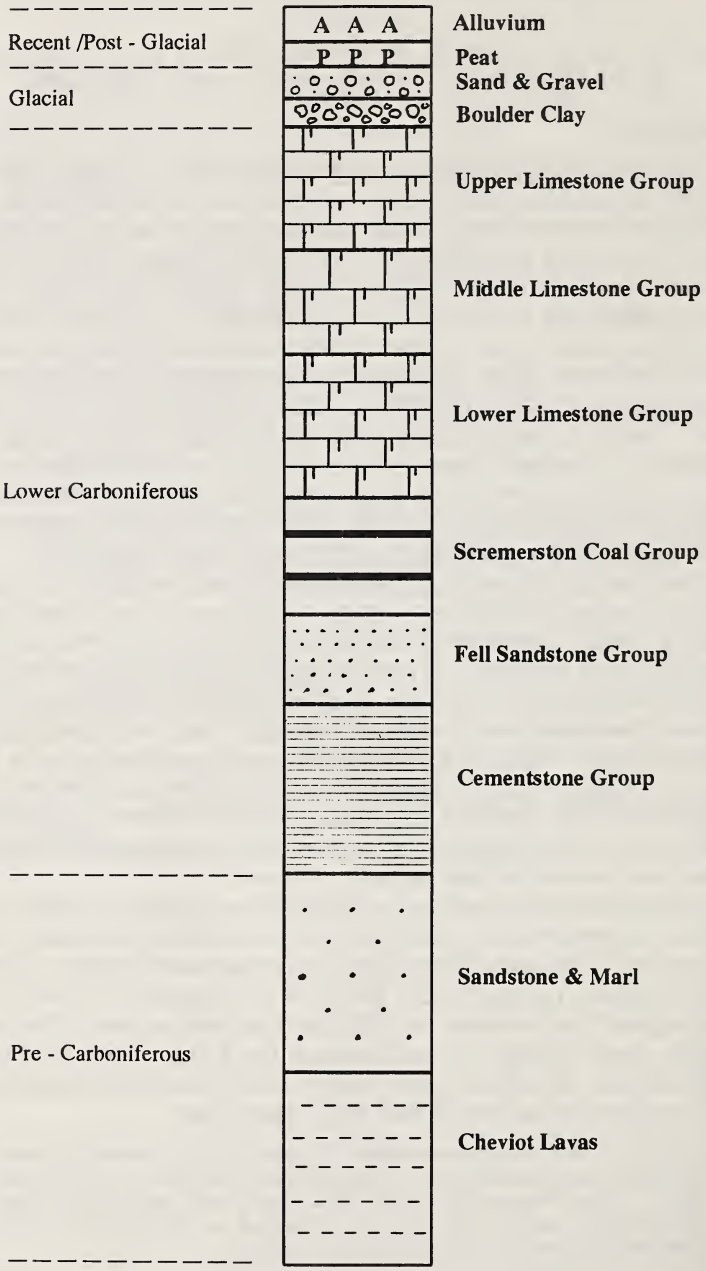

Figure 1. North Northumberland: solid geology.

Solid geology

Carboniferous rocks outcrop over most of north Northumberland and all the limestones represented, with the exception of the lowest in the series, the Dun, were quarried. These limestones are separated by mudstones, shales, cementstones, flaggy sandstones and thin coal seams. The principal Lower Carboniferous limestones present in the district are:[5]

Limestone	Features	Formerly quarried
Great	Most important of the series	North of Lowick in a continuous line of quarries ¾-mile long
Sandbanks	Dark earthy stone, with few fossils, of inferior quality	Extensively at Cocklawburn and at the northern end of Holy Island
Acre	Compact crinoidal stone that was considered by some to be the best of the series	North of Lowick
Eelwell	Top of stone heavily fossilised	In a long working, the Eelwell Quarry, immediately north of Lowick
Oxford	Grey or bluish-grey stone, crinoidal throughout	From Linkhamdean Quarry there is an uninterrupted series of quarries past Oxford to the Allerdean Burn. Also west of Ancroft and on the coast at Cargie's kiln west of Seahouse.
Woodend	Whitish-grey, streaked stone, rich in corals	In Reekyrow Plantation, near East Allerdean and west of the Slateford Burn
Dun	Dark crinoidal stone with a yellowish-rusty weathering, hence its name	Outcrops not common. Not worked

Initially, the limestones could be won with comparative ease. But by 1914[6] most of the quarries had been abandoned due to increasing 'cover' and the importation of other limes. Many of the former workings are now water- or debris-filled.

The Lower Carboniferous series also outcrops from the border to Duns and Greenlaw and southwards beyond Kelso. The youngest strata exposed on the Berwickshire coast at Hilton Bay and Lamberton include the Lamberton Limestone, thought to be equivalent to the Dun Limestone at the base of the Lower Limestone Group of Northumberland[7] and referred to above. There is a marked absence of economic limestones immediately north of the border and it is not until the Dunbar district is reached that the Lower Carboniferous limestones were, and still are,

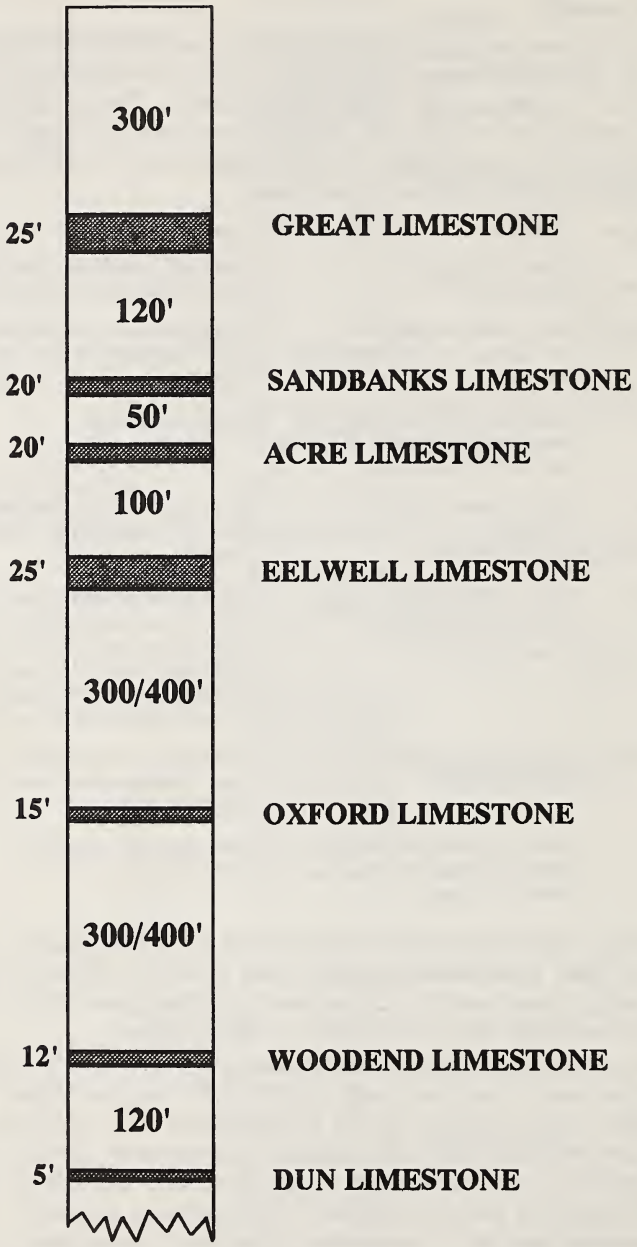

Figure 2. North Northumberland: Limestone Group.

wrought on a large scale. Some Ordovician limestones, associated with volcanic rocks, were formerly worked near Peebles.

Kilns

Before artificial fertilisers and cement were widely available, farmers and builders used natural lime that was obtained by burning limestone or chalk. Thus, where a fuel and limestone were plentiful, and accessible, the raw materials needed to manufacture lime were at hand. This was done in a kiln, and in north Britain two main types existed: the flare and continuous varieties.

The flare, or periodic or intermittent, kiln was normally used, as its secondary names suggest, at irregular intervals to provide relatively small amounts of lime. A section through a flare kiln was roughly that of an inverted cone, some 10 feet across and much the same in height, that tapered to a width of about three feet at the base. Such kilns were invariably built into a hillside to make them easier to top-load with raw materials. The more primitive had walls built of a local fire-resistant stone while the more advanced were brick-lined. Arched spaces, called ashpits, were tunnelled out underneath and led to the base or draught-hole. Two strong iron bars built into the brickwork of the kiln supported the fire-bars, which projected into the ashpit. A fire was kindled with a bundle of gorse on the fire-bars and wood and coal were dropped from the platform surrounding the kiln-top. Once the fire was blazing the kiln was loaded, from the top, with a layer of broken limestone, followed by a layer of coal. When this reached red heat alternate layers of stone and fuel were laid to the top. The kiln was kept blazing for 36 to 48 hours to ensure that the limestone was reduced to a good quality ash-free lime. The flames that shot from kiln-tops resulted in the name flare kilns. Once cool one or two of the fire-bars were removed and the lime fell into the ashpit. This was drawn to the front and carted away. The top of a flare kiln had no protection from rain which normally evaporated without affecting the blazing mass.[8] Flare kilns were ideally suited to provide a farmer with enough lime to meet his own needs.

Continuous, or running or draw, kilns were bigger than the flare version. Siting these massive masonry structures was important and they too tended to be built into a hill- or cliff-side. Within they consisted of a brick pot, that was egg-shaped, upwards of 30 feet in height and had a diameter that varied from six feet at the base to the open top of about 12 feet. The space between the masonry and pot could be sand-filled with layers of sand and lime that drained rain water to 'weeps' or holes in the outer masonry. At the base there were arched openings to provide draughts into

the kiln and for drawing the lime. Those with three arches were called triple-draw kilns.

Limestone was normally brought from nearby quarries and conveyed up the inclines on either side for feeding into the kiln. The process of laying, firing and loading a continuous kiln was the same as with the smaller type. But, as the name of the bigger variety implies, the process was continuous. It could be a difficult and slow task to kindle a kiln, so once alight it was kept running as long as possible. In a continuous kiln there were three zones in the pot: the filling zone at the top, the burning zone in the middle and the drawing zone at the bottom. The layers of limestone added were about four feet thick and in north Northumberland, with the Lower Carboniferous limestones and Scremerston Group coals available, approximately 27 cwts of coal were needed for every seven tons of limestone converted. In the early 20th century the use of coke in some kilns improved efficiency and provided a whiter and purer lime.[9]

Lime burners

As implied, lime kilns were imprecise structures. But it was known from experience that conditions in the conversion area of the pot determined the quality of lime that would be drawn. Here, actions and reactions, chemical and mechanical, occurred in a great mass of fire which prevented close observation. Lime burners did, however, build on past experiences. If, for example, at the moment a piece of lime was made, the incandescence and gaseous conditions of the kiln were unsuitable, recombination occurred, and the lime became 'dead burnt' or fused. Thence they had burnt lime. Also, the amount of smoke issuing from the mouth of a kiln, when excessive, was an indication of a waste of combustibles.[10] The work of a lime burner may have seemed simple; this was not so.

The amount of lime drawn from a flare kiln depended on the quality of the materials used, the efficiency of the kiln and the expertise of the workmen. When pieces fell before they were sufficiently burnt these went back into the kiln and doubtlessly some would re-emerge as burnt lime. After drawing was completed the fire-bars were replaced and the flare kiln left until the next day. The ash was then removed.

The fillers or calciners on continuous kilns were enveloped in smoke and fumes as they worked on the kilnhead shovelling in stone and fuel. The job, dusty and unpleasant, could even be dangerous, especially when the men took unnecessary risks as, for instance, on 5th July 1827:[11]

Two men were burnt to death at Morton lime kilns, near Staindrop.

> They had attended the kilns for several years, and on this day, as the kiln did not sink after they had added some fresh stones to it, they incautiously went upon it to make it do so, and, unfortunately, they both slipped in; one of them to the waist, and the other nearly overhead.

Accidents also occurred, like that of 30th May 1832:[12]

> A man named Robson, a workman at Heaton lime kiln, near Newcastle, incautiously ventured on top of the kiln, which gave way, and he sunk down into the burning lime. Several men immediately proceeded to the spot, and lost no time in rendering every assistance, but the unfortunate man was dead before they could get him out. He had been married only three days.

The wages that Northumbrian lime burners received at any time have not been traced. But in East Lothian at the beginning of the 19th century calciners were paid 8s. to 9s. a week while limestone quarrymen received 11s. weekly. A century later fillers obtained a piece rate of 3d. a ton when loading a kiln and quarry workers 2¾d. a ton.[13]

Lime

During the agricultural revolution of the second half of the 18th century in north Northumberland, the Borders and East Lothian, lime replaced marl as the usual means of improving the land. Some farmers were soon spending 10s. per annum per acre on lime, a sum not less than many farm rents.[14] It was quickly appreciated that most crops needed lime and some could not grow without it. Soil acidity and alkalinity are expressed as a pH value with pH7 being about neutral. If a soil was left to its own devices its acidity gradually increased. Lime was an effective and valuable neutraliser.

When limestone or chalk, $CaCO_3$, is broken down by heat in the kiln, carbon dioxide, CO_2, is driven off to escape from the kiln-top and the lime, CaO, is drawn off from the base. The lime is caustic and for most of the uses to which it was put it had to be slaked with water to produce slaked lime, $Ca(OH)_2$. Agriculturally, this was normally done by leaving piles of lime in the fields and once slaked by atmospheric moisture it was spread by raking. Today, soil testing provides a means of knowing how often land should be limed: to keep the pH to 6.5 for arable and 6 for grassland.[15] Many agriculturalists however believe the figures to be 7 and 6.5 respectively.[16] But there are, and were, questions of balance and timing to be considered. Liming can of course be overdone for some crops and as lime is slow acting, it needs to be applied well ahead of plant demand.

Prior to the development of cement, builders' mortar was obtained by sprinkling water over lime which swelled and released heat. Mortar, a lasting bonding material, was known to have been made by the Romans in north Britain.[17]

15th century lym kylnes

The earliest use of north Northumbrian lime that has been traced was for building mortar and not for agricultural purposes. Raine provided several examples, from the Norham rolls, of local lime being obtained for building work at Norham castle. These were:

1408 In this year the West-gate of the Castle was rebuilt . . . the work lasted from 16 February 1408 to the 8 December following . . . costs included . . . Lime. For 60 chaldrons of lime bought, 100s.; for leave to win stone and fuel to burn lime (to Thomas Presfen), 6s. 8d. . . . .

1422-3 To Robert Fekenham, mason, for hewing stone for the new tower within the Castle . . . to Robert Watson for carting . . . buying, and burning lime. . . .

1429-30 In this year was commenced 'quaedam nova latrina', appended to the great tower on the west . . . and other works . . . 38 chaldrons of hot lime (calcis vivi), at 2s., 76s.; to the forester of Barmoore for 10 loads of timber for burning 40 chaldrons of hot lime, 3s. 4d.; to John Bukton for 6 chaldrons of sea coal, 8s.; to Thomas Williamson for carrying the said lime from Shorswood to the Castle, 13s. 4d.; expenses in winning a coal pit at Bukton, 45s. 3d.

1431-2 The latrinae not yet finished . . . lime, 2s. per chaldron; wood for burning lime, 4d. per load; coals, 16d. per chald.

1510 Bought this week to burn a lym kylne with, at Twedmothe colpyt, 5myls from Norham, 10 chaldre cols, pr. le chaldre 16d. And payd for the caroag to Norham 2s. 8d. per chaldre, sum 40s. . . . Bought this week, at Furd colpyt, 5 chaldre cols, et . . . to beyt the lym kyln with, 16d. per ch.; caragg, 2s. 8d. per ch. . . . Payd this week for a man dispachinge, a lym kylne the spaic of 6 dayes, from morne to night, everie day, 12d., 6s. . . . .

Norham Castle's demands for mortar were considerable and this documentary evidence points to local coal, sea coal and wood being used to fuel 15th century kilns at Shoreswood, Tweedmouth colliery, Todalls and Norham.[18]

17th and 18th century lime kilnes

An order of guild, of the burgesses of the Corporation of Berwick upon Tweed, made on 20th July 1683 read:[19]

Mr Mayor haveing Acquainted the Guild that the Deputy Governor

> Capt. Raph Widdrington has told William Robisons widdow late Farmor of the Townes lime kilne scituate below the Kings Mount on the outside of the walls and Fortifications of this Borough, that if she will not Remove the said Kilne from the said walls which is noysome to him in his passing by it that he will cause pull it downe, uppon due Consideration whereof had and taken by this Guild and for that the Towne is willing to doe the Governor any civillitye that they lawfully may It is ordered that she shall Remove the same att her own Charge to the pear end where the former lime kilns Antiently stood.

When the above, drawn from the original Guild book entry, was repeated by Samuel Wilson[20] he added a contemporary footnote that 'The dainty sqeamish Capt. goeing out of Towne a little after the lime kilne still stands in its wonted place'.

