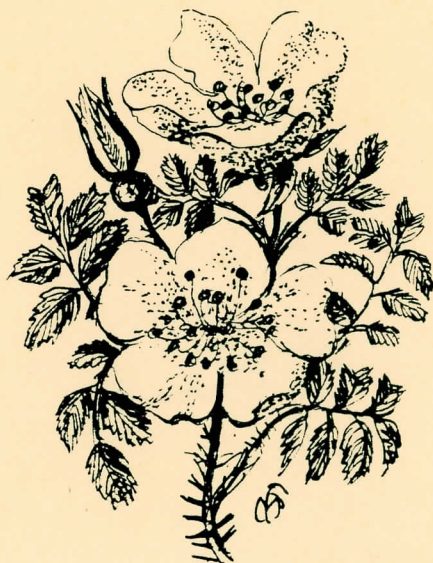


AYRSHIRE ARCHAEOLOGICAL  
AND  
NATURAL HISTORY SOCIETY

# PLANT LIFE in AYRSHIRE



Dr. Ralph Kirkwood  
Illustrated by Margaret Foulds

April 1992

Ayrshire Monographs No.9

£4.20

AYRSHIRE MONOGRAPHS No.9

# PLANT LIFE in AYRSHIRE

Dr. Ralph Kirkwood

Illustrated by Margaret Foulds

Published by

Ayrshire Archaeological and Natural History Society

Printed by

Walker & Connell Ltd. Hastings Square, Darvel, Ayrshire

## THE AUTHOR AND ILLUSTRATOR

Dr Ralph Kirkwood, BSc PhD FRSE FIBiol, is Reader in the Department of Biology and Biotechnology at the University of Strathclyde. He is well known to many members of AANHS, particularly through leading its nature-study excursions.

Margaret Foulds, DA, studied at the Glasgow School of Art and taught art at Carrick and Ayr Academies. Several of AANHS's documents and displays incorporate her art-work. Since retiral she has specialised in depicting wild flowers, and has developed a fruitful collaboration with Dr Kirkwood, of which this booklet is one outcome.

## CHAPTER 1

### WOODLANDS

In the lowlands of Ayrshire remnants of deciduous woodlands are restricted to riverbanks and less accessible fragments of land which are unsuitable for farming. Botanically, woodlands are fascinating places since the plant life is stratified into layers - trees, shrubs and herbs. The tall trees dominate the habitat, casting shade during the growing season over all of the other plants. The species which are native to Ayrshire include Oak, Beech and Wych Elm, while others such as Sycamore, Horse Chestnut and Lime have been brought into Britain from Central Europe and have become naturalized. Beneath are the smaller trees such as Birch, Rowan and perhaps Hornbeam all of which can survive in shaded conditions.

The shrub layer also is divided into two strata, the upper including Hazel, Hawthorn and Holly, while below are species such as Bramble, Wild Rose and Wild Raspberry. The herbs or woodland flowers are often seasonal in their appearance, thus contributing to the infinite variety of our deciduous woodlands.

In winter the great majority of the plants are dormant, thus surviving the frosts and snow. Many are perennials and are able to overwinter due to rhizomes (underground creeping stems), stolons (surface creeping stems), bulbs (swollen leaf bases), corms (swollen stems) and deep taproots. The leaf litter provides a protective insulating layer on the soil surface preventing frost damage to the buds which await warmer weather before emerging as the shoots or fronds of the new season's growth. During the winter months, the deciduous trees are gaunt without their leafy canopy and identification depends on differences in tree shape, bark texture and leaf bud shape and arrangement on the twigs (Plate 1).

Some of the woodland shrubs are evergreen, retaining their leaves from season to season and thus providing shelter for the small woodland birds. A few of the herbaceous plants appear able to withstand the inclement winter conditions and their green leaves soften the otherwise drab woodland floor. Ferns such as Polypody or Hart's-tongue are often found on steep banks, rocky outcrops or old mortar walls, dwarfing the delicate Maidenhair Spleenwort or Black Spleenwort. All of these produce reproductive spores from the underside of their leaves (fronds).

