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EDITORIAL

Contributions are invited on the Natural History, Antiquities, Archaeology, including Industrial Archaeology, or Geology of South West Scotland or the Solway Basin, and preference is always given to original work on local subjects. Intending contributors should, in the first instance, apply to the Editors for instructions, giving the nature and approximate size of their paper. Each contributor has seen a proof of his paper and neither the Editors nor the Society hold themselves responsible for the accuracy of information in it.

This volume continues to reflect the current interest in Wigtownshire but it is hoped that volume 61 will contain material relevant to the octocentenary of Dumfries. In addition to the monograph on the excavations at Cruggleton Castle 1978-81 by Gordon Ewart published during 1985 and distributed to members the Society is to publish a monograph on the excavations at Whithorn in 1984 by Peter Hill.

Exchanges should be sent to the Hon. Assistant Librarian, Mr R. Coleman, 4 Lovers Walk, Dumfries, to whom enquiries should be made regarding back numbers of these Transactions — see rear cover. As many of the back numbers are out of stock, members can greatly assist the finances of the Society by arranging for any volumes which are not required, whether of their own or those of deceased members, to be handed in. It follows that volumes marked as out of print may nevertheless be available from time to time.

Payment of subscriptions should be made to the Hon. Treasurer, Mr K. H. Dobie, 2 Corbelly Hill, Dumfries, who will be pleased to arrange Bonds of Covenant, which can materially increase the income of the Society without, generally, any additional cost to the member. The attention of members and friends is drawn to the important Capital Transfer Tax and Capital Gains Tax concessions which are conferred on individuals by the Finance Acts, in as much as bequests or transfers of shares or cash to the Society are exempt from these taxes.

Limited grants may be available for excavations or other research. Applications should be made prior to 28th February in each year to the Hon. Secretary. During 1985 a substantial bequest was made to the Society by Miss Ann Hill of Ayr for research into the history and archaeology of Kirkpatrick Fleming parish. The Council is working on a research scheme which will be intimated to the members in the annual report. Progress reports will likewise be intimated to members annually and the results of the research will be published in due course either as articles in the *Transactions* or as separate Monographs. Researchers are also reminded of the Mouswald Trust founded by our late President Dr R. C. Reid, which provides grants for work on the Early Iron Age, Roman, Romano-British and early Christian periods. Applications for grants should be made to Primrose and Gordon, Solicitors, Irish Street, Dumfries.

This Volume is made with the assistance of a generous Carnegie Grant. The Council is also indebted to the Royal Commission on Ancient and Historical Monuments for a grant towards the publication costs of I. M. Smith's paper on Balsarroch House and to the Mouswald Trust which has borne the cost of the paper by Miranda Green, Trevor Cowie and David Lockwood on the Three Bronze Animal Figurines of Probable Roman Date.

The illustration on the front cover is of the Wamphray "grave slab" from the article The Early Church in Dumfriesshire by W. G. Collingwood, in volume 12 (1926) of these *Transactions*.