The 1683 order pointed to a kiln, below King's Mount, that was presumably situated in the hillside near the start of the present Pier Road with the earlier site having been built near the end of Queen Elizabeth's Pier. This is likely to have been near the end of Pier Road, behind the Pier House or below the Pier Field. Eighty-four years later a reference to the Maudlin Fields limekilns was made at a sitting of Berwick's court of quarter sessions on 27th April 1767:[21]

> At this Sessions Watson Carr Agent to the Right honourable Lord Viscount Lisburne made his Appeal for the Limekilns in the Maudlin Fields the property of the said Lord Lisburne being overrated to the Poor of this Parish and the said Watson Carr alleged that the said Limekilns should not be charged for Poor Rate The Court do hereby confirm the Rate charged as to the said Limekilns.

In May 1966 when workmen were blasting a dangerous overhang on Berwick's seafront near the Greenses Harbour they exposed the remains of an extensive lime kiln built into the cliff face.[22] This was the site of a Maudlin, or Magdalene, fields lime kiln and it may have been the one referred to at the quarter sessions of 1767.

The 1683 reference mentioned, as already noted, the ancient site of lime kilns to have been at 'the pear end'. This may have been a long established lime burning point for the town. But it is certain that Berwick, more so than Norham, would seek the considerable quantities of lime that were required, for the fortifications alone, from a number of local sources.

19th century kilns

Cocklawburn

The most intensive limestone burning areas of the district last century were Scremerston, or Cocklawburn, Holy Island and

Figure 3. Cocklawburn: former industries.

Lowick. The highly industrialised coastal strip of Cocklawburn stretched from Cargie's Kiln, north of Seahouse, to Scremerston Limeworks. Here, where the remains of former limestone quarries and kilns abound, there are other relics that belonged to an industrial past that spanned several centuries. These include the site of a former salt pan;[23] the foundations of Scremerstonmill that housed a Norse wheel[24] designed by John Smeaton; fishery and icehouse reminders; a sand pit site; a windmill site; and clay pits that provided the raw material for a brick kiln alongside Scremerston Limeworks. But it is the limestone burning remains that dominate. As well as the kilns of the Scremerston Limeworks,[25] at the southern end of the coastal strip, there were others east and west of Saltpan How. There were also two horse-drawn light railways that operated into the present century. The eastern mineral line, called by the workmen the 'Northside', ran from the kiln-top of the Scremerston Limeworks to quarries before and beyond the main Newcastle-Berwick railway line. The second miniature railway, the 'Southside', ran from the same works, closer to the beach, to quarries near Saltpan How. The trucks of limestone were hauled to the kiln-mouth, up the incline, by an engine sited on the kiln-top. There was a rail link from the works to the main line nearby, that swung close to the track to Town Farm before joining the North-eastern line at a signal box south of Scremerston Station, where there was a lime depot.

At Scremerston Limeworks there were stables, a weighbridge, blacksmith's shop and grinder. Working on the kilns could, as noted, be a dusty unpleasant occupation but the worst job of all was to man the grinder, that turned the lime into a fine powder. The final phase of Cocklawburn lime burning had a workforce led by Alex Richardson, the 'gaffer', who lived in a detached cottage close to the main works. Charlie Blythe 'rode the trucks' and the two enginemen were Messrs Brown and Purvis. Other well known names among the workmen were Gardener, Ford, Barnett, Spratt, Mowit and Cowe, some of whom lived in rows of cottages at Saltpan How, Philadelphia and south of Scremerston Limeworks.[26] Seahouse, appropriately named, was the home of the Carr family who were responsible for much of the district's industry. John Carr (1830-94), for example, the proprietor of Scremerston & Shoreswood Coal & Lime Company, utilised fully the Sandbanks Limestone and Scremerston coals that he had at his disposal.[27] Nor did the Carr family restrict themselves to local ventures. Their company, for example, leased the Catcraig Kilns, near Dunbar.[28]

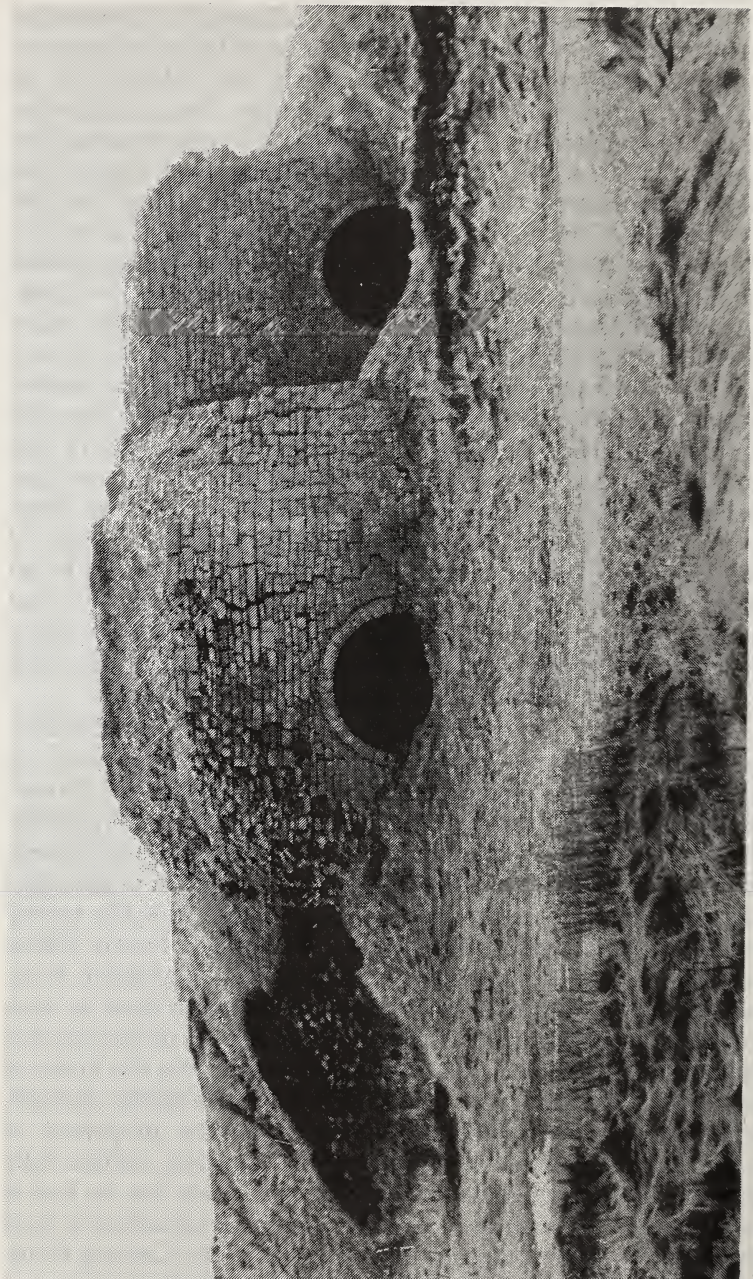

Plate 1. Former kiln of Scremerston Lime Works, 1980, before demolition in 1981.

Plate 2. Lindisfarne: the Dundee Company's lime kilns, 1964.

Holy Island

Quarrying limestone on Lindisfarne, for building purposes, is known to have been carried on at the Snook and Coves in the first half of the 14th century by Benedictine monks. Members of this order also burned seaweed to produce kelp in pits at the Lower Kennedy and on the beach by Sheldrake Pool. Rich in soda-ash, kelp was for centuries used to make soap. Kelp burning survived on the Island until 1791. Lime kilns, at the Old Snook and Lower Kennedy, seem to have used local coal though it has been suggested that it was shipped in to a jetty below the Tripping Chare. A waggonway to supply the Lower Kennedy Kiln was constructed in the 1840s and a decade later the largest of the Island's industrial complexes was developed by a Dundee company. The Coves quarries, fine new kilns, below Beblowe Crag, and an adjacent jetty were linked by mineral lines. To the west of the kilns were sidings for waggons and to the east a slaking pit. Business was good and the company normally had five ships plying between Lindisfarne and Dundee, loading lime at the Castle Jetty and on their return discharging coal to fuel the kilns. This arrangement was well tested but mishaps occurred, like that reported on 31st August 1868. The Customs House authorities at Berwick received a communication from Holy Island:

> . . . at 12.10 a.m. on 31st instant the sloop *Curlew* caught fire and sunk. Crew, two men, saved by their own boat.

The Berwick sloop had taken on lime for Dundee and an assumption must be that the lime was loaded too hot, and ignited with the loss of the *Curlew*. The Dundee firm had added to their local workforce of some thirty Islanders by bringing in Irish labour. These in-comers, who tended to live beyond the village, brought new demands to the Island's ten inns. Rowdiness and fighting became common occurrences and the maintenance of order was not easy.[29] It was part of the chapter of industrial development that was far removed from the Lindisfarne of pre- and post-19th century.

Lowick

Numerous kiln remains in and around four major quarry developments north of Lowick reveal this to have been the most important limestone burning district of north Northumberland. The limestones were tapped in the quarries of Eelwell, Acres, Dryburn and Berrington. This is the order of the outcrops as just over a mile of the Wooler to Berwick road cuts through each of the former workings. The run of these quarries was east-west and the remains, some flooded, can be clearly seen on either side of the B6525 road.

Plate 3. Lindisfarne: remains of the Castle Jetty, 1964.

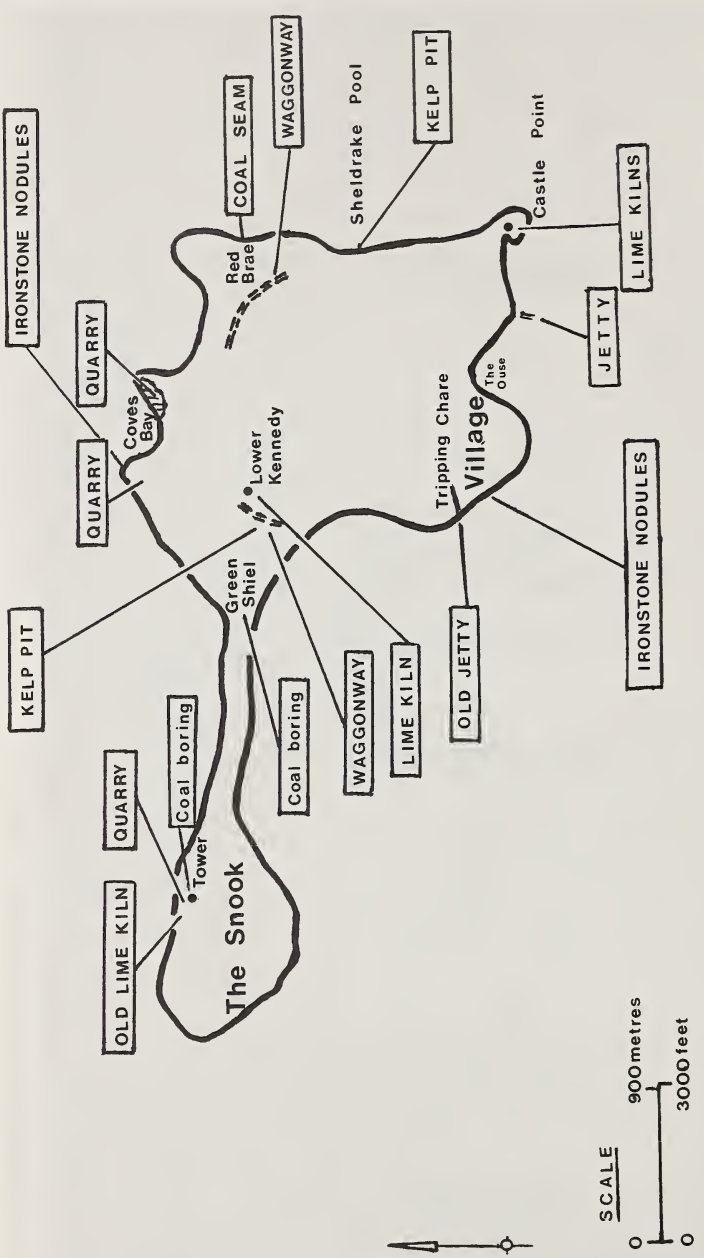

Figure 4. Lindisfarne: former industries.

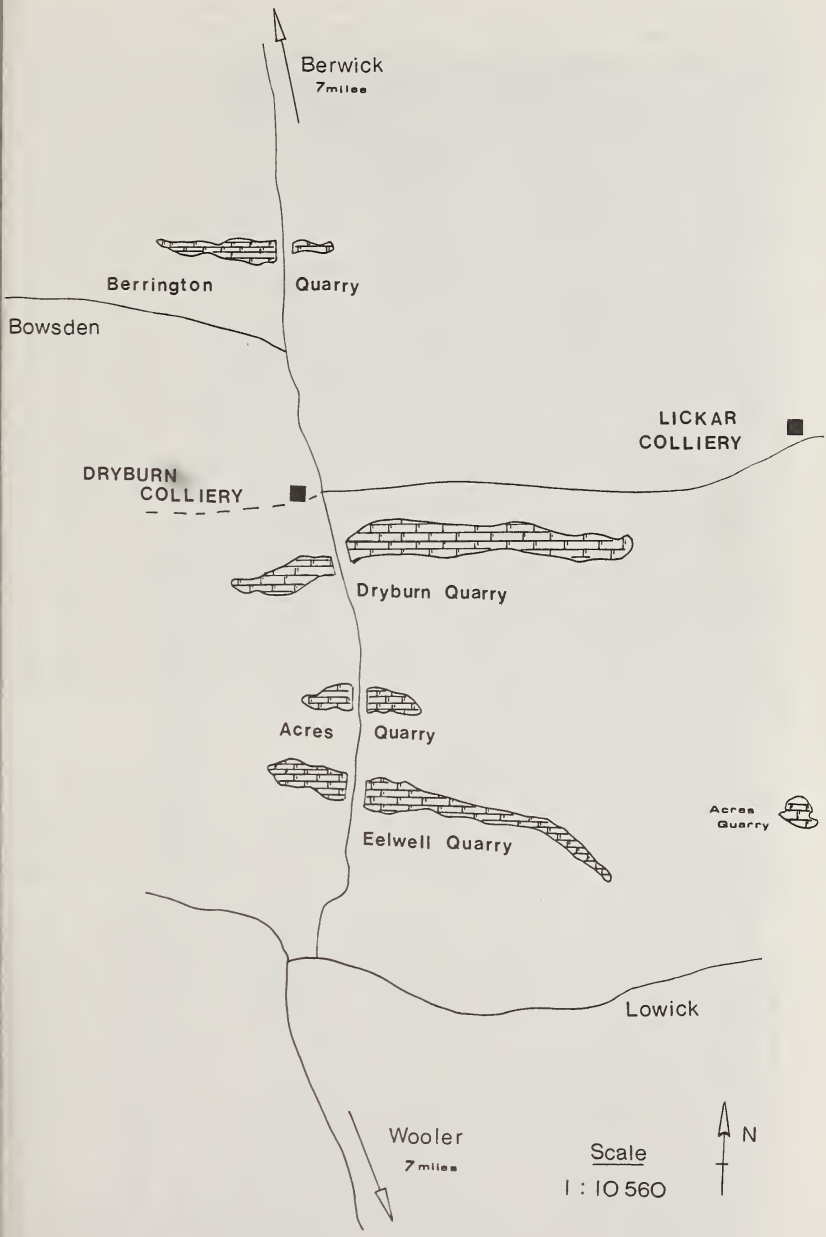

Figure 5. Lowick district: former quarries.

Other smaller scale, and yet significant, developments occurred at the former Oxford Quarries, and especially the Linkhamdean Kiln, north of the Cat Inn and west of the A1;[30] Ancroft Lime Works, west of Ancroft Mill; and Hoppen Lime Works, north-east of Lucker Station. Examples of individual kilns, working or abandoned, shown on the 1st Edition of the Ordnance Survey's 6-inch sheets were those north of Cragmill, north of Easington-grange Mill, west of Mousen, west of Middleton Tile Works, at Hetton Quarry, Hetton Coal Houses and Buddle Bay's Kiln Point.

It was the Lowick and Cocklawburn kilns that provided much of the agricultural and building lime in the 19th century. When, for example, the Royal Border bridge was built in mid-century the mortar was derived from these two sources.[31] An unlikely secondary reminder of north Northumberland's manufacturing industries, including lime production, in the last decade of the 19th century are two buildings at the northern end of the Ladykirk & Norham bridge, of 1885-7. These, a horse-keeper's cottage and stable, were built to provide fresh horses to assist heavily laden carts up the steep hill from the river Tweed to Ladykirk road end and the Border country beyond. How thankful the carters must have been, who led lime from Lowick or coal from Ford Moss and other Northumbrian collieries, to have the fresh Norham bridge horses hitched to theirs when they already had upwards of ten miles behind them. Norham bridge itself is also an example of its time; only 14 feet wide between the parapets it was suited to an age of the horse.