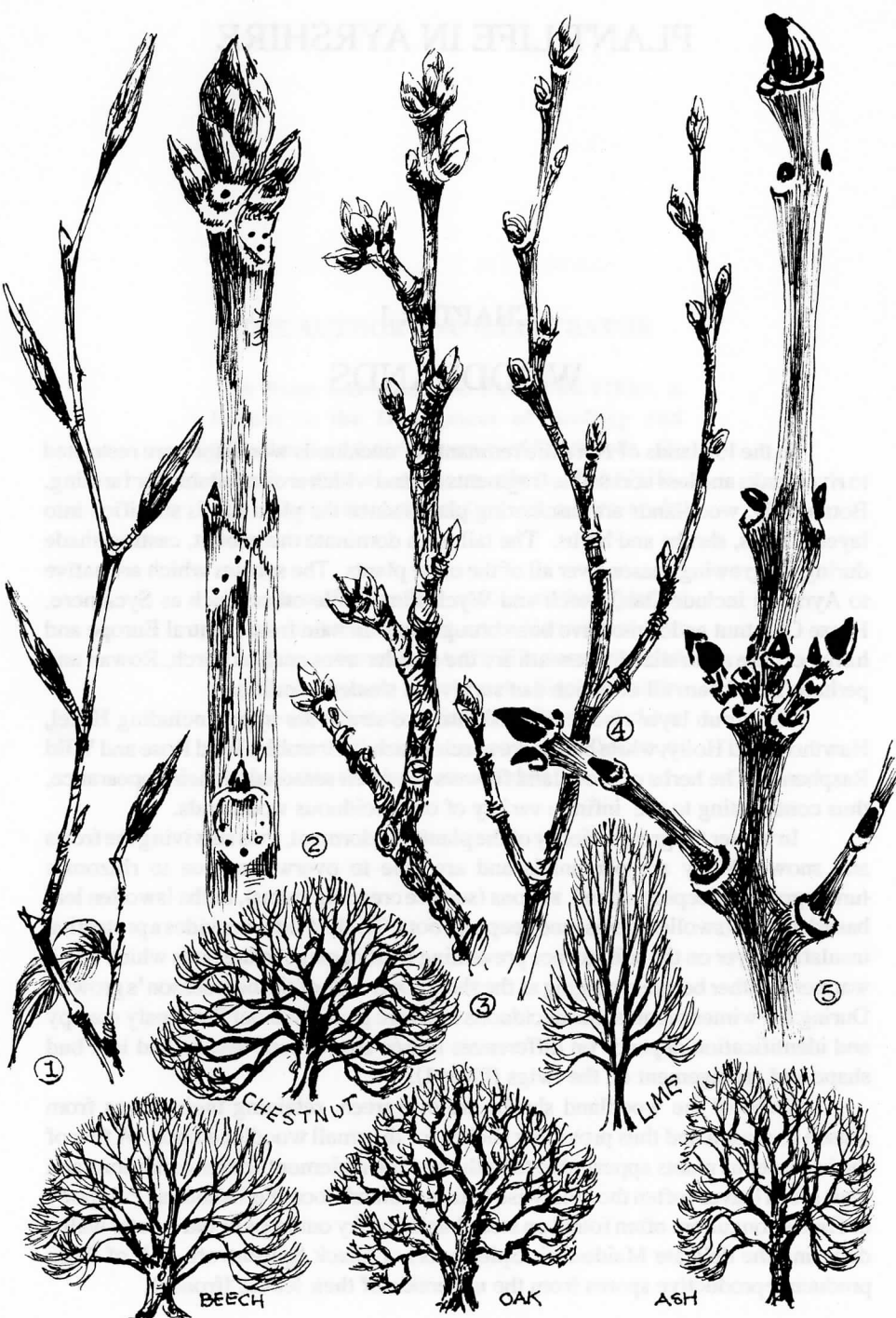


Plate 1. WOODLAND: Beech 1. Horse Chestnut 2. Oak 3. Lime 4. Ash 5.

Spring is heralded by the appearance of the Snowdrop in mid February. This hardy plant which produces leaves from an underground bulb, has become naturalized in many woodlands and fine displays can be seen in Culzean Country Park, Rozelle and Belleisle Parks in Ayr, Kelburn Country Park, Largs, and Ardgowan Estate, Inverkip (Open Days only). Thereafter a succession of flowering plants brighten the woodlands including Wild Onion, Ramsons, Dog's Mercury, Wood Sorrel, Moschatel ('Toon-hall clock'), Lesser Celandine, Wood Anemone, Primrose, Barren Strawberry, Melick Grass and, later, Wild Hyacinth (Plate 2).

Growth starts when the soil temperature reaches around 43°F and growth of shoots or leaves occurs from underground bulbs (eg. Wild Onion), rhizomes (eg. Dog's Mercury), stolons (eg. Bugle), tuberous roots (eg. Lesser Celandine) and corms (eg. Wood Sorrel). Some of our most interesting 'spring woodlands' are found on the riverbanks where the sheltered south-facing banks are ideal for early growth on the rich alluvial soil. Good riverside walks are found on the River Ayr at Auchincruive, Tarholm Bridge and Failford Gorge and on the River Doon at Cambusdoon and Doonfoot.

The woodland flowers are at their best around mid April - mid May after which they will become shaded by the tree canopy. The flora is still interesting, however, with great swathes of Bluebell (Wild Hyacinth) and some very beautiful shade-loving plants. In this 'vernal' phase, the woodland herbs tend to have relatively large leaves which compensate for the lack of light. Species found at this time include the *Geum* species, Wood Avens and Water Avens which have attractive flowers and basal palmately-lobed leaves. Water Avens has pink drooping flowers, whereas those of Wood Avens are upward-pointing and pale yellow; not surprisingly the crossing of these two species results in creamy-pink upward-facing flowers! Other woodland gems include Herb Robert with its cranesbill-type pink flowers, Pink Purslane, Red Campion, Yellow Archangel, Yellow Pimpernel, Creeping Jenny, Common Speedwell, Self-heal, Bugle, Wood Violet and Forget-me-not (Plate 3). Pink Purslane is particularly noticeable in Fullarton Estate, Troon where it has flourished in the relatively damp soil conditions.

Like the Pink Purslane at Fullarton a number of woodland plants are liable to spread and eventually dominate the woodland floor at certain periods of the year. These 'aggressive' species include the rhizomatous Dog's Mercury, Greater Woodrush, Male and Lady Ferns, and bulbous species like Wild Onion, Ramsons and Wild Hyacinth.

One of the tallest herbaceous species found in Ayrshire woodlands along riverbanks is Giant Hogweed. This umbelliferous plant may reach over 2 metres in height when it produces an immense white inflorescence which attracts bees and other pollinating insects. The resulting seeds appear to be spread by moving water and the writer recollects that in 1960 there were two plants on the banks of the River Ayr at Tarholm Bridge. It seems that the prolific seed production of these and other specimens combined with water dispersal has since resulted in many plants being





Plate 2. WOODLAND: Snowdrop 1. Lesser Celandine 2. Primrose 3. Barren Strawberry 4. Wood Sorrell 5. Toon-hall Clock 6. Anemone 7. Ramsons 8. Wild Onion 9. Dog's Mercury 10. Melick Grass 11. Wild Hyacinth 12.

found downstream. Indeed 30 years later this plant has become a troublesome weed which in some places lines the banks of the Ayr, Irvine and Garnock rivers; it seems to thrive in the detritus adjacent to the dunes at Doonfoot. Many Local Authorities are attempting to control this unwanted plant since it is poisonous. The flowering stems can be used by children as 'pea-shooters' and the juices cause photosensitizing of the skin leading to blistering in sunlight.