THE ECOLOGY OF THE ALGAE IN THE SOLWAY FIRTH I. THE URR ESTUARY

by

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Introduction

The attached alage are of widespread and often abundant occurrence at those margins of the sea where a suitable substratum is available. The populations are most diverse in waters of a high salinity, but become less so with increasing distance from the sea in estuaries (see e.g. Wilkinson, 1973; Perkins, 1974). These algae exhibit a marked zonation, classically recognised by the predominant species, as a progression from the green weed zones near extreme high water mark, through the brown weeds of the mid and lower shore to that of the red weeds below the extreme low water mark (see for example, Eales, 1939): indeed the changes in population composition which accompany the progressive reduction of salinity in estuaries are similar to those of shore zonation. Thus it is inferred that whilst salinity is an important controlling factor in the distribution of these organisms, desiccation during the emersion period is also an important factor controlling shore zonation, but whilst zonation is patent, the explanation is elusive (Dorgelo, 1976). Indeed, the whole zonation relationship is very complex and marked departures from the classical scheme are often observed. Thus, the red algae *Gigartina stellata* and *Porphyra umbilicalis* are characteristically found in the intertidal zone, on rock and bound shingle substrata which provide no shelter from desiccation, rainfall and temperature variations, in contrast to most other species of red algae which invade the intertidal. Both *Gigartina* and *Porphyra* may occur in such abundance as to form distinct zones. Dickinson (1963) stated that *Gigartina stellata* "may be seen to perfection about the level of low spring tides growing in closed communities, often covering very considerable areas of rock; much of it, however, is exposed at ordinary low tides." In the Gareloch, however, it was found throughout the whole of the period from 1967-75, that whilst there was a fringe of brown algae (*Pelvetia canaliculata*, *Fucus spiralis*, *F. vesiculosus* and *Ascophyllum nodosum*) on the rocks at upper shore levels, the middle and lower intertidal were characterised by an abundant growth of *Gigartina stellata*. Indeed, at the old lobster pond this species had displaced the brown algae and extended onto the rocks of the *Pelvetia* zone where it persisted throughout the period. In the Solway Firth, too, *G. stellata* may colonise the shore to levels just below that of the green algal zone. *Porphyra umbilicalis*, a widespread and often abundant resident of the Solway Firth, may be harvested and sold as laverbread, though its importance is now less than it was formerly. Like *G. stellata* it may be abundant in the higher mid shore, indeed during 1985 and 1986 at Allonby it was codominant with *Enteromorpha linza* in the bound shingle bed of the flood channel barblet, and at a level above that occupied by both *Fucus spiralis* and *F. vesiculosus*. Similarly, in 1985 a very abundant and successful colonisation formed a distinct zone on the crest of the shingle bank at Siddick: at a level about that of the *F. vesiculosus*/ *F. spiralis* zone. In this latter situation the degree of drainage and potential for

desiccation was extreme. In all these circumstances, it would appear that desiccation during the normal progression of the tidal cycle is unlikely to be a limiting factor for these seemingly delicate species. The ability to colonise such potentially unstable substrata as the shingle bank at Siddick, the bound shingle shore in the Gareloch and the bound shingle bed of the barblet at Allonby (whose existence as a substratum available for colonisation depends upon movements of the adjacent unstable sandy sediments) suggests, despite appearances, these are tough, opportunistic species able to take advantage of the most unlikely seeming opportunities. Certainly, the results of Biebl (1952) showing that 83% was the minimum relative humidity tolerated by *P. umbilicalis* exposed in small, closely sealed jars for 13h over saline solution and to atmospheres of varying relative humidity are unrealistic, not least because the environmental atmosphere is rarely calm. In a sense, too, the same criticism may be applied to the work of Dorgelo (1976) though this study was concerned with comparative rates of water loss in species of brown algae and showed that the initial rates of loss were highest in *Pelvetia canaliculata* and lowest in *Laminaria saccharina*, but that in *Pelvetia* effectively ceased after 3h with a loss of 70% fresh weight, whereas the loss in *L. saccharina* continued for 23h and ceased with a loss of 80% of fresh weight. Clearly even under the test conditions rapid losses of water occurred at a temperature of 22°C and a relative humidity of 40-45%, but as Dorgelo noted his results do not correspond to the observed zonation of species. Nevertheless, they are important in another context which, in part, is the topic of the following paper.