. . . not always observed

Having restricted the geographical area of the present study to the former North Durham and to the borough of Berwick upon Tweed it may be acceptable to draw a concluding example from the area of north Durham proper or, more precisely, from Wearside.

Joseph Wilson Swan's contribution to the development of a successful electric filament lamp and to the development of photography are well known.[32] Swan had been highly inquisitive from his earliest years and when his natural curiosity, aided by a fertile imagination, was later directed towards technological innovation the results, and benefits to society, were immense. Less well known is the rich and stimulating industrial environment on Wearside of his earliest years that this highly distinguished scientist was, later in life, to recognise:[33]

> . . . there was a great range of lime kilns that bordered the near side of the river bank and used up the produce of the quarry. There were also glass works near-by which I was taken to see. Lime-burning and glass bottle-making were, therefore, the first manufacturing processes I had the opportunity of seeing. . . .

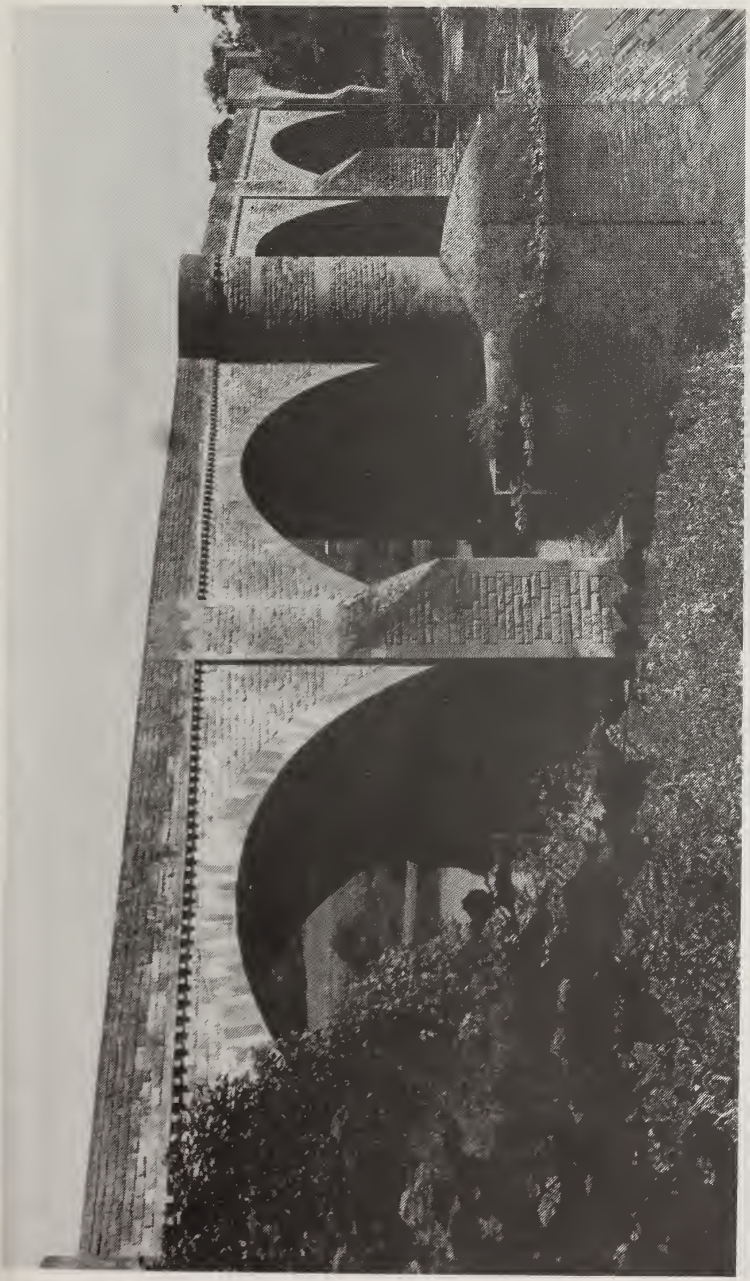

Plate 4. Ladykirk & Norham bridge.

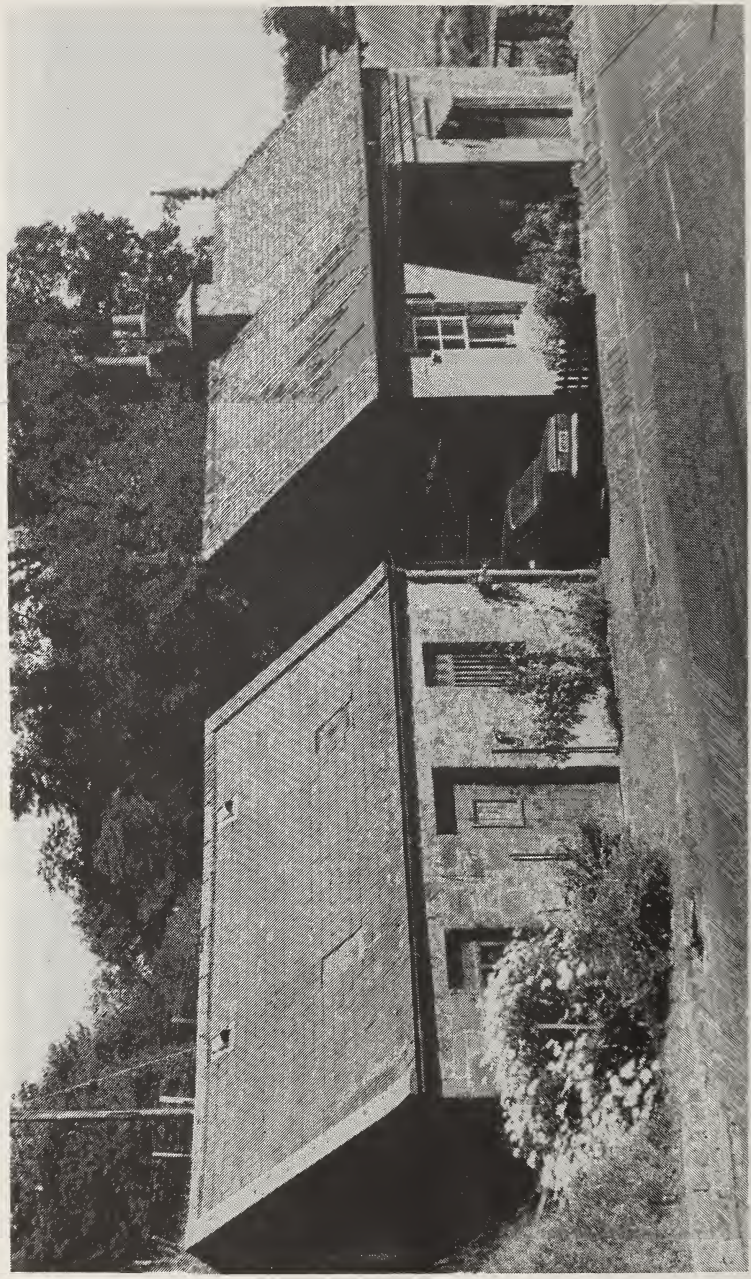

Plate 5. Norham bridge: former horse-keeper's cottage and stable.

Plate 6. Catcraig lime kiln, near Dunbar, restored.

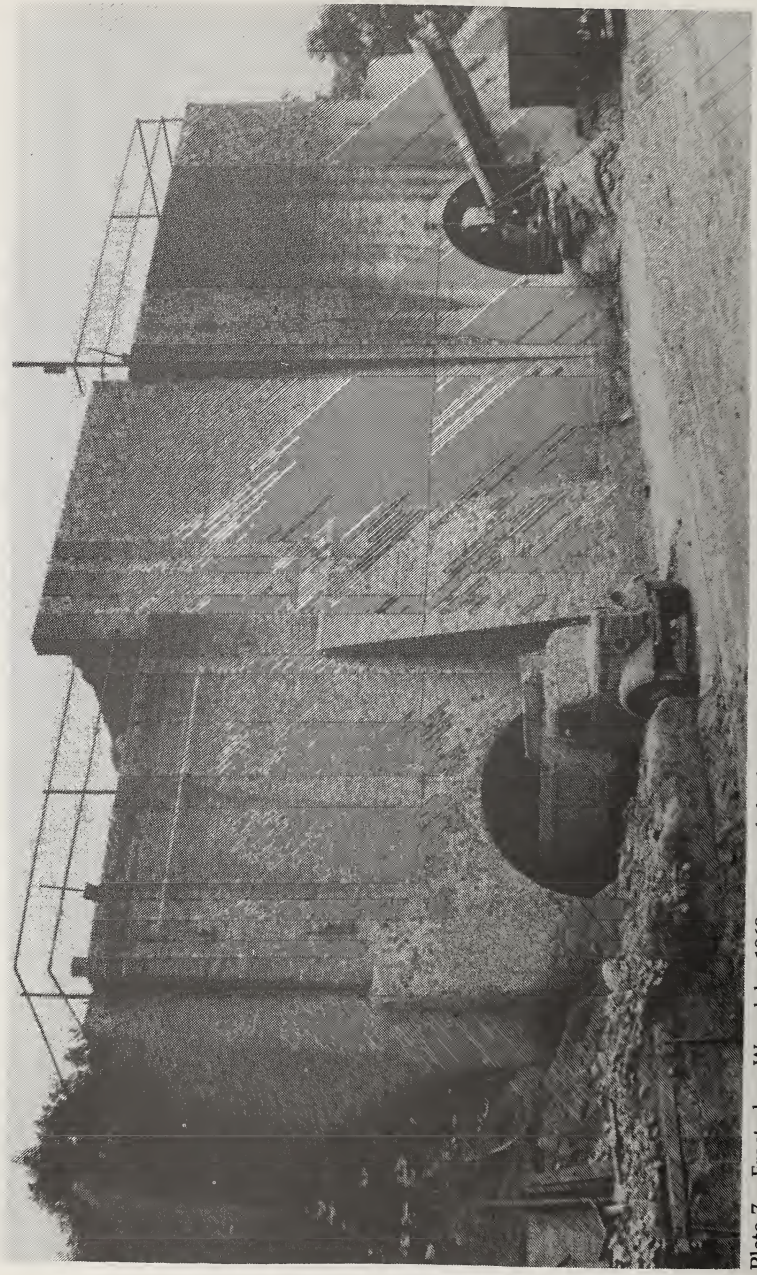

Plate 7. Frosterley, Weardale, 1969: some of the last continuous lime kilns at work in northern England.

Plate 8. Frosterley lime kilns, 1969: the limestone piled high on the kiln-top, became hot to the touch, before it gradually sank into the kiln.

> I can remember, from the time I was four years, how lime was made. . . .

The Wear, with all its sights and sounds, was always fascinating, 'Always beautiful'.[34] Swan's reference to the lime kilns of the early 1830s is of note, if not surprising. His father, as well as being an anchorsmith was also manager of the Pallion lime kilns. The young Joseph Wilson Swan had gained an insight into common, but not always observed, everyday forms of handicrafts[35] and industry. Unplanned and unstructured, his childhood was to kindle the understanding and imagination of one who was destined to contribute much to mankind. Limestone burning has played its part.

Plate 9. Place-name associations: an example from the Borders.

ACKNOWLEDGEMENTS

The writer wishes to express gratitude to Geoffrey McCreath, for renewing his interest in limestone burning, and to Francis Cowe, for drawing his attention to the Samuel Wilson reference of 1693.

SOURCES AND NOTES

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The Times, 25 December 1810, 3.
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2. Niall, Ian (1981) *Country Life*, 6 August, 485.
3. *Illustrated London News* (1874), 65, 482.
4. Fordyce, T. (1867) *Local Records*. Newcastle upon Tyne: T. Fordyce, 42.
5. Fowler, A. (1926) *The geology of Berwick-on-Tweed, Norham and Scremerston*. London: HMSO (Memoirs of the Geological Survey, England), 18-29.
Parts of the geological consideration are based upon material compiled by the writer, from various sources over many years, when working with groups of teachers engaged in field studies at Ford Castle.
6. Since the final closures in the early 20th century a quarry has occasionally reopened. Such an example occurred in January 1951 when W. R. Sitwell, of Barmoor Castle Estate, re-commenced operating a quarry, between Barmoor and Lowick, that had last been worked in 1893. Most of the limestone obtained, from this 1950s venture, was crushed to make fertiliser. — *The Berwick Advertiser*, 13 March 1952, 5.
7. Greig, D. C., *et al.* (1971) *British regional geology: the South of Scotland*. Edinburgh: HMSO, 83.
8. Bainbridge, J. (1978) *Processes*. Oxford: Basil Blackwell, 18-19.
9. Continuous Kilns: compiled from information provided by Blue Circle Cement in 1977, that related to the restored Catcraig lime kiln, near Dunbar (*The Times*, 4 September 1969, 3).
10. Anon. (1905) 'The Hindlow limeworks', *The quarry*. X, 443-6 at 445-6.
11. Sykes, John (1833) *Local records*. Newcastle upon Tyne, printed: John Sykes, 206.
12. Ibid. 360.
13. Blue Circle, *op cit.* (ref. 9).
14. Ibid.
There is also a series of lime ledgers, from a local kiln in the Berwick Record Office (BRO). These illustrate the considerable sums being spent on lime, from 1754 onwards, by customers mainly in Berwickshire. These are available as: BRO 139/18-27 1754-1775.
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19. BRO B1/13, 20 July 1683, 17-18.
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This reference is No. 442 in the sequence of guild orders listed, in the second part of the work.

21. BRO C8/4, 27 April 1767.
22. *The Berwick Advertiser*, 19 May 1966, 1.
23. Site of a former salt pan: this is likely to have been a relic of Cocklawburn's earliest industry. Salt was made by heating seawater in large pans, initially of lead but later of iron. There are records of salt pans having been established on the north-east coast as early as the 11th century while one on the Forth, at Prestonpans (its name being derived from the process carried on there), survived until 1959.
    The Ordnance Survey's 1st edition of the 6-inch series pinpoints the site of the former salt pan at the start of the rocks at the northern end of Cocklawburn beach. The precision may stem from mid-19th century information being available which served as a reminder that the salt pan had operated in living memory. Whether the pan had existed for centuries before that, and supplied Berwick and district with salt, is unknown. Happily, the 'salt pan' placename has not been lost.
24. Norse wheel: the foundations of Scremerstonmill still exist just to the north of Seahouse. This was a unique mill in the district, not for possessing what might have been termed its own harbour, but for having been powered by a Norse wheel that was designed by none other than John Smeaton (1724-92), the engineer of his age. The Norse wheel was a vertical-shafted waterwheel that was turned by water flowing down a steep wooden chute. The water entered carefully carved buckets on the rim of the wheel and caused it to turn more easily than earlier Norse wheels that had only flat wooden boards mounted on the wheel edge. The shaft was projected upwards through the eye of the lower mill stone, which remained stationary, to drive the upper mill stone without gearing. The gap between the stones was adjusted by raising or lowering the waterwheel and shaft. Some of Smeaton's engineering masterpieces were set in Northumberland but it is doubtful if he would have included Scremerstonmill as such. The Norse wheel's efficiency was improved between the 16th and 19th centuries and it is a fair assumption that Smeaton's would be a splendid appliance. But it could never, no matter how efficient it was, seriously rival the more common horizontal-shafted waterwheels, whether undershot, breast, overshot or pitchback. It may be that the Norse wheel, without gearing, was more simple than the horizontal-shafted mills to operate and maintain. This could have been the reasoning behind the design of Scremerstonmill which was built at some point between 1765 and 1792.
25. In 1981 Northumberland Planning Committee decided that the main kilns of the former Scremerston Lime Works were unsafe and these were demolished, at a cost of £1,500. — *The Berwick Advertiser*, 12 February 1981, 3. The kilns were situated below a Second World War gun position and, today, the only kiln on the site stands a little to the south on the edge of the dunes, above the beach.
26. Compiled from information provided by Tom Brown, 77 Newbiggin Road, Ashington, in November 1980. Mr Brown, aged 80 years, had been born at Philadelphia and his father was one of the enginemen referred to in the text.
27. Bainbridge, J. (1980) 'Cockleyburn's industrial past'. *Berwick Bulletin*, 27 August, 6.
28. Blue Circle *op cit.* (ref. 9).
29. Bainbridge, J. (1980) 'Lindisfarne's industrial past'. *Berwick Bulletin*, 26 March, 6.
30. In the late-1980s and early-1990s Northumberland County Council used the Linkhamdean Quarry for refuse disposal and they were virtually filled-in. A former kiln is, however, retained on the site.