In midsummer the woodlands become densely shaded and the vegetation coarse and less attractive. Occasionally, however, the sombre greens are punctuated by the inflorescences of late flowering plants; these include the pink/white flowers of Wood Sanicle, the blood red of Hedge Woundwort or the strange translucent white of Enchanter's Nightshade, and the bronze hooded flowers of Figwort (Plate 4). Beneath, the long creeping stems of Ivy may traverse the woodland floor perhaps interrupted by clumps of Bilberry ('Blaeberry') with its succulent purple fruits.

Turning now to the type of plants found in the wetter areas of our Ayrshire woodlands, perhaps in wet hollows or along the banks of rivers or lochs. The tree layer is generally composed of Alder, Birch, Willow and often Ash in the less wet conditions. In spring these 'alder swamps' are bright with the flowers of Golden Saxifrage, Marsh Marigold, (Plate 6) Lesser Celandine and perhaps Water Blinks or Pink Purslane. In early summer, these areas will have been transformed by the vigorous growth of 'marsh' plants such as Meadow Sweet, Marsh Valerian and Wood Cranesbill. The creamy inflorescence of Meadow Sweet contrasts with the pinks of Marsh Valerian and the Cranesbill. In contrast to these wetland-loving species, Woodruff and Cow-wheat tend to be found on moderately dry banks; the latter is relatively unusual and its presence may indicate local base-rich conditions, perhaps due to outcrops of limestone.

In general, autumn woodlands are of interest for their 'toadstools' (or 'fungal-fruited bodies'!), some of which are edible and some highly poisonous. Identification should be certain before consumption. In the mild, damp conditions of early October, a vast array of 'toadstools' survive until the first severe frosts of winter. This group of fungi include all of those which form a head or 'pileus' beneath which are produced large numbers of spores; others are modified to form 'puffballs'.

Access to woodlands is normally by consent of the owner and in spring, gamekeepers may restrict entry due to the risk of disturbance to their breeding pheasants. Access, however, is readily available to the woodlands of country parks such as Culzean (NTS) and Kelburn, Brodick Gardens (NTS), and nature reserves such as Enterkine (SWT), Failford Gorge (SWT) and Lochwinnoch (RSPB). Around Ayr delightful woodland walks can be found in Craigie, Belleisle, Rozelle and Cambusdoon Parks.



## CHAPTER 2

## WAYSIDES

The waysides of Ayrshire's highways and byways are, for most people, their closest 'brush with nature'. Speeding along in our cars, we might be conscious of a myriad of colours by the hedgerow changing with the seasons and with the habitat. These fragmentary gems, however, are worthy of closer investigation.

The hedges which often line our roadsides may be of considerable antiquity having been planted perhaps 200 or more years ago at the time of the Enclosure Acts. This marked a period of general improvement in agricultural husbandry, and scrutiny of old maps suggests that the pattern of field boundaries established then largely persists in Ayrshire today.

Hawthorn is an excellent hedgerow species, being armed with spines which help to deter the entry of livestock. When properly managed a compact hawthorn-based hedge provides an excellent field boundary. It also makes a good nesting site for hedgerow birds such as Blackbird, Song Thrush, Chaffinch and Sparrow, and in May the blossom provides nectar for visiting bees and other insects. Other common hedge species include Gean, Blackthorn, Dog Rose, Bramble, Honeysuckle (Plate 5) and occasionally Beech, Sycamore or Wych Elm. The age of a hedgerow is said to be indicated by the number of shrub species present.

In view of the shade cast by the hedge and the possibility that individuals may have been allowed to develop into trees, many woodland herbaceous species are found along shady waysides. The woodland spring flowers are all found along the Ayrshire roadsides during April and May. Wood Sorrel, Lesser Celandine, Wood Anemone, Dog's Mercury are followed by Wild Hyacinth, Red Campion, Water and Wood Avenas. One of the best examples is found around Sauchrie, near Ayr, along the waysides of the road reputedly used by (Tar) Macadam to test his new bituminous road material. In sunny evenings in late May, the Ayr-Dunure roadsides are brilliant with patches of Red Campion and Sweet Cicely. At around this time or earlier, some waysides are lined with swathes of Wild Onion or Wild Garlic. This is notable around Rozelle Park in Ayr, where both, particularly Wild Onion, have spread out from the woodlands and colonised the roadsides of Monument Road and Greenfield Avenue. The smell of onion around the area is unmistakable!

May-June is the time when flowering members of the *Umbelliferae* become noticeable, ranging from the diminutive Pignut to the more robust Hedge Parsley, Sweet Cicely and Cow Parsley. Ground Elder (Bishop Weed), which spreads by underground creeping stems (rhizomes) may dominate whole stretches of hedge bank; Hogweed and Wild Angelica will complement the more colourful plants.

A poisonous member of this family is worthy of mention. Hemlock Water Dropwort is one of the most poisonous of our flora. Its dark green leaves have a



Plate 3. WOODLAND: Forget-me-not 1. Self-heal 2. Yellow Pimpernel 3. Herb Robert 4. Wood Violet 5. Pink Purslane 6. Common Speedwell 7. Bugle 8. Red Campion 9. Yellow Archangel 10. Water Avenas 11. Wood Avenas 12.









Plate 7. WAYSIDE: Germander Speedwell 1. Tormentil 2. Silverweed 3. Bird's Foot Trefoil 4. Milkwort 5. Rush Vetch 6. Sneezewort 7. Rough Comfrey 8. Evergreen Alkanet 9. Tufted Vetch 10. Lady's Smock 11.





characteristic smell and the flowers which emerge around early June are greenish white. The tuberous roots which look like parsnips are extremely poisonous and should not be eaten. It is often found along ditches and in wet flushes. If ditches are being cleaned these plants should be disposed of promptly, since stock may graze the litter and losses occur.