First, however, consider the influences which act upon the attached algae in addition to desiccation. Salinity, temperature and exposure to wave action each exert an influence upon these plants. In addition the reverse of desiccation, viz., rainfall, as a direct environmental factor is often overlooked. Yet at the time of neap tides, the shore and its biota above neap tide level experience essentially terrestrial conditions for some days, the resident biota here includes the green algal zone together with *Pelvetia canaliculata* and *Fucus spiralis* of the brown algal zone. During this time, if there is persistent high rainfall, *Pelvetia* and *F. spiralis* patently absorb substantial amounts of water, conversely in times of prolonged cold these species may be frozen, coated in ice or if there is no precipitation freeze dried, becoming very brittle in the process. This last becomes particularly acute in times of prolonged dry weather accompanying strong easterly winds. In summer on the other hand natural evaporation rates are high in the warm temperatures prevailing. Such variations in temperature, particularly extreme cold, may have marked effects upon the timing of reproduction of the brown algae (e.g. Williams, Perkins and Bailey, 1963; Williams, Perkins and Gorman, 1965; Perkins, 1974a).

The reduction in diversity of algal species with distance moved upstream in an estuary has been noted above. It might appear that this is primarily a response to progressive reduction in salinity, but it has long been known (e.g. Nash, 1947) that temperatures also become more extreme with increasing distance from the open sea. In the laboratory Savodnik (1975) investigated the effects of temperature and salinity variations upon the photosynthesis of *Fucus virsoides*, *Ulva lactuca*, *Porphyra leucostricta* and *Wrangelia penicillata* from the northern Adriatic and found that the effect of combinations of temperature and salinity differed from species to species and in salinities < 37 g.kg $^{-1}$ the origin of the diluting water was important. In the

present context the most interesting result obtained by Zavodnik (1975) was that for *Ulva lactuca* in waters diluted by fresh spring water. This is a cosmopolitan species which may reach a considerable abundance in sheltered bays and estuaries, on both stony substrata and mud flats where interspersed stone and shell provide suitable sites for attachment. Zavodnik (1952) found while the rate of photosynthesis was temperature dependent, it tended to be highest at salinities equivalent to those experienced in the middle reaches of estuaries, declining at very low salinities and at those about that of normal sea water i.e. 35 $g.kg^{-1}$. Whilst such results are of evident importance to the understanding of the response of given organisms to environmental conditions they may only be of indirect value in a field monitoring programme employing biological indicators. In such circumstances, the questions asked are broadly what species are present, how abundant are they, how healthy are they, are there any marked morphological differences and do they reproduce in a manner consistent with populations elsewhere. Thus Jordan and Vadas (1972) studied the intraspecific variation of *Fucus vesiculosus* on the coast of Maine, U.S.A. and found that whilst position within the zonation range did not affect either branching or vesiculation, the latter decreased in increased wave action, while both increased with decreasing salinity. Williams, Perkins and Gorman (1965) not only showed that cold or warm weather may influence the timing of reproduction in brown algae, but that the period during which mature receptacles were present on *Pelvetia canaliculata* and *Fucus spiralis* was much shorter at the upstream stations on the Urr estuary than at Rockcliffe on the Rough Firth.

The author and associates have worked on the Solway Firth for some 25 years. During this time a prime interest has been the influence of industrial waste upon this large estuary and its tributaries. Initially the work was centred upon Annan with the specific interest in the dispersal and accumulation of radioactive nuclides, since 1965 the focus of attention has been the Cumbrian coast which has always been the more heavily industrialised of the two. Throughout it has been considered necessary to treat the Solway Firth as a unit and so far as it is possible to consider the biology of a wide range of organisms. It was realised in 1961 that the brown algae inhabiting the intertidal were, by their sessile habit, likely to yield useful results regarding the effect of position in an estuary upon their seasonal cycle and interpretation of the amounts of radioactivity associated with them were freed from the complexities introduced when using a vagile, migratory species or the drifting planktonic species as a model (Perkins, 1964; Williams, Perkins and Gorman, 1965). This approach to monitoring has become more widely used in recent years, particularly during the present decade, though in most cases the view which seeks to associate such results with reproductive activity is ignored (Perkins, 1986). The ultimate test of viability of any living organism must be its ability to reproduce. Size and abundance may be poor indicators of such performance and whilst a large size and high productivity may be important to those humans wishing to exploit particular populations these criteria may be irrelevant in the context of species survival (Perkins, 1986). The author and associates have always conducted the Solway Firth investigation with these principles in mind. The present work is concerned with the performance of the brown algae *Pelvetia canaliculata, Fucus spiralis, F. vesiculosus* and *Ascophyllum nodosum* along a gradient of exposure to wave action and decreasing salinity in the Urr estuary (Fig. 1). As Williams, Perkins and Gorman (1965) shows these algae reproduce along the