31. Proc. Inst. Civ. Eng. (1850-51), X, 288.
32. Several concise publications were produced in 1979 to mark the centenary of Joseph Wilson Swan's lecture on the newly developed incandescent electric lamp to the Literary & Philosophical Society of Newcastle upon Tyne. This was the first known occasion on which a significant number of electric lamps had been demonstrated to a public gathering. The booklets produced were:
Chirnside, R. C. (1979) *Sir Joseph Wilson Swan, FRS*. Newcastle upon Tyne: Literary & Philosophical Society.
Clough, Diane (1979) *Joseph Swan 1828-1914*. Gateshead: Metropolitan Borough Council.
Corfe, Tom (1979) *Swan in Sunderland*. Sunderland: Polytechnic with Tyne & Wear County Council.
33. Swan, Mary E. & Kenneth R. (1929) *Sir Joseph Wilson Swan FRS*. London: Ernest Benn, 13-19.
34. Ibid. 13.
35. Swan as a young boy also knew the tailor's and cobbler's arts 'so far as these can be known by early and careful observation' . . . coming from school he watched the chandler dipping the balanced frame, from which the wicks hung, into the melted, bad smelling fat . . . he and his elder brother John paid clandestine visits to copperas works, to brickfields where draggled women carried the bricks from the moulding table . . . he made an early acquaintance with boilers, steam engines, rope-, nail-, corn- and gas-making. Ibid. 16-17.

FURTHER READING

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Carruthers, R. G. (1927) *et al. The geology of Belford, Holy Island and the Farne Islands*. London: HMSO (Memoirs of the Geological Survey, England and Wales, 2nd edition).

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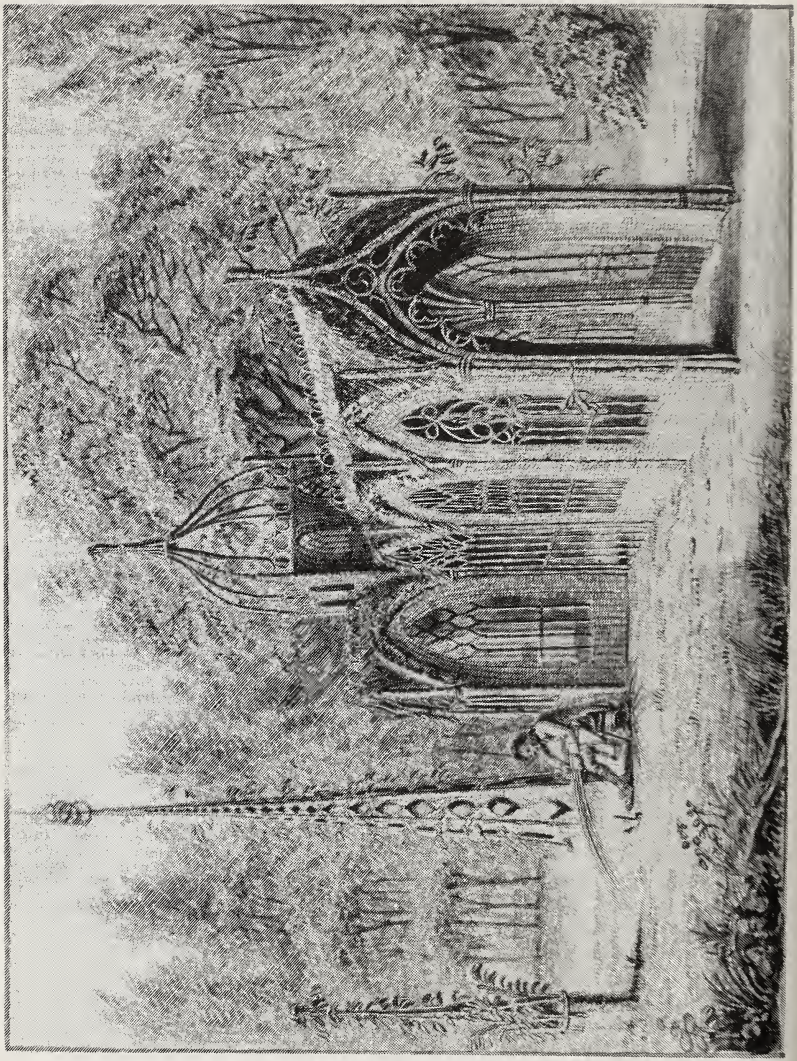
Publicity leaflets on the Dunbar Works from Blue Circle Industries PLC, Dunbar Works, Dunbar, East Lothian EH42 1SL.



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THE WILLOW CATHEDRAL

Patricia Payne
Whitehall, Old Cleeve, Minehead, Somerset TA24 6HU

Signposts to Withy Way and Willow Trail direct West Country visitors through the willow-growing levels to the cottage industry of basket making.

Not only baskets of all types, but chairs large and small, tables, hurdles and rose arches; a minute part of what was formerly made from willow.

Wicker sails once turned on the windmill as grain arrived in wicker-sided cart and pack pannier.

Green willow made ships' fenders, fish-baskets, eel-traps and kiddels, lobster- and crab-pots.

In the fourteenth century willow hurdles were part of the scaffolding round the great churches and cathedrals but no wicker structure was ever so remarkable as that known as ''The Willow Cathedral''.

This unique masterpiece of craftsmanship was made in Berwickshire, Scotland, an area not noted for wickerwork though the fisherman had his crab-pot and the fisherwife her creel.

Sir James Hall of Dunglass, an original and eccentric member of a gifted family, had a theory that Gothic Architecture derived from early buildings of wattle.

He employed an un-named craftsman on his estate of Dunglass, some twelve miles south of Dunbar, in constructing an edifice that was at once an architectural experiment, a rustic folly and an object of so much comment in Society, travellers on the Great North Road made a half-mile detour to view the marvel.

Some, like Miss Eliza Grant of Rothiemurcus, recorded their impressions and the Scottish artist Alexander Carse made a series of watercolours between 1794 and 1797, now in the British Architectural Library.

The Willow Cathedral stands in a glade backed by half-grown trees, a cathedral of nave, transepts and central crossing tower, the end of the nave being an open arch to allow visitors to enter.

The nave is three bays long, each bay in the form of a Gothic arch of wickerwork, the lower part a closely woven wall of about three feet high. Above that, the tracery of a Gothic window in willow rods; the nave topped with a thatched roof finished off with willow hoops as a decorative ridge-line.

The central tower has a crown or lantern top, possibly suggested by St Giles, Edinburgh.

Close under the transept gable, a workman sits on a stool with a bundle of willow rods on his knee. He is in the prime of life and respectably dressed in the Scots fashion of the time.

Supposing the seated man is drawn to scale, then the transepts were eight feet high, the nave ten to twelve feet and the tower perhaps as much as twenty to the end of the finial.

On closer examination of the watercolour published in the National Galleries of Scotland Scottishmaster Series, No. 2, Plate 1, it is clear the workman is filling in the base of a nave bay, the skeleton of the Cathedral based on very long willow rods stuck in the ground, for some of the rods have taken root and budded out.

No two windows are alike and the Willow Cathedral is flanked by a tapering structure covered in leaves and about thirty feet tall, suggesting the first experiment was in the form of a spire completed before the Cathedral was begun.

Also included in the watercolour is a mysterious object, a tree stump or perhaps an earthenware chimney pot. There is a ring with branches threaded through it, out of which rises a miniature spire or pinnacle topped with the suggestion of a cross.

Is this Sir James Hall's latest idea for embellishing the Cathedral?

Let Miss Eliza Grant have the last word:

''Sir James had lately published a truly ingenious work, an attempt to deduce Gothic architecture from the original wigwams made of reeds . . . a fanciful theory yet with some show of reason in it.''

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Illustration by Alexander Carse, No. 6356, copyright British Architectural Library, R.I.B.A.

TWEEDBANK — A SUCCESS OR A FAILURE?

Andrew T. Bramhall
Scottish College of Textiles
and
Christopher O. Badenoch
Nature Conservancy Council for Scotland
(now Scottish Natural Heritage)

The Club visited Tweedbank on the 8th of June 1989. This account has been prepared by the Leaders of that afternoon excursion, memorable for the adept Chairmanship of the late Sir W. B. Swan.

There has been much debate by many people over the short history of the Tweedbank development. Although the scheme has not yet reached its full potential as a housing or industrial area, there have been many critics of its presence and value. Virtually no attention, however, has been paid to its natural history, yet consciously or not, the planners have created an area full of varied habitats, with a wide range of plants and the insects and other invertebrates dependant upon them. A wide variety of birds and mammals is attracted to the development. All these afford both resident and visitor alike, the chance to have easy access to see wildlife on the urban doorstep without undue pressure on the human or wildlife environment.

Tweedbank is a new-town ''village'' development, within the District of Ettrick and Lauderdale, situated halfway between the town of Galashiels and Melrose on the south bank of the Tweed. Before Local Government reorganisation, Tweedbank lay in the County of Roxburghshire, within the Parish of Melrose. It consisted mostly of rolling farmland, to the south of the estate, with the hedged, relatively moderate field sizes, and arable and stock-rearing, typical of the Melrose-Gattonside valley.

In the mid-1960s, an unofficial Plan for the Central Borders, written by Professor Percy Johnston-Marshall of Edinburgh University and submitted to the Scottish Development Department, was adopted, in part, by Roxburgh County Council. Development opportunities were considered by a working party consisting of the County Council, the Scottish Estates Corporation, Scottish Special Housing Association, and the Scottish Development Department. The Plan considered that population and industrial growth in the Borders could usefully be focused in the Central (Tweed Valley) area.

At last, two farms — Tweedbank and Lowood Mains — were

settled upon as having the desired characteristics, and these were acquired together with the trackbed of the former 'Waverley' (Edinburgh-Carlisle) railway line at the point where it traversed those farms after crossing the Tweed below Langlee.

Tweedbank thus became a development area in the early 1970s, after prolonged negotiations, two Public Inquiries — one on the Plan; the second on the land acquisition — and a decision which went all the way to the House of Lords. It is sad that such a bitter struggle had to presage the actual development and indeed some say that the acrimony of the debate had a wide effect on the success of the development itself.

The original idea was to stem the drift of the young, working population away from the Central Borders, by the provision of new housing and opportunity for open, light industrial development and 'greenfield' sites. Originally this took place round the spine of a new road network. Access was originally from the Abbotsford-Melrose B6380 road, but within Tweedbank that was replaced by a new service loop, Tweedbank Drive, which served both housing and industrial estates, leading to Galashiels by the Bottle Brig in the early days. Later, the completion of the imposing new Tweed Bridge, in early 1976, provided a more direct route.

Development was not haphazard. While landscaping detail round housing was undertaken by the Scottish Special Housing Association, the landscaping of more open areas, including a park and pond, were worked on by the late Dr David Skinner, adviser to the Scottish Development Department and lecturer at the Edinburgh College of Art. An initial, complete site survey was carried out, with boundaries, elevations and levels, roads, hedges and even individual trees marked.

Initially great attention was given to the route and line of the roads. Slopes were much more varied than was normal engineering practice at that time, and cut material was used to add to and create existing slopes, as well as to bring land often flooded by the Tweed, to an acceptable height. Likewise, housing levels were varied. An early decision was made to screen the new Melrose 'by-pass' to Galashiels extension by raising a huge ridge of soil along most of the length. Contractors and road lines had to work with existing topography, as far as possible, and there was even a penalty clause for every tree that was felled or damaged unnecessarily! The loch was lined, to continue the wetland habitat of Lowood — of which a tiny portion is still present in the southern plantings — and arrangements made for augmentation of the pond level by water pumped from the river. A Badger route from sett to feeding area and the slopes below Kaeside, was considered and an underpass provided for the

animals, beneath the main road. Quite a feat before there was even any statutory protection afforded to these animals!

All this took a lot of careful design, discussion and planning. It was also labour intensive in parts, with Manpower Services Commission, Scottish Development Agency, and the later Borders Regional Council all involved. Extreme care was taken to plant trees correctly and carefully, with a high proportion of native species and retention of existing old estate stands towards the river and on knolls. 'Saturation' planting and generous bulking of shrubs round housing and the parkland, gave screening and sudden vistas, getting away from the rather sterile, open planting of semi-mature trees in the compressed soils of flat, uninspiring grassland which characterised so many of the 'sixties new-town developments.

Tweedbank is the lie to the often-held idea that such new developments denude the landscape, and create an unattractive environment. Careful attention to the architectural detail and scale and its relationship to the immediate topography and locale has produced a scheme which does not sit uneasily in its rural setting. Although utterly different from the original farmed land, it nonetheless avoids the awful excesses of 'sixties housing estates. Cumbernauld, Livingstone, Glenrothes, East Kilbride and others are widely acclaimed, yet often not by their residents, and certainly not by visiting biologists! The success of Tweedbank is largely unsung. Retention of existing riparian, grassland and marginal agricultural and roadside habitats and their slopes, together with creation of new habitats, exposure of unweathered glacial mounds, and woodland planting to connect Abbotsford to Melrose, Galashiels and the river to the hill, have all contributed to a new working and living environment, which gives a sense of space or enclosure; open vista and closed variety; formal park and pond with unstructured wood and river. This is rarely equalled, even fifteen years on.

During the past fourteen years there has been a slow but steady growth in the community. Today (1989) there are some 350 S.S.H.A.-built homes (many now in private ownership), a privately developed housing estate, a small industrial estate, school, community centre (created out of Tweedbank farm steading) and some craft and small workshop units. The Department of Agriculture and Fisheries for Scotland established their local headquarters in the estate, with the Ministry of Agriculture veterinary inspectorate. An indoor bowling club, running track and playing fields, provide much-needed sports facilities — these being on the site of the former Melrose rubbish tip!

The value of Tweedbank for wildlife has been shown by biological recording over the past fourteen years. Sadly, no baseline ecological information was collected; but ecologists are agreed that the variety of habitats, both formal and 'wild', provide a more diverse series of species and communities than could have existed on the site in its farmed condition. There is probably an overall increase in wildlife species; there is certainly an increase in human enjoyment. There will be some loss as disturbed habitats settle down, and exposed surfaces heal and it is important to recognise that its present habitat and wildlife success, will not necessarily continue. Steps have to be taken to ensure future good development, and proper, continuous management planning preferably in accordance with defined, written prescription and record of detail.

Some of the main records for the area are given in the attached lists.

APPENDIX I

Tweedbank Plants

The plant list reflects the variety of habitats present at the site, and the changes which have taken place as the development proceeds (see text). Obvious amongst these are the riverine and riparian species; those of old woodland and open scrub edges; hedgerow and roadside verge; long, unmown grassland and tall herbs; shorter infrequently mown grassland, both damp and dry; finally mown amenity grass; dry knoll and colonising banks; garden ground shrubbery, plantation and agricultural fields. The range of new habitats, and the creation of garden and formal ground has led to the introduction of many species over and above those introduced casually or by estate management in the past. The hard edge to the pond and its lining prevent the full complement of pond plants to be present, although some small wetland areas occur. The more outstanding plants are noted below:—

Riverine/Riparian Algae, Liverworts and Mosses

Nostoc parmelioides
Heribaudiella fluviatilis
Cladophora glomerata
Collemo fluviatile
Verrucaria praetermissa
Marchantia polymorpha
Brachythecium rutabulum
Chiloscyphus polyanthos
Conocephalum conicum
Eurhynchium praelongum
Fontinalis antipyretica
Grimmia alpicola
Leptodictyum riparium
Mnium hornum

Tortula mutica
Rhytidiadelphus squarrosus
Hildenbrandia rivularis
Vaucheria spp.
Spyrogyra spp.
Dermatocarpon fluviatile
Other Verrucaria spp.
Bryum pseudotriquetrum
Cinclidotus fontinaloides
Cratoneuron filicinum
Eurhynchium riparioides
Funaria hygrometrica
Hygroamblestegium fluviatile
Orthotricum rivulare
Mnium longirostrum
Thuidium tamarascinum

(Collected by N. T. Holmes, D. Ellis, C. O. Badenoch, 1972-1982; but by no means a full list.)

Fungi:

Piptoporus betulinus — Birch Polyporus
Clitocybe nebularis — Cloudy Funnel-cap
Russula mairei — Beech Russula
Lactarius cf. *rufus* — Rufous Milk-cap
Hypholoma fasciculare
Cortinarius (several species)
Laccaria laccata — The Deceiver
Lepiota procera — Shaggy Parasol
Hygrocybe cf. *coccineus* — Orange Wax-cap
Boletus badius — Bay coloured Boletus
Entoloma spp.
?Inonotus dryadeus
Lepista nuda — Wood Blewit
Lycophyllum fumosum

(All taken during a brief survey by Nick Stewart in November 1982.)

APPENDIX II

Tweedbank Higher Plants

Plants are the bottom of the food chain. They trap sunlight energy and make the basic carbohydrates and primitive protein, for food as well as providing cover, breeding sites and shelter upon which ultimately all our insects, other invertebrates, amphibians, birds, and mammals depend.