In summer the hedgerows reflect the changes already mentioned with regard to woodland. The pink flowers of Lady's Smock, Red Campion, Herb Robert, Bush Vetch and Water Avens contrast with the yellows of Tormentil, Silverweed and Bird's-foot Trefoil, the white of Sneezewort and the blues of Germander Speedwell, Tufted Vetch, Rough Comfrey and the relatively rare Alkanet (Plate 7). The hedge plants become adorned with flowers, pink or white in the case of Dog Rose, cream tinged with pink for Hawthorn, Gean, Elder and Honeysuckle. Gorse which starts to flower in January, continues to produce golden blossom until the summer when the characteristic nutty aroma is a feature of warm sunny days in June.

Broom is another hedgerow shrub which produces bright yellow flowers in summer, complementing the delicate yellow of Slender St. John's Wort. On the verges around the entrances to agricultural fields some of the common weeds are found, perhaps preferring the trampled or rutted soil adjacent to the gate; these include Redshank, Pineappleweed and Ribwort Plantain. Later, towards autumn, Field Bindweed (*Convolvulus*) and Woody Nightshade (poisonous berries!) are found entwined in the hedge shrubs, using these woody plants as supports. All of these plants are illustrated in Plate 8.

Grasses are abundant along our waysides, playing an important role in stabilising the banks and providing cover for the small mammals such as Field Mice, Voles and Shrews. Common grasses include Sweet Vernal Grass, Meadow Foxtail, Crested Dogtail, Bent grasses, the Meadow grasses, Tall Oat Grass, Tufted Hair Grass, Meadow Fescue, Tall Fescue, Cocksfoot and Perennial Ryegrass (Plate 11). Most of these flower in May, though the first two generally produce inflorescences in April.

The variety of Ayrshire's roadside vegetation is enhanced by the range of other habitats found in the county. Seashore roadsides reflect the variety of coastal niches. The Ardrossan - West Kilbride road passes along the largely shingle/sandy beaches of North Bay and many of the shore plants characteristic of these habitats are found by the wayside including Sea Celery, Sea Couch Grass and Perennial Sowthistle. The Girvan - Ballantrae route, which is surely one of the most attractive in Ayrshire, passes along a shore-line which is predominantly of rocky headlands and shingle bays. The wealth of wild flowers found in early July includes such rare plants as Wood Vetch, Blood-red Geranium (Bloody Cranesbill), Hemp Agrimony, Sweet Agrimony and Tutsan.

Ditches provide an opportunity to find wetland plants and one of the best examples occurs on the Ayr - Dalmellington road, near Waterside. The road passes through a fine area of marsh/bog and in the wayside ditches the marsh plants include



Plate 8. WAYSIDE: Redshank 1. Slender St. John's Wort 2. Stitchwort 3. Pineappleweed 4. Lady's Mantle 5. Broom 6. Ribwort Plantain 7. Woody Nightshade 8. Bindweed 9. Nipple-wort 10.





Plate 10. WAYSIDE: Northern Fen Orchid 1. Bird's-nest Orchid 2. Fragrant Orchid 3.



Plate 9. WAYSIDE: Lady's Bedstraw 1. Bitter Vetch 2. Devil's Bit Scabious 3. Tansy 4. Meadow Cranesbill 5.