whole gradient, but the present paper is concerned with the differences of morphology and size in these viable populations, and by re-examining the data of Williams, Perkins and Gorman (1965) considers particularly the effects of desiccation and rainfall upon these species.

Location and Station Positions

The Solway Firth, a major tributary of the north east Irish Sea, is a major estuary arising not from one large influent but as a contribution from a number of rivers of differing sizes and catchment areas. It also represents the western border between Scotland and England. Unlike the relatively simple Cumbrian coast of England, the

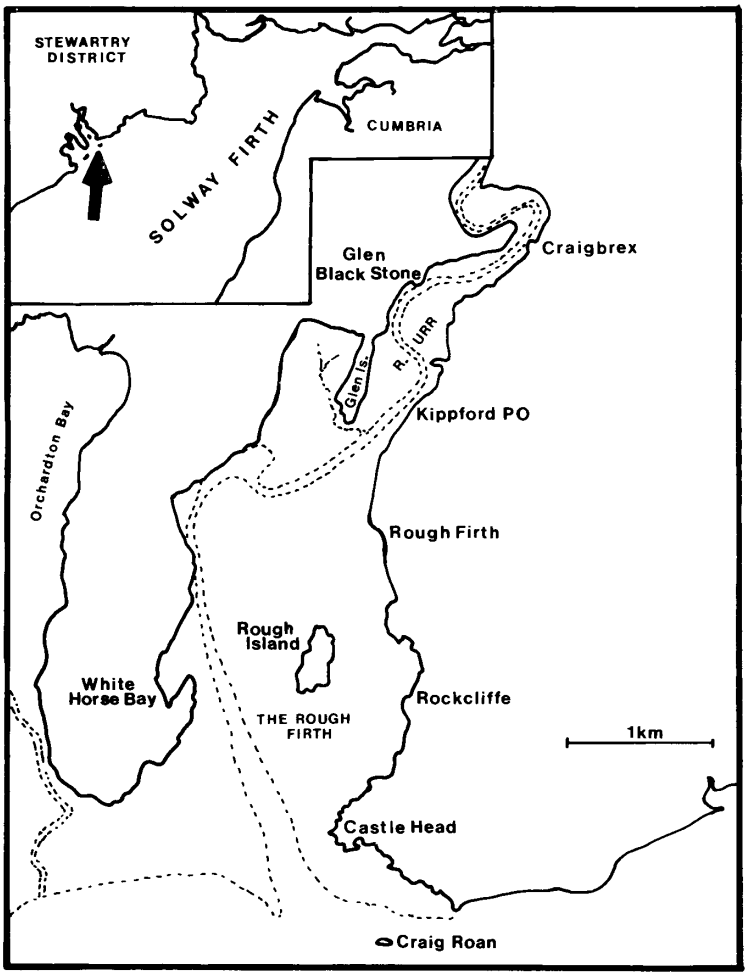

Fig. 1 Map of the River Urr Estuary showing station positions.
The Urr Estuary is arrowed in the inset.