The flora of Tweedbank Estate reflects not only the main habitats left (almost) intact by the development — parkland, estate plantings, long-established riparian woodland, river and river fringe, marshy wetland, railway embankment, verge and hedgerow — but also the interaction of all these with the relict

seed and propagule population in abandoned agricultural soils, in the opening of relatively unweathered glacial and superficial mineral materials, the localised importation of filling soils, rubble and road material from round about, and in the mixing of all these in cut-and-fill engineering and landscaping techniques. The variety of wet and dry soils, on a wide range of aspects and slopes, and the confinement of too much 'sterile' grass-and-clover monocultural seeding of new roads and banks, has given reign to over three hundred species of flowering plant.

Undoubtedly some of these will disappear as the development scars grow over, and building proceeds; others will arrive. The whole is indicative of the success, both economically and biologically, of a more careful and caring approach to our planned environments. A few of the more obvious are grouped by their habitats below. (* Denotes introduction to UK, many with astonishing powers of colonisation here at the expense of our own flora.)

Tweedbank Woodland and Woodland Edge:

Adoxa moschatelina — Moschatel
Agropyron caninum — Bearded Couch
**Allium paradoxum* — Few Flowered Leek
Anemone nemorosa — Wood Anemone (also in some open areas of former woodland)
Brachypodium sylvaticum — False Brome
Bromus ramosus — Hairy Wood Brome
Cardamine flexuosa — Wavy Bitter Cress
Corylus avellana — Hazel
**Doronicum pardalianches* — Leopard's Bane
Dryopteris austriaca — Broad Buckler Fern
Dryopteris filix-mas — Male Fern
Endymion non-scriptus — Wild Hyacinth/English Bluebell
Festuca gigantea — Giant Fescue
**Galanthus nivalis* — Snowdrop
Geranium sylvaticum — Wood Cranesbill
Glechoma hederacea — Ground Ivy
Lonicera periclymenum — Honeysuckle
Mercurialis perennis — Dog's Mercury
Moehringia trinervia — Three-nerved sandwort
Oxalis acetosella — Wood Sorrel
Rumex sanguineus — Bloody Wood Docken
Sarothamnus scoparius — Broom
Saxifraga granulata — Meadow Saxifrage
Scrophularia nodosa — Figwort

Tweedbank Tall Herb, Riparian strip and Verge:

Barbarea vulgaris — Winter Cress
Calystegia sepium — Hedge Bindweed
Campanula latifolium — Giant Bellflower
Centaurea cyanus — Cornflower
**Chicorium intybus* — Chicory
Chrysanthemum leucanthemum — Ox-eye Daisy
Chrysanthemum parthenium — Feverfew
Geranium pratense — Meadow Cranesbill
Geum × intermedium — Hybrid Avens
Geum rivale — Water Avens
**Heracleum mantegazzianum* — Giant Hogweed
Hypericum perforatum — Perforate St John's Wort
Hypericum tetrapterum — Square-stemmed St John's Wort
**Impatiens glandulifera* — Himalayan Balsam
**Narcissus* species — Daffodil (unspecified)
Ornithogallum umbellatum — Star of Bethlehem
Papaver dubium — Long-headed Poppy
Silene alba — White Campion
Silene vulgaris — Bladder Campion
Sinapis arvensis — Charlock
Stachys sylvatica — Hedge Woundwort
Stellaria nemoreum — Wood Stitchwort
Symphitum tuberosum — Tuberous Comfrey
Symphitum × uplandicum — Russian Comfrey
Torilis japonica — Upright Hedge Parsley
Valeriana officinalis — Common Valerian
**Valeriana pyrenaica* — Pyrennean Valerian
Verbascum thapsus — Greater Mullein
Vicia angustifolia — Narrow-leaved Vetch
Vicia hirsuta — Hairy Tare (especially on railway)

Tweedbank Drier, More Open Grassland and Banks:

Allium vineale — Crow Garlic
Aphanes arvensis — Parsley Piert
Arabidopsis thaliana — Thale Cress
Arabis hirsuta — Hairy Rock Cress
Campanula rotundifolia — Bluebell/Harebell
Cardamine hirsuta — Hairy Bitter Cress
Carex ovalis — Oval Sedge
Conopodium majus — Pignut/Earthnut
Crepis capillaris — Smooth Hawksbeard

Erophila verna — Whitlow Grass
Euphrasia officinalis — Eyebright
Festuca rubra — Red Fescue
Galium verum — Lady's Bedstraw
Geranium dissectum — Cut-leaved Geranium
Geranium molle — Dove's Foot Cranesbill
Geranium pusillum — Small-flowered Cranesbill
Hieracia pilosella — Mouse-ear Hawkweed
Hypericum pulchrum — Slender St John's Wort
Hypochoeris radicata — Cat's Ear
Leontodon autumnalis — Autumnal Hawkbit
Leontodon hispidus — Hairy Hawkbit
Lepidium campestre — Field Pepperwort
Lepidium heterophyllum — Smith's Cress
Linaria vulgaris — Common Toadflax
Medicago lupulina — Black Medick
Myosotis ramossissima — Early Forget-me-not
Pimpinella saxifraga — Burnett Saxifrage
Tragopogon pratensis — Goatsbeard
Trifolium campestre — Hop Trefoil
Trifolium dubium — Lesser Yellow Trefoil
Trifolium medium — Zig-zag Clover
Trisetum flavescens — Yellow Oat Grass
Veronica arvensis — Wall Speedwell
Viola tricolor — Field Pansy

Heathy areas also have:—

Deschampsia flexuosa — Wavy Hair Grass
Festuca ovina — Sheep's Fescue
Galium saxatile — Heath Bedstraw
Luzula multiflora — Heath Wood-rush
Vaccinium myrtillus — Blaeberry
Veronica officinalis — Heath Speedwell

Tweedbank: Marshy Wetland and Open Water:

Achillea ptarmica — Sneezewort
Alisma plantago-aquatica — Water Plantain
Alopecurus geniculatus — Marsh Foxtail
Callitriche autumnalis — Autumnal Starwort
Caltha palustris — Marsh Marigold
Cardamine pratensis — Cuckoo Flower
Carex nigra — Common Sedge
Carex paniculata — Carnation Sedge
Carex rostrata — Bottle Sedge
Crepis palludosa — Marsh Hawksbeard

Epilobium palustre	— Marsh Willow Herb
Filipendula vulgaris	— Meadow Sweet/Queen of the Meadow
Glyceria fluitans	— Sweet Float Grass
Juncus acutiflorus	— Sharp-flowered Rush
Juncus articulatus	— Jointed Rush
Juncus bufonius	— Toad Rush
Juncus inflexus	— Hard Rush
Lotus uliginosus	— Greater Bird'sfoot Trefoil
Lysimachia nemoreum	— Yellow Pimpernel
**Lysimachia vulgaris*	— Yellow Loosestrife
Mentha × verticillata	— Corn Mint × Water Mint (hybrid)
Mimulus guttatus	— Monkeyflower
Myosotis scorpioides	— Water Forget-me-not
Ranunculus sceleratus	— Celery Leaved Crowfoot
Rorippa islandica	— Marsh Yellow Cress
Rorippa sylvestris	— Creeping Yellow Cress
Sparganium erectum	— Branched Burr-reed
Stachys palustris	— Marsh Woundwort
Stellaria alsine	— Bog Stitchwort
Veronica beccabunga	— Brooklime

Tweedbank, Trees and Shrubs

Of over thirty species of woody plants recorded from the new town, almost two-thirds are introductions, as might be expected in an area of partly estate policy woodland, with roads and a railway. The list includes the Midland Hawthorn, *Crataegus oxycanthoides* which was probably introduced as a hedging plant during the agricultural enclosures. Barbery, *Berberis vulgaris*, is another hedging plant, but one which was native to the area, although, before fungicides, one which was ruthlessly weeded-out as it was an alternate host of Wheat-rust. Another hedgerow plant which has taken advantage of the less-frequent use along the old Abbotsford to Melrose road and seeds widely is the Burnet Rose of Jacobite fame. As with some other Tweedbank plants it is more at home in a less acid soil.

(All the lists given are of the more interesting plants — only a part of the total for the habitats.)

APPENDIX III

Tweedbank Lepidoptera

Recording of the moths and butterflies of Tweedbank began in detail in 1979 when it was noticed that a number of species occurred. The butterflies were comparatively easy to identify and the thirteen or so represent the range of butterfly habitats to

be found, and are widespread as residents or migrants in the Eastern Borders.

The moths are a little more involved. The main methods of collection were by netting in the early morning and in the evening, and by use of a fishing rod during the day. The latter use is novel but effective. The moths often rest on the lamp-posts and on the harled walls, which, themselves, often had street lights attached. The rod was used to knock down those moths out of reach and these were then collected in specimen tubes and released after identification, later. A complete list is given since this area has not been the subject of intensive recording for nearly a century.

Butterflies:—

Small White
Large White
Green-veined White
Orange Tip
Small Tortoiseshell
Red Admiral
Painted Lady
Peacock
Small Copper
Small Heath
Common Blue
Ringlet
Meadow Burn

Moths:—

Ghost Moth	— *Hepialus humuli*
Gold Swift	— *H. hecta*
Orange Swift	— *H. sylvina*
Mapwing Swift	— *H. fusconebulosa*
Common Swift	— *H. lupulinus*
December Moth	— *Poecilocampa populi*
Large Emerald	— *Geometra papilionaria*
March Moth	— *Alsophila aescularia*
Small Fan-footed Wave	— *Idaea biselata*
Riband Wave	— *I. aversata*
Garden Carpet	— *Xanthorhoe fluctuata*
Silver Ground Carpet	— *X. montanata montanata*
Shaded Broad Bar	— *Scotopteryx chenopodiata*
Yellow Shell	— *Camptogramma bilineata*
The Streamer	— *Anticlea derivata*
Water Carpet	— *Lampropteryx suffumata*
Chevron	— *Eulithis testata*
The Spinach	— *E. mellinata*
Barred Straw	— *E. pyraliata*
Small Phoenix	— *Eciptoptera silaceata*
Autumn Green Carpet	— *Chloroclysta miata*
Dark Marbled Carpet	— *Chloroclysta citrata*
Common Marbled Carpet	— *C. truncata*
Barred Yellow	— *Cidaria fulvata*

Grey Pine Carpet	— *Thera obeliscata*
Spruce Carpet	— *T. britannica*
Green Carpet	— *Colostygia pectinataria*
Broken-barred Carpet	— *Electrophaes corylata*
May Highflyer	— *Hydriomena impluviata*
July Highflyer	— *H. furcata*
Scarce Tissue	— *Rheumaptera cervinalis*
Twin Spot Carpet	— *Perizoma didymata*
Sandy Carpet	— *P. flavofasciata*
Small Rivulet	— *P. alchemillata*
Tawny Pug	— *Eupithecia icterata*
Brindled Pug	— *E. abbreviata*
Currant Pug	— *E. assimilata*
Scorched Wing	— *Plagodis dolbraria*
Brimstone	— *Opisthograptis luteolata*
The V-moth	— *Semiothisa wauaria*
Latticed Heath	— *S. clathrata*
Scalloped Oak	— *Crocallis elinguaria*
Feathered Thorn	— *Colotois pennaria*
Swallow Tail	— *Ourapteryx sambucaria*
Canary Shouldered Thorn	— *Ennomos alniaria*
Early Thorn	— *Selenia dentaria*
Common White Wave	— *Cabera pusaria*
Scalloped Hazel	— *Odonoptera bidentata*
Peppered Moth	— *Biston betularia*
Pale Brindled Beauty	— *Apocheima pilosaria*
Light Emerald	— *Campaea marginata*
Engrailed	— *Ectropis bistortata*
Mottled Beauty	— *Alcis repandata*
Barred Red	— *Hylaea fasciaria*
Poplar Hawk	— *Laothoe populi*
Elephant Hawk	— *Deilephila elpenor*
Puss Moth	— *Cerura vinula*
Sallow Kitten	— *Furcula furcula*
Swallow Prominent	— *Pheosia tremula*
Lesser Swallow Prominent	— *P. gnoma*
Coxcomb Prominent	— *Ptilodon capucina*
Pale Prominent	— *Pterostoma palpina*
Buff Tip	— *Phalera bucephala*
Lunar Marbled Brown	— *Drymonia ruficornis*
Garden Tiger	— *Arctia caja*
Ruby Tiger	— *Phragmatobia fuliginosa*
White Ermine	— *Spilosoma lubricipeda*
Heart & Dart	— *Agrotis exclamationis*
Purple Clay	— *Diarsia brunnea*

Flame Shoulder — *Ochropleura plecta*
Plain Clay — *Eugnorisma depuncta*
Large Yellow Underwing — *Noctua pronuba*
Small Broad Border Yellow Underwing — *N. janthina*
Lunar Yellow Underwing — *N. orbona*
Autumnal Rustic — *Paradiarsia glareosa*
Pearly Underwing — *Peridroma saucia*
Ingrailed Clay — *D. mendica*
Setaceous Hebrew Character — *Xestia c-nigram*
Double Square Spot — *X. triangulum*
Square Spot Rustic — *X. xanthographa*
Dotted Clay — *X. baja*
Green Arches — *Anaplectiodes prasina*
The Shears — *Hada nana*
Pale Shouldered Brocade — *Lacanobia thalassina*
Cabbage Moth — *Mamestra brassicae*
Broad Barred White — *Hecatera bicolorata*
Broom Moth — *Ceramica pisi*
Glaucous Shears — *Papestra biren*
Campion — *Hadena perplexa*
Marbled Coronet — *H. confusa*
Antler Moth — *Cerapteryx graminis*
Pine Beauty — *Panolis flammea*
Common Quaker — *Orthosia stabilis*
Hebrew Character — *O. gothica*
Common Wainscot — *Mythimna pallens*
The Shark — *Cucullia umbratica*
Minor Shoulder Knot — *Brachylomia viminalis*
Deep Brown Dart — *Aporophyla lutulenta*
Black Rustic — *A. nigra*
Red Sword Grass — *Xylena vetusta*
Green Brindled Crescent — *Allophyes oxycanthae*
Merveille du Jour — *Dichonia aprilina*
Grey Chi — *Antitype chi*
Satellite — *Eupsilia transversa*
Brick — *Agrochola circellaris*
Brown Spot Pinon — *A. litura*
Pink Barred Sallow — *Xanthia togata*
Dusky Lemon Sallow — *X. gilvago*
Centre Barred Sallow — *Atethmia centrago*
Lunar Underwing — *Omphaloscelis lunosa*
The Miller — *Achronicta leporina*
Grey Dagger — *A. psi*
Knot Grass — *A. rumicis*

The Mouse	— *Amphipyra tragopoginis*
Old Lady	— *Mormo maura*
Brown Rustic	— *Rusina ferruginea*
Angle Shades	— *Plogophora meticulosa*
The Saxon	— *Hyppa rectilinea*
Dun Bar	— *Cosmia trapezina*
Dark Arches	— *Apamea monoglypha*
Light Arches	— *A. lithoxylaea*
Clouded-bordered Brindle	— *A. crenata*
Confused	— *A. furva britannica*
Dusky Brocade	— *A. remissa*
Rustic Shoulder Knot	— *A. sordens*
Common Rustic	— *Mesapamaea secalis*
Marbled Minor	— *Oligia strigilis*
Dusky Sallow	— *Eremobia ochroleuca*
Flounced Rustic	— *Luperina testacea*
Small Mottled Willow	— *Spodoptera exigua*
Vine's Rustic	— *Hoplodrina ambigua*
Rosy Rustic	— *Hydraecia micacea*
Frosted Orange	— *Gortyna flavago*
Large Wainscot	— *Rhizedra lutosa*
Green Silver Lines	— *Pseudoips fagena britannica*
Nut Tree Tussock	— *Colocasia coryli*
Burnished Brass	— *Diachrysia chrysitis*
Gold Spot	— *Plusia festucae*
Gold Spangle	— *Autographa bractea*
Plain Golden Y	— *A. jota*
Beautiful Golden Y	— *A. pulchrina*
Silvery Y	— *A. gama*
The Spectacle	— *Abrostola triplasia*
The Herald	— *Scoliopteryx libatrix*
The Snout	— *Hypena proboscidalis*

APPENDIX IV

Tweedbank Birds:

Due to the variety of habitats a similar variety of birds has been recorded in Tweedbank. Some are resident, breeding in the area. Others winter, and yet a third group are merely present on passage, spending only a few moments in the area.

During the winter of 1980/81, a group of four Whooper Swans stayed on the Gunknowe Loch for almost two months. In March 1981 a large flock of geese became 'lost' in fog and low cloud in the valley. At about eleven at night, at tree-top height and

mysteriously illuminated by reflected street lights, a lone Snow Goose appeared amongst the Greylag and Pinkfeet, its features clearly visible. Wintering Mute Swans on the loch are part of a special study and have included a bird ringed at Montrose Basin, while other records include a family party ringed at one of the Lammermuir Reservoirs. The corpse of a dead Common Tern was found one October in the loch. Within gardens and shrubbery on the estate elusive Waxwings have spent part of the winter, especially in 1981-82. Nine species of wader alone make this a remarkable place, by Border standards.

The total list for the development area is well over one hundred species. Only those of note are given here.