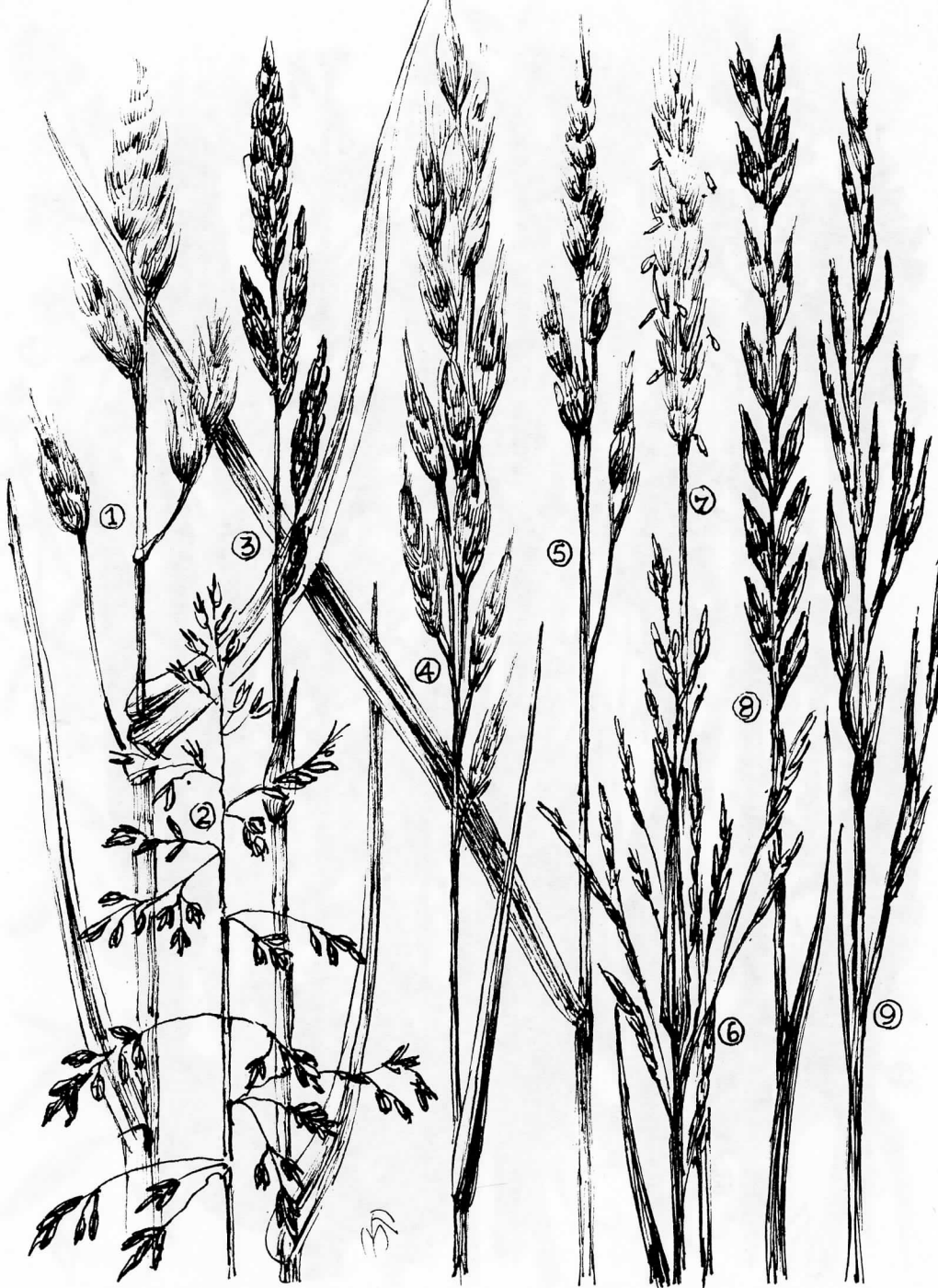


Plate 11. WAYSIDE: Cocksfoot 1. Meadow Grass 2. Tall Fescue 3. Brome Grass 4. Tall Oat Grass 5. Tufted Hair Grass 6. Meadow Foxtail 7. Perennial Ryegrass 8. Meadow Fescue 9.

Bur-reed, Meadow Sweet, Marsh Valerian and Rushes. In the vicinity of Hollybush, and other damp waysides, Iris, Water Aven, Hemlock Water Dropwort and Marsh Orchids indicate wet enriched conditions.

The myriad of colourful summer flowers found along the roadside verges include the striking blues of Meadow Cranesbill and Devil's Bit Scabious, which blend with the purple/reds of Knapweed ('Hard-Heads') and Woundwort and the pinks of Yarrow (Milfoil), Bitter Vetch and Rosebay Willowherb. The delicate yellow inflorescences of Lesser Spearwort, Lady's Bedstraw and Meadow Vetchling contrast with the more sombre ochre of Tansy (Plate 9).

One of the best 'orchid' roadsides is found on the Isle of Cumbrae on the shore leading from the car ferry slipway to Millport, particularly adjacent to the Lion Rock. In June, before the roadsides are cut, several orchid species are found in flower including Early Marsh, Marsh, Common Spotted, Fragrant, Twayblade and occasionally the Lesser Butterfly Orchid (Plate 10). Of these the last named and the Fragrant or Sweet Scented have a gentle fragrance that is worth the effort of kneeling down! These very rich waysides border wet meadows which seem to receive mineral-rich water from the adjacent ancient sea cliffs.

An interesting feature of hill roadsides is the rapid transition from heath or bog to herb-rich grassland. The wayside immediately next to the road is invariably grass dominated with a range of herbs, and this may reflect the leaching of minerals (and salt?) from the road into the verges, trampling or tyre damage. The upland grasses are often abundant, with species such as the Fescues, Wavy Hair Grass, Tufted Hair Grass, Moor Mat Grass or 'flying-bent' (Purple Moor Grass) (see Plate 17). With the exception of the last named these have needle-like leaves which can survive drought conditions. A number of broad-leaved herbs are often present, especially in sheep-grazed areas, including Tormentil, Heath Bedstraw, Milkwort, Plantains and Daisy. The legumes are represented by Wild White Clover and Bird's-foot Trefoil. Good examples of hill road verges are found around Ayr on the Patna-Kirkmichael-Dalrymple, Stair-Skares-Sinclairston and Culroy-Dunure roads, and good views are obtained on the Dalry moor road from Hunterston-Dalry and Inverkip-Cornylees-Largs roads via the Brisbane Glen.

In all, the waysides represent a very beautiful and interesting series of microhabitats which are readily accessible to all; sadly the age of the car renders them more dangerous and less tranquil than in an earlier era of horse transport.





Plate 13. COAST: Lousewort 1. Thyme 2. Oyster Plant 3. Perennial Sowthistle 4. Common Storksbill 5.







## CHAPTER 3

## COASTAL PLANTS

The Ayrshire coast is subject to predominantly south-westerly onshore winds which can carry salt considerable distances inland. It is not surprising, therefore, that the seashore plants have to be well adapted to their inclement environment. Two major factors combine to make life difficult. Firstly, plants have to absorb water from a salty substrate and, secondly, due to high sunlight and often windy conditions the rates of water loss may be high. Thus, water stress is a major problem to which halophytic (salt tolerant) and xerophytic (drought tolerant) species have become adapted, presumably by mutation and natural selection over a multitude of generations.

The Clyde Coast has a wonderful variety of seashore habitats, ranging from the dune-lined bays of the Central Basin to the flanking rocky shores of North and South Ayrshire. In the north, the shores of Great Cumbrae Isle and the mainland around Largs are characterised by old red sandstone or sandstone conglomerates; those of South Ayrshire, however, are of volcanic origin. This is true also of Little Cumbrae, as well as the smaller isles of Ailsa Craig (volcanic plug), Horse Island and Lady Isle (sills). Shingle and pebble beaches are sandwiched between rocky headlands and occasional fragments of saltmarsh are often associated with river outlets such as the Pow Burn at Prestwick.

Sand dunes are formed where a great expanse of sandy beach is exposed at low tide to predominantly onshore winds. Dune development depends on the presence of two species of perennial grasses, Sea Lyme Grass and Marram Grass (Plate 14). Both are xerophytes possessing extensive underground creeping stems (rhizomes) which enable them to spread rapidly or grow vertically when heavy sand deposition occurs. Their leaves are specially modified enabling them to roll up under drought conditions, thus reducing water loss from the stomatal pores which are located on the inner enclosed surface; water loss from the outer surface is minimal due to the outer waxy cuticle. Characteristically the Ayrshire dunes develop due to colonisation by Sea Lyme Grass which forms pioneer dunes; thereafter Marram Grass becomes the dominant species, forming the 'main dunes'. Sea Couch, Sand Sedge and Sea Plantain (Plate 14) are also involved in dune formation since they may colonise the upper beach in advance of Sea Lyme Grass.