Little Grebe
Great Crested Grebe
Cormorant
Grey Heron
Teal
Wigeon
Goldeneye
Goosander
Shelduck
Greylag Goose
Pinkfooted Goose
Canada Goose
Snow Goose
Whooper Swan
Buzzard
Sparrowhawk
Merlin
Golden Pheasant
Ringed Plover
Snipe
Curlew
Woodcock
Common Sandpiper
Redshank
Greenshank
Common Gull
Common Tern
Cuckoo
Barn Owl
Kingfisher
Green Woodpecker
Great Spotted Woodpecker
Sand Martin
Jay
Marsh Tit
Long-tailed Tit
Tree Creeper
Dipper
Fieldfare
Redwing
Stonechat
Whinchat
Grasshopper Warbler
Sedge Warbler
Garden Warbler
Wood Warbler
Goldcrest
Spotted Flycatcher
Pied Flycatcher
Goldfinch
Siskin
Linnet
Redpoll
Bullfinch
Crossbill
Brambling
Reed Bunting
Tree Sparrow

APPENDIX 5

Tweedbank Amphibians, Reptiles and Mammals:

Like birds, the 'animal' list as it stands at present for Tweedbank is very full for such an area of the Central Borders. As has been already stated, Badgers survived the upheaval of the development and have a sett in a quiet corner. Another legally scheduled species, the Red Squirrel, may still be seen, although the area has been invaded in recent years by the alien Grey, which may be better able to exploit the mixed woodland. In spring 1981, the freshly cast skin of an Adder was found on the disused railway, and at least three species of Bats — also protected now — have been seen, while others could easily be present.

The following is an initial list of those actually recorded.

Amphibians/Reptiles:

Palmate Newt
Frog
Toad
Viviparous (Common) Lizard
Adder

Mammals:

Common Shrew
Hedgehog
Bank Vole
Short-tailed Field Vole
Wood Mouse

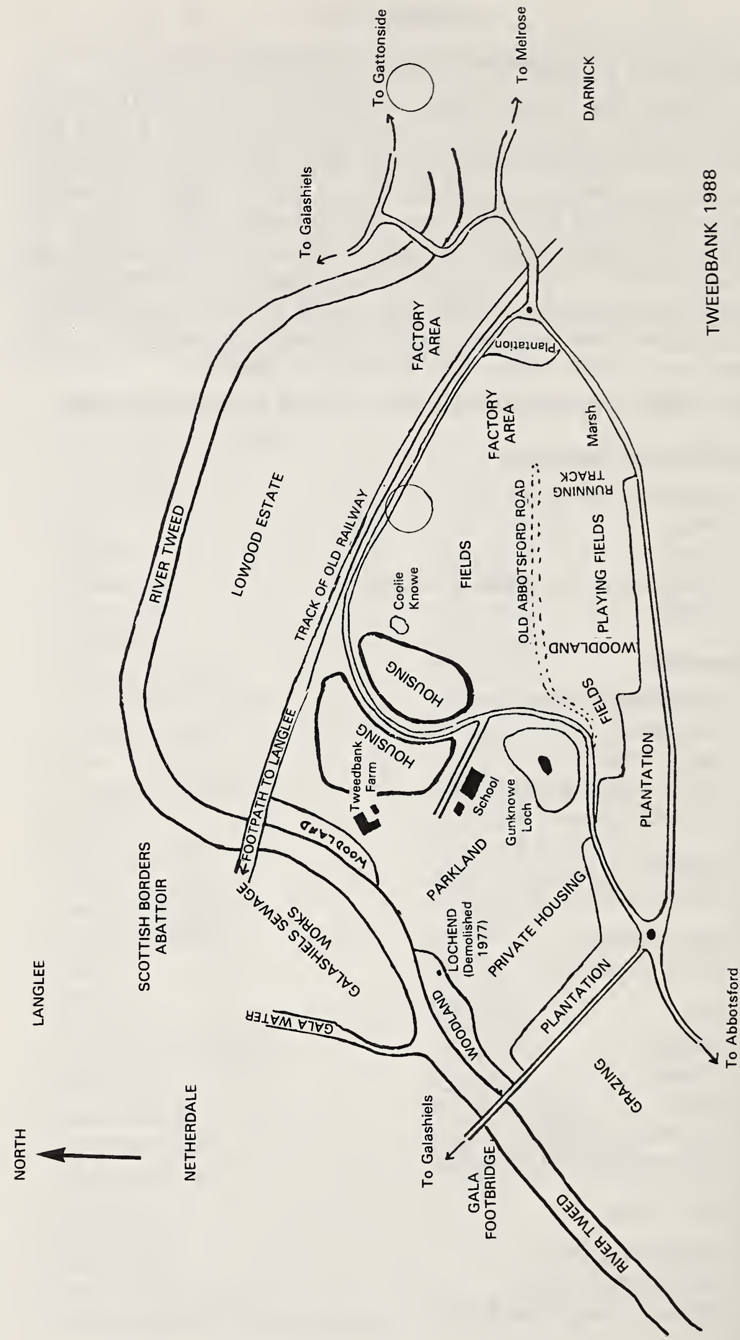
*Rabbit
Brown Hare

Red Squirrel
*Grey Squirrel

Fox
Badger
Weasel
Stoat
*American Mink
Polecat/Ferret (escaped)

Roe Deer

Pipistrelle Bat
Daubenton's Bat
Brown Long-Eared Bat


TWEEDBANK 1988
NORTH
To Gattonside
To Melrose
DARNICK
To Galashiels
FACTORY AREA
Plantation
FACTORY AREA
Marsh
RUNNING TRACK
RIVER TWEED
LOWOOD ESTATE
TRACK OF OLD RAILWAY
FIELDS
OLD ABBOTSFORD ROAD
PLAYING FIELDS
Coolie Knowe
HOUSING
WOODLAND
FIELDS
FOOTPATH TO LANGLEE
HOUSING
Tweedbank Farm
School
Gunknowe Loch
PLANTATION
WOODLAND
PARKLAND
PRIVATE HOUSING
SCOTTISH BORDERS ABATTOIR
GALASHIELS SEWAGE WORKS
LOCHEND (Demolished 1977)
LANGLEE
GALA WATER
WOODLAND
PLANTATION
To Abbotsford
GRAZING
NETHERDALE
To Galashiels
GALA FOOTBRIDGE
RIVER TWEED

A NOTE ON DR F. G. HARDY'S PAPERS

C. O. Badenoch

The two papers in this journal on the inshore, sublittoral and littoral interest of the Berwickshire Coast represent an important contribution to what has become an internationally recognised resource of wild plants and animals. It is too early to say which of the British inter-tidal and marine habitats will be subject to particular highlighting by the European Community Habitat Directive, but in East Coast terms, the Berwickshire coast has escaped the chemical, thermal and particulate pollution of the Forth, and that of the southern North Sea basin, starting at the Northumberland-Durham coalfield. The species range here is immense with south-western Lusitanian elements mixing with those from Arctic waters and those typical of the North Sea itself. A wide range of exposed and protected underwater habitats are represented and while not as clean as those of the north west coast, nor perhaps as spectaclar as equatorial waters, there is nevertheless here a largely untapped resource which is the basis of our inshore fishing community.

The present papers do not pretend to cover fully the wide range of terrestrial, intertidal and inshore survey work which has been done in the last twenty years along the entire coastline, carried out and sponsored in the main by the Botanical Society of the British Isles, The Marine (Underwater) Conservation Society, The Scottish Ornithologists' Club, our own Club and staff and contractors of the former Nature Conservancy Council, of whom Dr Hardy is one.

Terrestrial botany has been recorded over a large part of the area to quarter 1-kilometre squares, and intertidal and sub-littoral species have been collected and catalogued, enabling the gaps in recording to be identified and to aim survey work more precisely. In June and July of 1992 the ''North East Team'' of the Joint Nature Conservancy Council Committee Marine Conservation Review will try to complete these gaps for the littoral and sub-littoral zones between North Berwick and Flamborough. Their final report — amalgamating all their own data with (reliable) previous data, including Dr Hardy and Mr Wheeler's, on to computer mapping and storage, with parallel analyses to incorporate all the Berwickshire data into a definable ''communities'' list for North West Europe — should be available within two years.

Dr Hardy's listings have been compared with such data as is available regionally — prior to the main literature review — and the outstanding records are noted below:

Porifera:

Leucosolenia complicata (Montague, 1810)	New
Suberites domuncula (Olivi, 1792)	New

Cnidaria:

Haliclystus auricula (Rathke, 1806)	New
Cuanea capillata (Linn., 1756)	Very few records, see Smith & Gault in Hardy & Wheeler, P. 110 above.

Ctenophora:

Pleurobrachia pileus (Muller, 1776) *Bolinopsis infundibulum* (Muller, 1776) *Beroe cucumis* (Fabricius, 1780)	All new species

Annelids:

Eulalia viridus (Linn., 1767)	Very few records
Amphitritides gracilis (Grube, 1860)	Ditto.
Spirorbis spirorbis (Linn., 1758)	Not recorded south of Burnmouth before.

Crustacea:

Praunus flexuosus (Muller, 1776)	Probably overlooked; very few records.

Molluscs (Nudibranchs.):

Jorunna tomentosa (Cuvier, 1804)	Very few records.

Bryozoa:

Flustra foliacia (Linn., 1758)	Very few records.

Tunicata:

Botryllus schlosseri (Pallas, 1766)	Very few records.

The table below gives a summary of post-1960 records currently available to the Borders Office of Scottish Natural Heritage. These include those of Hardy and Wheeler. The work of the Joint Nature Conservation Committee Marine Conservation Review staff, will undoubtedly expand this list, clarify the synonymy of earlier records and group the species into communities as the basis of a North West European classification, thus enabling the true significance of the Berwickshire Coast to be realised.

BERWICKSHIRE COAST: INCLUDING MARINE CONSULTATION AREA AND VOLUNTARY MARINE RESERVE
(Lothian-Northumberland Border)

SUMMARY OF SPECIES RECORDED (SINCE 1960) TO JUNE 1992

LICHENS		9	No full survey available.
ALGAE			
ZM	Rhodophycota 'reds'	84	(+ unspecified encrusting calcareous and non-calcareous reds)
ZR	Chromophycota (Phaeophyta) 'browns'	36	(+ unspecified encrusting 'dark browns')
ZS	Chlorophycota 'greens'	29	(+ unspecified)
	Chrysophyta	+	(unspecified 'diatom' fuzz)
C	Porifera	20	(+ unspecified)
D	Cnidaria	35	
E	Ctenophora	3	
F	Platyhelminthes	0	
G	Nemertea	5	
J	Priapula	0	
K	Entoprocta	0	
M	Pognophora	0	
N	Sipuncula	1	
O	Echiura	0	
P	Polychaeta	49	
	Annelida Oligochaeta	0	
	Annelida Hirudinea	0	
Q	Cheilicerata	4	
R	Crustacea (lower):—		
	Brachiopoda	0	
	Maxillopoda	4	
	Ostracoda	25	
S	Crustacea (higher):—		
	Malacostraca	0	
	Fumalacostraca	54	
W	Mollusca		
	Caudeofauvata	0	
	Solenogastres	0	
	Polyplacophora	7	
	Gastropoda	108	

	Mollusca — continued		
	Scaphopoda	1	
	Pelecypoda	62	
	Cephalopoda	5	
X	Brachiopoda	0	
Y	Bryozoa	29	
ZA	Phoronida	0	
ZB	Echinodermata:		
	Crinoidea	2	? record cards but no records!
	Asteroidea	6	
	Ophiuroidea	6	
	Echinoidea	4	
	Holothuroidea	1	
ZC	Hemichordata	0	
ZD	Tunicata	15+	
ZE	Pisces Agnatha	2	
ZF	Pisces Chondrichthys	2	
ZG	Pisces Osteichthyes	43	
ZJ	Aves		
	Extinct	2	
	Breed	38	Not fully recorded
	Sea watch/feed/passage	109	
ZK	Mammalia	5+	Not fully recorded

HAREHEUGH CRAIGS

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(Hareheugh Craigs, Hume, was visited by the Club during the afternoon of June 6th 1991. The Secretary asked for a brief note on the geological and wildlife interest of the site.)

Hareheugh Craigs is considered the best example in South East Scotland, of what may be called a 'composite intrusion', that is a volcanic, igneous body of rock formed of more than one sort of magma. Such intrusions offer the geologist clear evidence for the co-existence of two magmas of differing composition, and further give insight into the process which took place — far below ground level! — in the magma chambers. It also helps to elucidate the sequences and availability of lavas at different times and the mechanisms by which intrusion took place, and how the intruded rock cooled. Interestingly, the affinities of Hareheugh are with the North Northumberland Basin rather than the Midland Valley of Scotland. Obviously the crags are therefore of some note in geological education and research, as geologists try to unravel the relative structures of the past and their formation.

Hareheugh Craigs is often described as a 'volcanic plug' — a mass of magma which has solidified in the channel which fed it to the surface volcanic vent. Later erosion has removed all remains of any sedimentary, softer rocks above and around the plug, and also the main volcano of which this vent was a part — about 300 million years ago!

In the past it was assumed that this plug was a conduit which fed the adjacent olivene-basaltic lava field round about. This slab of lavas, 'the Kelso Traps', lies in a great horseshoe shape, from Whiteadder Water in the north, westwards through Smailholm and Makerstoun, and round to the south of the Tweed at Redden and Nottylees. These lavas were erupted at the close of the Upper Old Red Sandstone era, and appear to lie at the bottom of the Cementstone series of the Lower Carboniferous age. In fact research has shown that plugs like that at Hareheugh have been intruded into these lavas and over them in places. The relationship is apparent to geologists and adds to the interest of the site.

The rocks vary in composition, but are typically a dark grey-black with a variety of porphyry grain sizes and hardness. One of the coarser types has been suggested by Professor Tomkieff to be possibly an olivene dolerite, rather than basalt (Tomkieff, 1945). Later he described the general type as Markle basic intrusion (Tomkieff, 1954). The hardness of the intrusion lends itself to quarry material, unlike much of the soft sedimentary rocks elsewhere in the Region, and Hareheugh was used in the 1930s by Kelso Town Council, and later is reputed to have been used by the Royal Engineers for the construction of the war aerodromes at Charterhall and Winfield.

The plants growing at Hareheugh, and the animals dependant on them, reflect to a large extent the physical features of variable low-acidity, hard rocks (relatively high pH) with thinly developed soils for the most part. The eastern flowing ice-sheets of the last glaciation led to rather typical crag-and-tail formation on a lot of these intrusions. The steep western, ice-plucked crag and its longer tapering tail is perhaps most clearly seen at Sweethope hill, immediately to the south. Scraped by the ice, and with downwash of finer material, the soils of the rocky heights are thin, with deeper bands in hollows, and between the ridges. Typically, although neutral or mildly basic in reaction, they are otherwise quite nutrient-poor. Being thin and rocky, their moisture retention is small and they often dry out at the height of the growing season in May-July. These are the factors which primarily keep them open for thriving colonies of small lichens, mosses and herbs, and which stop the grasses growing too lush and swamping the tiny plants.

Because of their drought and steepness, such intrusive lumps in our arable countryside have to a large extent escaped the plough, and more recently the effects of fertiliser and herbicide which would spoil the botanical variety. More recently, the advent of the fertiliser barrow and herbicide tank on the hydraulic linkage has enabled tractors to get into places where trailed implements could not go. Pressure on agricultural output has meant increasing stocking rates, and winter feeding often on these hard knolls, and so the wild grasslands have retreated right across Britain. There is an insidious effect too of grazing stock bringing nutrients from agriculturally improved land, and reducing the botanical diversity as a result of increased fertility from dung and urine. The removal of the boundary at the north edge of the site shows this quite clearly, but largely the area has been well managed by fairly low levels of sympathetic grazing at the right levels.

The botany at Hareheugh has been a source of delight for many groups over the years and, despite its thin soils, over 100 species

of flowering plant have been recorded, with about 116 lichens, at least 63 mosses and 16 liverworts. National rarities include the lichen *Ramalina polymorpha*, which is on the Red Data Book list, although it has two other known Border sites. Also nationally rare are the moss *Grimmia affinis* and the tiny, but spectacular, Maiden Pink, *Dianthus deltoides*, which is known from about 24 Border localities making this Region a British stronghold for the species, since it is known to occur in only fifty-eight of the ten-kilometre squares of the National Grid, and is therefore classified as nationally 'Scarce'.