A number of associated plants called "surface fixers" may accompany the pioneer grasses. Apart from the occasional annual or ephemeral species such as Dog Violet or Field Mouse-ear Chickweed, these tend to be perennial species with deep tap roots (eg Curled Dock or Sea Radish), creeping runners (eg Common Storks-bill or Silverweed), stolons (eg Hop Trefoil) or rhizomes (eg Sea Purslane, Sand Sedge and Sea Couch). These plants are able to grow and spread in an unstable, humus and water deficient environment and their presence helps to stabilise the dune surface.

Mature dunes are relatively stable, though erosion and 'blow-outs' do occur



Plate 14. COAST: Sea Couch 1. Marram Grass 2. Sea Lyme Grass 3. Sand Sedge 4. Sea Plantain 5.









following damage to the surface vegetation. The Ayrshire dunes tend to be colonised by a variety of indigenous grasses including Red Fescue, Common Bent, Yorkshire Fog, Crested Dog's-tail, Sweet Vernal Grass and a range of broad-leaved species including Knotgrass, Bulbous Buttercup, Harebell, Eyebright and leguminous species such as Bird's-foot Trefoil, Haresfoot, Least Bird's-foot and Red and Wild White Clovers.

The nature of the sand deposited on the dune surface has an influence on the flora. The more acidic dunes formed around Troon and Irvine are colonised by heath plants such as Bell Heather, Cross-leaved Heath and Heather (*Calluna vulgaris*) as well as shrubs such as Bramble, Gorse, Broom and Dog Rose. Where an element of 'shell sand' is present such as occurs at Turnberry, the dunes are more calcareous and the flora includes species such as Kidney Vetch (Lady's Fingers), Restharrow, Yellow Rattle and Common Spotted, Marsh and Northern Fen Orchids.

The Ayrshire dunes have been used to form a series of world-famous 'links' golfcourses where recreation and conservation of this important habitat are combined. While the fairways, tees and greens are intensively managed by the groundstaff, the 'roughs' remain relatively untouched and the wild plants survive unscathed.

Saltmarshes may be found at the mouths of rivers such as the Stinchar, Irvine and Garnock and also as fragments on flat shelving areas along the coast. One of the best examples occurs at Bogside near Irvine and the Bogside Flats are an important feeding and roosting area for wintering birds. The characteristic zonation of saltmarsh vegetation results from their periodic inundation by the sea; the most salt-resistant are found at the seaward end of the marsh. Walking inland from the edge of typical salt-marsh, the range would include Sea Grass, Sea Arrow Grass, Sea Plantain, Sea Milkwort, Sea Fescue, Scurvy Grass, Sea Aster and Sea Couch.

All of these species are able to live in their salt environment due to their high salt content which enables them to absorb and store water which would be physiologically unavailable to normal plants. Further, water loss from these plants is reduced due to the relatively low surface/volume ratio of the leaves, the thick waxy cuticle and the 'sunken' stomata which reduce the level of transpiration. Compared with the great salt marshes of the Solway Firth, the fragments along the Ayrshire Coast are meagre, but representative nonetheless. A range of species found in sand-dune, salt marsh, shingle beach or rocky shore are shown in Plates 12, 13 and 16.

Both saltmarsh and sand dune habitats have formed due to the accretion of sand particles or sediments, eroded by the continual action of the waves on rocky shores or cliffs. Good examples of sea cliffs are found south of Girvan (eg Kennedy's Pass), Dunure, Heads of Ayr, or in the north at Portencross/Hunterston. On the islands, good cliff communities are found on Ailsa Craig, Lesser Cumbrae and Great Cumbrae (Farland Point).

The zonation of rocky shore is similar to that found in saltmarshes, and the most salt-tolerant plants are found adjacent to the sea. The 'spray zone' is covered in lichens such as *Verrucharia* (black), *Xanthoria* (yellow), *Lecanora* (grey) and



Plate 17. HINTERLAND: Moor Mat Grass 1. Marsh Bredstraw 2. Germander Speedwell 3. Mountain Violet 4. Red Fescue 5. Bracken 6. Tormentil 7. Creeping Bent 8. Sweet Vernal Grass 9. Crested Dog's-Tail 10.



*Rammalina* (grey) species. Above these lichen zones the rock crevices may be colonised by Sea Pink, Sea Plantain, Buck's-horn Plantain, Sea Milkwort and Sea Rush, all of which are relatively salt-resistant. They can survive where normal plants would become scorched and die.

The flora of the upper shore and cliff face depends on a number of factors including rock type, exposure and presence of ledges or screes. The shaded conditions of the cliffs may enable woodland plants to complement the halophytes and this is particularly well illustrated at the Heads of Ayr where Primrose and Wild Hyacinth are followed by great stands of Red Campion. On the more exposed faces, however, Thrift, Sea Campion, Bird's-foot Trefoil and Scentless Mayweed are complemented by shrubs such as Heaths, Burnet Rose, Blackthorn, Bramble and Hawthorn growing on the more sheltered ledges.

On the cliff-tops, salt-loving plants may survive on the short sheep-grazed turf, and diminutive Buck's-horn Plantain, Sea Plantain or Thrift may be just identifiable. Normally the bent/fescue turf is colonised by species such as Bird's-foot Trefoil, Lady's Fingers, Tormentil, Lousewort, Heath Bedstraw, Lady's Bedstraw and possibly rarer plants such as Spring Squill, Rock Rose, Mountain-everlasting (*Antennaria dioica*), Bitter Vetch, Early Purple, Sweet-scented and Heath Spotted Orchids (Plates 12, 13 and 16). All of these species can be seen on the cliffs to the south of Dunure Castle.

Excellent examples of rocky shore and sea cliff plants are found at a number of other sites along the Ayrshire coast, particularly between Girvan and Ballantrae, at Culzean, Heads of Ayr, Portencross, between Largs and Skelmorlie and also on the Isle of Cumbrae. At several of these, examples of dykes (basaltic intrusions) will be found with a number of characteristic species including lichens, mosses, Wall Pennywort, Hawkbit, Wood Sage, Wild Thyme, English Stonecrop and the heaths. At Portencross the dyke flora includes Meadow Saxifrage, Early Purple Orchid, Lovage and Bloody Cranesbill.

The remaining seashore habitat to be considered is the shingle or pebble beach. The substrate is formed of rock fragments which have been 'rounded' into pebbles by the action of the sea; the size ranges from less than 5mm to over 1 metre. The plants grow in the 'strand line', a zone above the high-tide mark in which seaweed, driftwood etc. is deposited at particularly high tides. On the seaward side of this zone salt-tolerant species include Sea Purslane, Sea Sandwort, Hoary Cress, the Sea Oraches, Curled Dock, Perennial Sowthistle, Silverweed, Scentless Mayweed and Sea Couch. These are mostly perennials with rhizomes, runners or deep tap-roots, which are able to survive in this inclement environment by firm anchorage combined with efficient water-absorption properties.

There are many interesting pebble beaches along the Ayrshire coast and on the Isle of Cumbrae. Amongst the best, floristically, are the shingle spit at Ballantrae where the Sea Rocket and Oyster Plant are found, the beaches to the south of Dunure Castle, and the western shores of the Great Cumbrae.

## CHAPTER 4

## THE HINTERLAND

The Ayrshire landscape resembles an amphitheatre, with the uplands of Cunninghame, Cumnock and Doon Valley and Kyle and Carrick surrounding the coastal plain. In the North the hills above Largs and Fairlie are essentially of old red sandstone with outcrops of felspar, while in the South the Carrick Hills are of volcanic origin and the soil can be relatively fertile for upland conditions. In between lie the extensive undulating moorlands which border Lanarkshire where glacial deposits have resulted in poorly drained conditions and extensive peat bogs.

The vegetation of these upland areas tends to involve a repetitive pattern which reflects altitude, aspect, slope and water table. In the better drained slopes a 'brown forest soil' underlies the grassland pasture, normally dominated by bent/fescue. Such areas are often extensively colonised by bracken fern. The rocky outcrops which punctuate these grasslands are generally dominated by heath plants including Cross-leaved Heath, Bell Heather and Heather. These can survive in the thin peaty soil which overlays the rock and they are all low-growing plants with minute needle-like leaves from which water loss is minimal. The wetter areas of the uplands tend to be colonised by rush or sedge flushes, or perhaps by great blanket bogs which may date back to post-glacial times. In this chapter the various types of plants found in these upland communities will be considered in relation to the underlying soil conditions.

The well-drained slopes are generally dominated by short indigenous grasses and are excellent grazing pastures for the hill sheep such as Black-face or Grey-face which thrive in these areas. The grasses include Creeping Bent, Red and Sheep's Fescues, Crested Dog's-tail, Yorkshire Fog, Moor Mat Grass and the Meadow Grasses (Rough or Smooth Stalk Meadow Grass). Most of these grasses have needle-like leaves which enable reduced rate of water loss by transpiration. The broad-leaved plants associated with these grasses include Wild White Clover, Bird's-foot Trefoil, Tormentil, Heath Bedstraw, Common Speedwell, Self-heal and occasionally Mountain Violet. These broad-leaved herbs tend to be mineral-rich and undoubtedly benefit the diet of grazing animals. A range of these hill pasture plants is shown in Plate 17, in the centre of which is portrayed Bracken in the 'crozier' or emerging frond stage.

Bracken fern is a poisonous plant containing carcinogens which can cause disease in the alimentary canal of grazing animals which may feed on it when other food is scarce. A number of other diseases of domestic stock are attributed to bracken including 'staggers' in horses and 'bright-blindness' in sheep; thiamin deficiency is caused by bracken consumption, especially in the young hook or crozier stage when it is more succulent and palatable.





Plate 18. HINTERLAND: Carnation Sedge 1. Bottle Sedge 2. Crowberry 3. Cladonia (lichen) 4. Mosses 5. Bog Myrtle 6. Jointed Rush 7. Black-headed Sedge 8. Bistort 9. Star Sedge 10. Common Rush 11.

caused by bracken consumption, especially in the young hook or crozier stage when it is more succulent and palatable.

The traditional way of controlling bracken was by cutting the fronds by scythe or machine at the stage of full expansion. More recently herbicides have been used such as asulam (Asulox) or glyphosate (Round-up); these are applied to the frond canopy at full expansion and transported within the plant to the multitude of buds on the underground creeping stem (rhizome) where they kill the dividing cells and prevent further growth. Unfortunately the use of these effective herbicides is uneconomic for most hill farms. An alternative approach is being examined at the University of Strathclyde which involves the use of naturally-occurring fungal pathogens of bracken. The ecological desirability of reducing or eliminating bracken from our hill slopes will need to be taken into consideration. Some farmers maintain that a low level of bracken helps early and late season growth of grasses, providing stock with an early or late 'bite'. Furthermore bracken appears to have a role in the retention of potassium (and possibly other minerals) in the soil of these 'leached' hill slopes.

The leaching of soluble minerals from these upland slopes results in base-deficient acid soils. Conversely enrichment of flush areas through which the drainage water percolates leads to botanically interesting sedge and rush communities. The plants likely to be found include Carnation Sedge, Bottle Sedge, Bog Myrtle, Black Headed Sedge, Bistort, Star Sedge, Jointed and Common Rush (Plate 18), and Marsh Bedstraw, Heath Spotted Orchid, Devil's Bit Scabious, Grass of Parnassus, Marsh Cinquefoil, Bog Asphodel and Ragged Robin; some of these are shown in Plate 15. The Grass of Parnassus has a particularly beautiful flower (around late July), with pristine white etched petals and creamy anthers and stigmas. It is reputed to grow on the slopes of Mount Parnassus.