With all the plants, many occur in recognisable groups or communities, and each group has its own preferred niche. To the north, on the steeper more acid and shaded slopes where there are sections of columnar basalt — almost like the Giant's Causeway or Sampson's Ribs! — are the vestiges of old woodland, but only a few Honeysuckle, Rowan and Hazel remain of the trees. But the 'woodland' ground flora remains. Here is Goldilocks, *Ranunculus auricomus*, Moschatel, *Adoxa maschatellina* and patches of Lady Fern, *Athyrium felix-foemina*, and Male Fern, *Dryopteris felix-mas*, Bugle, *Ajuga reptans*, Wood Cranesbill, *Geranium sylvaticum* and no less than twelve species of 'woodland' mosses and lichens. On deeper soils to the north-east is a patch of Whin, *Ulex europaeus*, close by the Badger sett, while in a tiny flush and rill there is Ivy-leaved Crowfoot, *Ranunculus hederaceus*, and the locally rare Water Whorl Grass, *Catabrosa aquatica*. Beside the mediaeval farm and its enclosures there is Squirrel-tail Fescue, *Vulpia bromoides*, Little Mouse-ear Chickweed, *Cerastium semidecandrum*, and Dark Green Mouse-ear Chickweed, *C. diffusum*.

But by far the most productive, herb-rich hunting-grounds for the botanist are the dry, south-facing rocky slopes and the grasslands surrounding them. On the thinner grass areas grow the Meadow saxifrage, *Saxifraga granulata*, Doves-foot Cranesbill, *Geranium molle* and Yellow Mountain Pansy, *Viola lutea*. On the rocks are colonies of the Maiden Pink, with Small Cudweed, *Filago minima*, Prickly Sedge, *Carex muricata (subspecies* lamprocarpa), Lop grass, *Bromus hordaceus*, Thyme-leaved Sandwort, *Arenaria serpyllifolia*, and occasional plants of the tiny Moonwort, *Botrychium lunaria*, and Lesser Chickweed, *Stellaria pallida*. Here too the Early Forget-me-not, *Myosotis ramosissima*, Parsley Piert, *Aphanes arvensis*, and some of the small winter-flowering annuals on open patches, often with Sheep's Fescue, Red Fescue, and the tiny Hair grasses. High on the crags, and out of reach of the most heavy grazing, are small patches of grassy heath with Bell Heather, *Erica cinerea*, Heather, *Calluna vulgaris*, Wild thyme,

Thymus druceii, and in among the fescues and Meadow Oat Grass, *Avenula pratensis*, swaths of Rockrose, *Helianthemum nummularium* and its dependant butterfly — now partly protected by law — The Northern Brown Argus, *Aricia artaxerxes*. A lonely, stunted Scots Pine has found its way here, too, and some scrubby Burnett Rose, *Rosa pimpinellifolia*.

Curiously, when one compares these flowery communities with similar groups elsewhere in the country, the characteristic species — Carline Thistle, *Carlina vulgaris*, is absent! It is also apparent that some of the bryophyte species in particular represent Berwickshire species which are locally rare and upland species 'isolated' in a lowland sea. Whether this is because the species were once common in the lowlands, and are now rare because of encroaching farmed land, or because they prefer open, dry and exposed rocky habitats is not clear.

The site also supports at least ten other species of butterfly in recent years, but moths have not been adequately recorded. The silky black Chimney Sweeper, *Odezia atrata*, occurs, along with other Geometrids, some of the Tortrix moths, and those of the Pyralid group. At least two kinds of grasshopper are present, and these require closer attention.

One might expect Slow-worm here, but there are no records, and the only record for the Common Lizard is unconfirmed, from a fleeting glimpse.

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CIST GRAVE, WEST LONGRIDGE, 1945

In 1945 when West Longridge was in the ownership of Mr James Hume, Snr, ploughing revealed that what had been thought to be a rocky outcrop was a slab of rock about one metre square. Some Italian prisoners of war who were working on the farm decided to 'look for gold' and shattered the slab with a sledge hammer to expose a foursquare, stone-sided cist with human skeletal remains which had been buried in the crouched lateral position. Nothing else was found and after further years of ploughing, there are no remaining signs.

The location was about 250 metres due south of West Longridge farmhouse (NT 954493) overlooking Murton Dene. This is about 1,000 metres due west of the site of a Bronze Age cist grave found in 1966[1&2] and about 900 metres south-south-west of the Chapel of Longridge Towers where a short cist was found by workmen in 1968.[1]

Dr George Johnston, the Club's founder, recorded the finding of two funerary urns on Murton farm but did not note the exact site.[3] Evidence of a further probable Bronze Age burial was found in 1983 during excavation of two enclosures on Murton High Crags.[4] No local evidence of Bronze Age dwellings has been found nearby.

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BOTANICAL RECORDS

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Bryophytes

All records for Berwickshire vc 81 by D. G. Long during 1991. Nomenclature follows Corley & Hill, *Distribution of Bryophytes in the British Isles* (1981). All records are supported by a voucher specimen in the Edinburgh herbarium.

Mosses

Acaulon muticum. On ant-hill on turfy sea bank, Hilton Bay, NT9659, 3 February; on silty soil on upturned tree roots by Tweed near Lochton, NT7738, 3 March. First Berwickshire records since *c* 1930 of a nationally declining species.

Campylium elodes. Boggy ground, Lamberton Moor, NT9558, 27 February. Confirmation of only Berwickshire locality of this local fen species, last seen in 1950.

Grimmia montana. On low basaltic rock outcrop, Hareheugh Craigs, NT6839, 6 June, det. T. L. Blockeel. New to vc 81; a rare and declining species nationally.

Plagiothecium laetum. Base of *Salix*, Long Belt, Lamberton Moor, NT9557, 19 August. Second Berwickshire record.

Pseudobryum cinclidioides. Wet boggy ground, foot of Rotten Cleugh, NT5660, 19 May. On both sides of county boundary; new to East Lothian and second Berwickshire record.

Scleropodium tourettii. In turf on cliff-top, Siccar Point, NT8170, 17 February. New to vc 81; fourth Scottish record of this Mediterranean species.

Tortula virescens. On open dry rock face, Little Thairn, Eden Water, NT6637, 6 June. Second Berwickshire record for this local species.

Weissia longifolia var. *longifolia*. In old pasture, top of Witches Cleugh, Edrington NT9454, 20 January. New to vc 81; third record for Scotland.

Zygodon rupestris (Z. baumgartneri). Basic rock face under trees, Little Thairn, Eden Water, NT6637, 6 June. New to vc 81.

Liverworts

Barbilophozia barbata. In turf overlying basaltic rocks, Hareheugh Craigs, NT6839, 20 June. Second Berwickshire record.

Calypogeia neesiana. Peaty gully, head of Long Grain, NT5560, 5 May; peaty bank under *Calluna*, foot of Rotten Cleugh, NT5660, 19 May. First found in vc 81 in 1989; now known from four Lammermuir sites.

C. trichomanis. Peaty bank under *Calluna*, foot of Rotten Cleugh, NT5660, 19 May. New to Berwickshire.

Kurzia pauciflora. Raised bog, Drone Moss, NT8466, 24 March. Second recent record for Berwickshire of a local raised bog species.

K. trichoclados. Peaty bank under *Calluna*, foot of Rotten Cleugh, NT5660, 19 May. New to Berwickshire.

Leiocolea bantriensis. Rich flush, valley below Lamberton Moor, NT9557, 19 August. Second Berwickshire locality.

Mylia taylorii. Peaty bank under *Calluna*, foot of Rotten Cleugh, NT5660, 19 May. New to Berwickshire; an oceanic species rare in eastern counties.

Ptilidium pulcherrimum. On log, Feuars Bog, Gordon Moss SWT Reserve, NT6342, 9 May. Fourth recent Berwickshire record.

Tritomaria exsectiformis. On large sandstone boulder, N end of Lamberton Beach, NT9658, 3 February. Confirmation of one of two Berwickshire records; last seen in 1931.

Vascular Plants

All are field records made during 1991 except where otherwise indicated; * refers to an introduction.

Anagallis tenella, BOG PIMPERNEL. Flush in heather moor, Wheel Burn, NT5651, 1 September, M. E. Braithwaite. Superb colony at 300m of a most attractive plant common on the west coast in wet places near the sea but rare in the east. Formerly known, in the last century, at Springhill in Berwickshire and Rubers Law in Roxburghshire; still present on the coast in the Holy Island area and around Aberlady. First record for the Southern Uplands.

Botrychium lunaria, MOONWORT. Basaltic outcrop, Hareheugh Craigs, NT6840, 20 June, D. G. Long. Second extant record for vc 81 for a fern now very scarce in the Borders.

**Cardamine corymbosa* Hook.f. (*C. uniflora* (Hook.f.)Allan), NEW ZEALAND BITTERCRESS. Garden weed especially flowerpots, Silverwells NT8066, Reston NT8862, April, A. R. Jermyn, det. D. R. McKean & T. G. Rich. Known at Silverwells since *c.* 1988. Similar to *C. hirsuta* but distinguished from that species by its failure to give in decently and pull out of the ground when weeded and by the larger flowers that are usually single. Apparently introduced accidentally from New Zealand to the Royal Botanic Garden, Edinburgh, 1975 or earlier, and thence to Silverwells.

Cochlearia scotica, SCOTTISH SCURVYGRASS. St Abbs Head NT9169, 24 April 1884, A. Craig-Christie, det. P. S. Wyse-Jackson. This old herbarium specimen in Edinburgh has been re-determined to provide the first definite record for the Borders, though A. G. Long had a probable record from Siccar Point in 1948. The precise status of this taxon is still debated.

Eriophorum latifolium, BROAD-LEAVED COTTONGRASS. Calcareous flush, Lamberton Moor, NT9558, 10 August, M. E. & P. F. Braithwaite. Second extant locality for vc 81.

Montia fontana subsp. *chondrosperma*, BLINKS. Basaltic outcrop, Hareheugh Craigs, NT6839, 24 April, R. W. M. Corner. Second record for vc 81 of the scarce subspecies, favouring rocks or sand, of a species more commonly found in springs.

**Rubus procerus* P. J. Mueller, HIMALAYAN GIANT BRAMBLE. Rough banking, Coldingham NT9066, Autumn, D. P. Earl. Escape from cultivation of a favoured garden bramble; first record for vc 81.

Schoenus nigricans, BLACK BOG-RUSH. Calcareous flush, Lamberton Moor, NT9558, 10 August, M. E. & P. F. Braithwaite. A superb colony of a west-coast plant thought to have been reduced in the Borders to a few tufts on the coast, following the recent loss of other parts of Lamberton Moor to the plough.

Stellaria pallida, LESSER CHICKWEED. Basaltic outcrop, Hareheugh Craigs, NT6840, 24 April, R. W. M. Corner. Second record for vc 81 of an inconspicuous annual now known to be scattered over a number of rocky hilltops across the Borders.

**Valerianella carinata*, KEELED-FRUITED CORNSALAD. Rock outcrop, Muckle Thairn, Girrick, NT6637, 6 June, M. E. Braithwaite, det. D. R. McKean. First record for vc 81 of a species generally considered an introduction in Scotland but here amongst native species in a natural habitat.

Viola lutea x *V. tricolor*, hybrid MOUNTAIN PANSY and WILD PANSY. Basaltic outcrop, Hareheugh Craigs, NT6840, 6 June, M. E. Braithwaite, det. D. R. McKean & H. J. Noltie. R. W. M. Corner first drew attention to this interesting population earlier in the season but formed a different opinion as to its parentage, which remains debateable.

Macro-Lepidoptera in Tweedmouth in 1991

A. G. Long

Being 'confined to barracks' by a stroke and cared for by kind people at Tweedmouth House, near the south end of the old

road bridge over the River Tweed, I have tried, as occupational therapy, to enlist the help of nurses and auxiliaries to note the species of moths over the year, mostly coming through lighted windows at night. The records are arranged in chronological order.

Biston marginaria Fabr. DOTTED BORDER. March.
Apamea monoglypha Hufn. DARK ARCHES. July.
Peribatodes rhomboidaria D. & S. WILLOW BEAUTY. July.
Mamestra brassicae Linn. CABBAGE MOTH. July-August.
Cryphia domestica Hufn. MARBLED BEAUTY. July.
Lacanobia oleracea Linn. BRIGHT-LINE BROWN-EYE. July.
Apamea lithoxylaea D. & S. LIGHT ARCHES. July.
Hepialus lupulinus Linn. COMMON SWIFT. July-August.
Cerapteryx graminis Linn. ANTLER MOTH. August.
Crocallis elinguaria Linn. SCALLOPED OAK. August.
Idaea aversata Linn. RIBAND WAVE. August.
Idaea seriata Schr. SMALL DUSTY WAVE. August.
Noctua pronuba Linn. LARGE YELLOW UNDERWING. August.
Apamea remissa Hb. DUSKY BROCADE. August.
Mesapamea secalis Linn. COMMON RUSTIC. August.
Mythimna pallens Linn. COMMON WAINSCOT. August.
Phlogophora meticulosa Linn. ANGLE SHADES. August.
Mormo maura Linn. OLD LADY. August.
Ourapteryx sambucaria Linn. SWALLOWTAIL MOTH. August.
Apamea unanimis Hb. SMALL CLOUDED BRINDLE. August.
Eulithis prunata Linn. SMALL PHOENIX. 14 August.
Xestia xanthographa D. & S. SQUARE SPOT RUSTIC. 19 August.
Hydraecia micacea Esp. ROSY RUSTIC. 24 August.
Amphipyra tragopoginis Cl. MOUSE. From Eyemouth, 26 August.
Noctua orbona Hufn. LUNAR YELLOW UNDERWING. 28 August.
Eulithis testata Linn. CHEVRON. 29 August.
Luperina testacea D. & S. FLOUNCED RUSTIC. 30 August.
Xanthorhoe fluctuata Linn. GARDEN CARPET. 31 August.
Antitype chi Linn. GREY CHI. 6 September.
Diarsia mendica Fabr. INGRAILED CLAY. 14 September.
Autographa gamma Linn. SILVER Y. New Road, 15 September, H. F. Church.
Agrochola litura Linn. BROWN-SPOT PINION. 17 September.
Celaena leucostigma Hb. CRESCENT. 17 September.
Omphalosecelis lunosa Haw. LUNAR UNDERWING. 17 & 18 September.
Aglais urticae Linn. TORTOISESHELL. 21 September.
Vanessa cardui Linn. PAINTED LADY. Behind pier, 20 September, H. F. Church.

Vanessa atalanta Linn. RED ADMIRAL. Spittal, 9 October, H. F. Church.

The St Abbs Head National Nature Reserve

Bird Log — 1991

K. J. Rideout

The full report lists 142 species observed over the year on or from the Reserve. A selection of the more interesting records is presented here.

Gavia stellata RED-THROATED DIVER. Total of 66, Sept.-Nov.
Gavia arctica BLACK-THROATED DIVER. Total of 8, Sept.-Nov.
Gavia immer GREAT NORTHERN DIVER. Total of 9, Sept.-Dec.
Fulmarus glacialis FULMAR. 362 nests (292 in 1990).
Puffinus griseus SOOTY SHEARWATER. Total of 22, Oct.-Nov.
Puffinus puffinus MANX SHEARWATER. Low totals of 52 and 75 in Aug. & Sept.
Phalacrocorax aristotelis SHAG. 463 nests (338 in 1990).
Branta leucopsis BARNACLE GOOSE. 3 flocks of 16, 7 and 38 in early October.
Anas strepera GADWALL. One on 31 Aug.
Somateria spectabilis KING EIDER. Young male for 3 weeks in June.
Clangula hyemalis LONG-TAILED DUCK. 1-2 at sea on a few dates Sept.-Oct.
Melanitta fusca VELVET SCOTER. One, July; total of 13, Oct.-Dec.
Pandion haliaetus OSPREY. Single birds on 8 June and 29 Aug.
Falco columbarius MERLIN. One, October.
Rallus aquaticus WATER RAIL. 1-2 in Jan., up to 4 Oct.-Nov.
Pluvialis squatarola GREY PLOVER. 6 flying over in Sept.
Lymnocryptes minimus JACK SNIPE. Single birds in Jan. and Oct.
Limosa lapponica BAR-TAILED GODWIT. 3 in Sept.
Numenius phaeopus WHIMBREL. 1 in May; 54 between July and Sept.
Tringa nebularia GREENSHANK. One at Mire Loch, 5-9 Aug.
Stercorarius pomarinus POMARINE SKUA. Only 6 birds, 7 Sept.-9 Oct.
Stercorarius parasiticus ARCTIC SKUA. Only 7 birds, July-Aug.; 192 in Sept. including 110 on 10th.
Stercorarius longicaudus LONG-TAILED SKUA. 3 on 8 Sept., 1 on 10 Sept.
Stercorarius skua GREAT SKUA. 1 in May; 20 between July-Sept.

Rissa tridactyla KITTIWAKE. 16,183 pairs bred (17,642 in 1990), but fairly poor breeding success.
Chlidonias niger BLACK TERN. Two single birds in Sept.
Uria aalge GUILLEMOT. Estimated total 32,000 breeding pairs.
Alca torda RAZORBILL. Estimated total 1,900 breeding pairs.
Cepphus grylle BLACK GUILLEMOT. Single birds in Aug. and Sept.
Alle alle LITTLE AUK. 14 in Jan.; 1 in Oct.
Fratercula arctica PUFFIN. Highest count 58 April-July.
Anthus petrosus ROCK PIPIT. 11 pairs bred.
Phoenicurus ochruros BLACK REDSTART. One on 31 May; 2 on 10 Oct.
Saxicola torquata maura/stejnegeri SIBERIAN STONECHAT. One 26-30 Oct.
Turdus iliacus REDWING. Massive 'fall' in thick fog on 10 Oct. with possibly up to 10,000 birds.
Acrocephalus scirpaceus REED WARBLER. One, 29 Sept.
Sylvia curruca LESSER WHITETHROAT. Occasional birds from 24 May to 12 Oct.
Phylloscopus inornatus YELLOW-BROWED WARBLER. 1-2 on 7 days between 10 and 30 Oct.
Ficedula parva RED-BREASTED FLYCATCHER. One, 29 Sept.
Pica pica MAGPIE. Single bird in April.
Corvus corax RAVEN. 1-2 seen Jan., June, Sept., Oct.
Fringilla montifringilla BRAMBLING. 100 on 10 Oct.
Carduelis flavirostris TWITE. 3 on 4 Oct.
Loxia curvirostra CROSSBILL. 3 on 16 June.
Plectrophenax nivalis SNOW BUNTING. Total of 11 between 14 Sept. and 5 Nov.

Following the retirement of Mr and Mrs Mackenzie Robertson as Field Secretaries, a small sub-committee was set up to arrange field meetings. In 1991 this consisted of the President, Mr J. L. McDougal, Mr and Mrs B. Cato, Mr G. B. Millican and Mr G. C. McCreath, with Dr G. A. C. Binnie as co-ordinator.

16th May. Thursday. JAMES HOGG, THE ETTRICK SHEPHERD: THE VALLEYS OF ETTRICK AND YARROW.

About 110 members and friends visited the valleys of Ettrick and Yarrow treading loosely in the steps of James Hogg under the guidance of Mr Walter Elliot of Ettrick and Lauderdale Museum Service who spoke at each stopping place. With the permission of the minister of both valleys, the Rev. Bruce Lawrie, who unfortunately was on General Assembly duty, the Club met at Kirkhope Church and were able to admire Kirkhope Linn where it is crossed by Ettrick Bridge. The Club moved up the valley to Ettrick Church on the way passing the monument on the site of James Hogg's birthplace and the Boston Memorial Hall — unfortunately Thomas Boston's descendant, Club member Miss Boston, was not with us on this occasion. Thomas Boston's church was in the hands of the builders, but his grave and those of James Hogg and Tibbie Shiel were pointed out.

Our path was retraced to Tushielaw Inn. We took the beautiful drive over the moorland ridge to the Yarrow Valley past Achrevie which Hogg farmed unsuccessfully. A picnic lunch was enjoyed near Tibbie Shiels Inn and by St Mary's Loch. The statue of James Hogg was inspected and some anecdotes of his career passed on by Mr Elliot, including the statement that it was impossible for anyone called Hogg to claim descent from James Hogg, supported it may be added by what seemed incontrovertible facts. The last visit of the day was to Yarrow Kirk where Hogg had been an elder for many years.

The day ended with tea at Woodburn House Hotel, Selkirk.

G.A.C.B.

19 June. Wednesday. HOWICK HALL and PRESTON TOWER.

In the morning at Howick Hall the Head Gardener, Mr Robert Jamieson, conducted members round the Silver Woodland Garden planted in 1931 to commemorate the Silver Wedding of

Earl and Countess Grey. He described how a shelter belt of conifers was added to the native Howick woodland and underplanted with rhododendrons, azaleas and many rare and tender plants. Mr Brian Cato described the architecture of the Hall and traced the four centuries of the branch of the Grey family who occupied it with special emphasis on Earl Grey of the Reform Bill. Mrs Barbara Cato described the creation of the New Pond and the planting which surrounds it and took members into the Church where she described the architecture. In the afternoon, after a welcome from Major Baker-Cresswell, Mr Brian Cato showed members round the 14th century Preston Tower playing a recorded commentary to each of the numerous small groups made necessary by the limited space in the Tower. Mrs Barbara Cato spoke about the history and linking of the Baker and Cresswell families. Mrs Baker-Cresswell showed members the Doll's House which is a replica of the 19th century house. Members were able to walk the woodland paths. Although rain clouds threatened in the morning they cleared and the meeting ended in sunshine. Tea was taken at the Eat Again on the A1 near Warenford.

B.C. & B.C.

July 18th. Thursday. SOUTRA AISLE and CHANNELKIRK.

About 100 members met at Soutra Aisle, the site of a long-term project which was visited by the Club in 1989. Dr Brian Moffat of the Soutra Aisle project spoke about the history of the site from Roman times onwards and its growth between the 12th and 17th centuries. He pointed out the features of the small area already excavated and the large potential areas for further investigation revealed on aerial photographs. More information about mediaeval medicine had already been found than from any other British site.

The Club moved on to Channelkirk Church and was addressed by the Rt. Hon. Henry Borthwick on the history of the church, which was on the site of one of the earliest Borders churches, and it was pointed out that the churchyard contained stones which were very much older than the present church. The connections of the Borthwick family with the parish were pointed out. Mr John Dent, Borders Regional Archaeologist, spoke to the Club in the churchyard and pointed out some of the interesting historical features of Lauderdale.

Tea was taken at Carfraemill Hotel.

J. L. McD.

21st August. Wednesday. DUNS LAW, POLWARTH CHURCH and MARCHMONT HOUSE.

At Duns Law the Rev. Hugh Mackay, minister of Duns Parish Church addressed about 120 members, explaining that the name Duns was probably taken from 'Doune', a hill fort. Mr Mackay described the double earthwork near the summit which points to a defensive position from about 1,000 B.C. The Covenanter's Stone on the site is where Sir Alexander Leslie raised the banner with the inscription ''For Christ's Crown and Covenant''.

At Polwarth members were welcomed to the Church by the Minister, the Rev. Alex Slorach. A translation of the Latin inscription on a sandstone slab above the south door indicates the existence of a church at Polwarth before the year 900.

The present Church was rebuilt in 1703 with the shrine in the form of a vault augmented by a bell tower but the exterior has remained virtually unaltered through the years. The connections with Holland where Sir Patrick Hume lived for some years following his escape from the vault at Polwarth Church are the Orange and the Crown in the apex of the gable at the east end of the Church, and the peculiar finial at the top of the tower. The armorial bearings of the Hume family are on the tower while in the churchyard is the original tub-shaped Norman font. On display were the funeral bell of 1775 used to frighten away the evil spirits, the collection ladles, and the famous Laudian rails, a reminder of Archbishop Laud, Archbishop of Canterbury in 1643, and claimed to be the only altar rails left north of the Tweed. The Laird's Loft in the tower has a unique ''Bole Hole'' in the wall and a wooden shutter which closed when the laird wished.

At Marchmont House members were welcomed by Brigid Lady McEwen. While it was widely believed that Marchmont was an Adam designed house, all available records point to Thomas Gibson as the architect. The house completed in 1754, faces the impressive avenue of beech trees planted by the second Earl in 1740. Mr Robert Finnie McEwen employed Sir Robert Lorimer to enlarge the house, in the second decade of this century.

Bought in 1985 by the Sue Ryder Foundation, Marchmont House has been converted to accommodate up to forty severely neurologically disabled people.

G.B.M.

September 19th. Thursday. TORNESS, SKATERAW HARBOUR, DUNGLASS COLLEGIATE CHURCH, DOON HILL and COCKBURNSPATH CHURCH

Torness was visited in 1981 while in the course of construction and now the completed power station had been opened to visitors

for the last four months with conducted tours of the plant in groups of 11 or 12. Because the visitor centre at Torness could only cope with a maximum of 60 visitors at a time, three programmes were available. Skateraw Harbour and Cockburnspath Church were common to all three, with the choice of two out of Doon Hill, Dunglass or Torness to complete each programme.

Mr Christopher Tabraham, Assistant Inspector of Ancient Monuments spoke to Club members at Dunglass Collegiate Church and pointed out interesting decorative features which have only recently been revealed. He also spoke at the Anglian site on Doon Hill and enlarged upon the various other peoples who had lived there. A brisk breeze blew and it was difficult to imagine a period in mediaeval times when corn was harvested not only at this height but well up the slope of what are now inhospitable hillsides.

Many members had picnic lunches at Skateraw Harbour and enjoyed its tranquility. Some were able to appreciate the Torness walkway which goes round the seaward side of the Power Station, and a few inspected the memorial to the Rev. Selby Wright of the Kirk of the Canongate. The restored lime kiln showed some of the geological features of the bay and Dr D. R. C. Kempe found a crinoid which was later displayed at Cockburnspath Church. Here Mr Edward Hay, Club member and Church Elder, told the history of the church as well as allowing us to view the church's treasures.

The afternoon finished with tea at Cockburnspath Hotel.

G.A.C.B.

Extra Meetings

6th June. Thursday. HAREHEUGH CRAIG, HUME.

Hareheugh has a three-fold interest. It has recently been designated a site of special scientific interest because of its geological features which in the past resulted in it having been a quarry and now put it in danger of being removed altogether by further quarrying. An Iron Age fort is situated on the summit ridge of the craig and there is a mediaeval homestead to the east within the boundary wall. Finally, it has botanical interest with plants found at few other sites in Berwickshire.

About 45 members and friends had the geological features described by Mr C. O. Badenoch of the Nature Conservancy and on the summit of the craig the archaeological features were pointed out by Mrs Logan, wife of the farmer and owner of the land but not of the mineral rights. Mr Michael Braithwaite and

Mr David G. Long introduced us to the important plants on the craig, those flowering for the Club's benefit being Mountain Pansy (*Viola lutea*), Common Rock Rose (*Helianthemum chamaecistus*) and Meadow Saxifrage (*Saxifraga granulata*) but the Marren Pink (*Dianthus deltoides*) was not so easily seen as it was not in flower.

A pleasant bonus was the opportunity to visit Hume Castle under the guidance of Sir John Swinton in his guise as Chairman of Berwickshire Civic Trust and also with Mr David Mylne, architect in charge of the restoration project.

Our thanks are due to Mr C. O. Badenoch for organising the meeting and to those who pointed out the salient features, as well as to Mr and Mrs John Logan of Humebyres who gladly made us welcome and share our concern regarding this important site which seems at such high risk of commercial development and the site's eventual destruction.

G.A.C.B.

15th October. Tuesday. SCREMERSTON

On the morning of the A.G.M. Geoffrey McCreath gave a talk to the Club on the lime kilns at Scremerston. He talked from the top of Sandbanks East Kiln. This enabled the members present to obtain a view of the whole area, which had been so busy 100 years ago. He explained that lime was vital in the building trade to manufacture mortar, and later in agriculture to neutralise the acid soil.

Into each kiln limestone ($Ca\ CO_3$) and coal were placed. This was fired to produce shell lime (Ca CO). This was transported by road, rail or water to different areas. Hundreds of people had been employed in the area, not only producing lime, but sand, gravel, coal, bricks, tiles and salt. From the sea nearby came salmon and shellfish. It had also been a highly productive farming area.

G. C. McC.

Histories were donated to the library by Mrs E. B. Millard, Mrs J. E. T. Fairfield and by Mrs F. Robson — the last named giving several early issues. Miss D. Macari gave a large collection of leaflets which have been sorted but await a more suitable storage place in the new library.

Interesting references in publications received by the library included the following:

Ferrell, Gill (1990). A Reassessment of the Pre-historic Pottery from the 1952-62 Excavations at Yeavering. Archaeol. Aeliana, 18, 29-49.

Smith, Christopher (1990). A Barbed and Tanged Arrowhead from Corby's Crags, Edlingham. Archaeol. Aeliana, 18, 229.

Hawkey, Peter (1991). The Birds of the Farne Islands. Transactions of the Natural History Society of Northumbria, 55, 155-192.

Robson, D. A. (1991). A Magnetometer Survey of the Eastern Margin of the Cheviot Granite. Transactions of the Natural History Society of Northumbria, 55, 200-204.

Davis, P. S. (1991). Records of Rare Fishes from the Northumberland Coast. Transactions of the Natural History Society of Northumbria, 55, 205-6.

Scull, C. J., and Harding, A. F. (1990). Two Early Mediaeval Cemeteries at Milfield, Northumberland. Durham Archaeological Journal, 6, 1-29.

Wood, George O. (1987). The Norman Church at Minto. Hawick Archaeological Society Transactions 1987, 9-32.

De Prato, G. R. D. The Breeding Birds of some Built-up areas in S.E. Scotland. Scottish Birds, 15, 4, 170-177.

Books purchased this year included:

Robertson, Anne S. (1990). The Antonine Wall.

Murray, Robert (1913, republished 1991). Hawick Characters.

Borders Family History Society (1991). Roxburghshire monumental Inscriptions: Hounam and Linton.

Baldwin, John R. (1985). Exploring Scotland's Heritage; Lothian and the Borders.

Received by exchange from Glasgow Natural History Society was:

Lee, John R. (1933). The Flora of the Clyde Area.

LIBRARIAN'S FINANCIAL STATEMENT FOR THE YEAR ENDED 25th OCTOBER, 1991:

INCOME	£	*EXPENDITURE*	£
Opening balance	310.73	Postage	11.88
Receipts	119.64	Books	28.24
Interest	11.34	Book Binding	47.50
			£ 87.62
		Closing balance	354.09
	£441.71		£441.71

FINANCIAL STATEMENT FOR THE YEAR ENDED SEPTEMBER 30th, 1991

INCOME	
Balance in No. 1 Account at 30/9/90	£ 588.64
No. 2 Account at 30/9/90	1,654.78
Subscriptions	
Annual & Libraries (including subs overpaid)	3,391.00
Entrance Fees and Badges	83.00
Arrears of Subscriptions	19.00
Sundries	
Refund of Tax 1990/91	384.97
Visitors' Fees	101.50
Donations	31.26
Interest on No. 2 Account	14.05
From Savings Account	100.00
	£6,368.20

EXPENDITURE	
Printing — including Postage	£2,418.10
Final repayment of Loan for Index	500.00
Library Insurance	106.06
Subscriptions paid	35.00
Overpaid Subscriptions refunded	81.00
Hire of Hall for A.G.M.	8.59
Club Badges	194.39
Expenses	
Corresponding Secretary	122.51
Treasurer	55.08
Field Secretaries	112.20
Presentation to Mr & Mrs Mackenzie Robertson	160.00
	£3,792.93
Balance in No. 1 Account at 30/9/91	2,516.44
Balance in No. 2 Account at 30/9/91	58.83
	£6,368.20

Balance in Natural History Publication Fund £1,372.19

21 October, 1991. I have examined the books of The Berwickshire Naturalists' Club and from the vouchers and information provided have found them to be correct and in order.

(Sgd) E. J. Kellie

Royal Bank of Scotland, Ayton.

ADVICE TO CONTRIBUTORS

The *History* of the Berwickshire Naturalists' Club has now run continuously for 160 years. It has recorded a huge amount of information about every aspect of life in the Borders: archaeology, genealogy, history, sociology, topography, and all branches of natural history. It is an invaluable repository for such primary information.

Many people with special knowledge of Border affairs and happenings may, perhaps, be inhibited from contributing to the *History* by being unfamiliar with how to put an article together. The following notes are designed to assist, reassure and encourage such people; but also to be a general guide to all contributors. The requirements are simple; but the more closely the notes are followed, the speedier will be publication, the easier the lot of the Editing Secretary; and the greater the likelihood that the Club will be able to attract Editing Secretaries in the future!

Manuscripts are best typed, double-spaced, and two copies sent; but even handwritten documents, if clearly legible, can be considered. References in the text to other publications are most simply done by author name(s) and date and then listed in alphabetical/chronological order at the end of the manuscript, giving the title of the document and, for papers in journals, the volume and page number, for books, the place of publication and the publisher. In this style:

Baxter, E. V., Rintoul, L. J. (1953). The birds of Scotland, Edinburgh: Oliver and Boyd.

Boyd, H., Ogilvie, M. (1969) Changes in the British wintering population of the pinkfooted goose from 1950-1975. *Wildfowl*, 20, 33-46.

Taylor, G. (1937) List of fungi observed in the neighbourhood of Cockburnspath. *History of the Berwickshire Naturalists' Club*, 29, 303-313.

Titles of periodicals should be written in full, as above, not abbreviated.

Sometimes text references to other publications, documents, etc., in the text are more conveniently done by superscript numbers, e.g.:

"the house of Netherbyres[5]"

and then related to a numbered entry in a list of references/ notes at the end of the paper, as e.g.:

"5. Scottish Record Office TD 78/7."

When other publications have been consulted but are not specifically cited, it may still be useful to guide readers following up the subject, to give a "Bibliography", citing the publications in the same way as for references above.

Illustrations should be numbered consecutively and provided with short descriptive legends.

Contributions may be sent direct to the Editing Secretary, or handed to any Council Member.

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