Enriched ('calcareous') pastures are found occasionally in Ayrshire. Good examples occur at the Scottish Wildlife Trust's reserves at Auchalton (Crosshill), Feoch Meadows (Barrhill) and at Grey Hill near Girvan. These calcareous pastures are unusual in the West of Scotland where the uplands tend to have acidic soils due to the combination of acidic baserock and high rainfall. The exceptions occur due to localised outcrops of base-rich rock such as limestone or dolerite. The plant life of these areas is particularly interesting and may include a range of orchids (Plate 10), Field Gentian, Mountain Everlasting (both Plate 15), Moonwort, Parsley Fern, Cow-wheat and Spiguel.

Acid peat bogs, however, are at the opposite end of the spectrum. They have formed over a very long period of time, perhaps stretching back to post-glacial times, around 20,000 years ago. It is believed that colonisation of shallow lochs occurred by bog mosses, including *Sphagnum cuspidatum*, *S. rubrum* and *S. magellanicum*. Peat develops at a rate of 1" per hundred years, at rainfall levels in excess of 55" a year. The partially decomposed litter from the mosses formed a floating mat of vegetation which covered the surface of the water like a blanket. A good example is found at the Silver Flow in Galloway, just outwith the Ayrshire border. As the peat



layer develops so the vegetation tends to have less close contact with the water and a range of 'mixed moor' species come in, including the heaths, Bog Rosemary, Bog Asphodel and Cotton Grass (Plate 15), Crowberry, Bog Myrtle, Jointed Rush, assorted mosses and lichens (Plate 18), Deer Grass and Stool Bent.

Bog Myrtle is reputed to be a 'nitrogen-fixer'. In fact it lives in symbiosis with a micro-organism (an Actinomycete) in nodes in the roots; the microbe is able to utilise atmospheric nitrogen and transfer a portion to the plant. Bog Myrtle exudes an attractive aromatic perfume from its leaves and on hot sunny days the fragrance is exotic.

Good examples of blanket bogs are found on the Fenwick Moor, above Sorn, and at Dalmellington. Relatively rare species which characterise some of these acid peatbogs include Marsh Andromeda ('Bog Rosemary': *Andromeda polyfolium*), Sundew, normally round-leaved, and Butterwort (Plate 15). The last mentioned are both insectivorous, being able to trap small insects on sticky mucilage, digest the proteins, and absorb the amino acids through leaf glands. In this way these plants are adapted to life in a nutrient-deficient habitat and they supplement their 'photosynthesis assimilated' diet by this means.

In some respects the final vegetation type which we should consider, rocky outcrops, bears some similarities to the last, in that the plants grow in peat. The base-rock is covered with a thin mantle of peat which fills the hollows and crevices and enables a range of ericaceous species to grow there. In fact the peat is the partially decomposed litter of Heather, the *Erica* species (Bell Heather and Cross-leaved Heath), Crowberry, Moor Mat Grass and a range of mosses, lichens and English Stonecrop. Most have reduced leaf surfaces to minimise water loss and are able to survive in their inclement habitat.

Heather moorland is still found in parts of Ayrshire, but the tendency for high-intensity sheep grazing has resulted in some 'brown' hills becoming 'green'. This encroachment of heather-dominated hill with indigenous grasses such as Moor Mat Grass can be seen in parts of the 'Brown Carrick' south of Ayr. The soil found beneath is often classified as a podsol, reflecting the podsolisation process which results in leaching of the more soluble iron and humus from the 'top' soil to lower regions in the soil profile. In extreme cases this deposit forms an 'iron-pan' which prevents effective drainage and leads to peat formation at the surface ('peaty podsol').

Thus the upland hinterland of Ayrshire may present in places a bleak and unwelcome habitat, but to the botanist or ecologist it has many fascinations. Not least the way in which plants grow in communities which clearly indicate the conditions under which they grew, particularly reflecting slope and water-table. The adaptations of plants which enable reduced water-loss or enhanced nutrition under nutrient-deficient conditions are remarkably ingenious. These areas remain almost a last wilderness in which man's influence has, until recently, been relatively slight. In the future however, afforestation with exotic conifers can be expected to reduce the area of these upland habitats.

# PUBLICATIONS of the AYRSHIRE ARCHAEOLOGICAL & NATURAL HISTORY SOCIETY

available from Ronald W Brash MA, Publication Distribution Manager  
10 Rosland Avenue, Ayr, KA7 2RW

Round Old Ayr (guided walk)	95p
Roderick Lawson of Maybole 1831 - 1907 (Douglas)	£1.50
An Ayrshire Family 1526 - 1900 (Waterson)	£1.50
Rails to Ayr (Broad)	£2.50
Ayrshire Honestones (Tucker)	£1.50
Ayrshire Mining Enterprises 1600-1840 (Whatley)	£1.50
Digging Up Old Ayr (Lindsay)	£1.00
Mauchline Memories of Robert Burns (ed. Strawhorn)	£1.50
Ayrshire Abbeys (Cowan)	£1.25
George Locket of Ayr (Broadie)	£1.25
The Stone Ages in Ayrshire (Morrison & Hughes)	£2.75
{Excavations in the Citadel (Waite)	
{Referendum on the Sabbath (Brash)	£3.60
{Ancient Fish Traps (Patterson)	
A Scottish Renaissance Household (MacKenzie)	£3.00
The Antiques of Ayrshire (Grose, ed. Strawhorn)	£3.60
The Shipping Trade of Ayrshire 1689 - 1791 (Graham)	£3.60
Armstrong's Maps of Ayrshire (1775: reprint: 6 sheets)	£12.00