Scottish coast of the outer Solway Firth is much indented by bays and estuaries, of which the Urr estuary is one (Fig. 1). The outer part of the estuary, known as the Rough Firth, has rocky margins, but the substratum is composed predominantly of the fine sands which characterise the Solway. The rocky margins persist as far upstream as Glen Isle and Kippford, but from the hamlet of Rough Firth the sediment becomes progressively finer with an increased proportion of the silt/clay fractions. Whilst *Zosteretum* is present downstream from Glen Isle/Kippford, it is at this point that the very fine salt marshes begin and thereafter dominate the substratum, and from this point upstream the opportunities for brown algal colonisation are offered only by the occasional emergent cobble, rock outcrop (e.g. Glen Black Stone) or man-made structure (e.g. Craigbrex) (see also Perkins, 1973). In the initial study, 1961-65, the stations used were at Rockcliffe, Rough Firth, Kippford Post Office, Glen Black Stone and Craigbrex and additional samples were collected monthly from Craig Roan, Rough Island and White Horse Bay (formerly known as Horse Isles Bay) by Mr J. Butler of Kippford. Use of these stations has continued since, but a further one, at Castle Head (Castlehill Point) was introduced in 1986.

Conditions at the individual stations were as follows:

Castle Head (NX 855524), exposed to the effects of wind and wave action in directions from the south west to south east, is partially sheltered from the east by sand banks which occupy much of the Solway. To the east of the head, and in its lee, is a small bay largely filled with boulders and cobbles, but with shingle in the most sheltered part at the foot of the cliff and sand at the low water mark. The brown algae vary in size depending upon the degree of shelter offered by the head. Associated residents included *Ulva lactuca*, *Enteromorpha linza*, *Ectocarpus* sp., *Porphyra umbilicalis*, *Chondrus crispus*, *Hildenbrandia* sp., *Ceramium rubrum*, *Polysiphonia lanosa* (growing on *Ascophyllum*), *Verrucaria maura*, *Lichina* sp., *Lanice conchilega*, *Sabellaria* sp., *Balanus balanoides*, *Elminius modestus*, *Patella vulgata*, *Littorina littorea*, *Littorina littoralis*, *Thais lapillus* and *Mytilus edulis*. It should be noted that the *Sabellaria* colonisation was abundant, forming large hummocks; where these hummocks were deteriorating colonisation by *Fucus vesiculosus* occurred.

The remaining stations were described by Perkins (1973); the following additional points should be noted. At Rockcliffe, only the lowermost fringe of *Fucus vesiculosus* came into contact with the muddy substratum. Associated organisms included *Cladophora* sp., *Gigartina stellata, Chondrus crispus, Hildenbrandia* sp., *Lithophyllum* sp., *Polysiphonia lanosa* (growing on *Ascophyllum*), *Verrucaria maura*, *Lichina* sp., *Balanus balanoides*, *Patella vulgata*, *Littorina littorea* and *Mytilus edulis*. It should be noted that this station is influenced by Mill Burn to the south of it. At Rough Firth, a greater proportion of the *F. vesiculosus* and some of the longer *Ascophyllum* came into contact with the muddy substratum. Associated organisms included *Enteromorpha linza*, *Hildenbrandia* sp., *Polysiphonia lanosa* (growing on *Ascophyllum*), *Verrucaria maura*, *Lichina* sp., *Zosteretum*, *Dynamena pumila, Actina equina, Balanus balanoides, Elminius modestus, Littorina littorea, L. saxatilis, L. littoralis* and *Mytilus edulis.*

At Kippford P.O. most of the plants downwards from the *Pelvetia* zone came into contact with the muddy substratum. Associated organisms were *Cochlearia*

officinalis, *Limonium* sp., *Armeria maritima*, *Aster tripolium* and *Spartina* sp. in the grass marsh fringe, algal mat marsh percursor in the muddy substratum, *Enteromorpha linza* and, on the stones among *F. spiralis*, *Lichina* sp.

At Glen Black Stone, the steep fall of the rock outcrop, jutting out into the flow of the Urr, kept many of the *Fucus vesiculosus* free of mud, although at this site all the algae came into a variable degree of contact with it. Associated organisms included *Enteromorpha linza*, *Ulothrix* sp., *Cladophora* sp. and *Verrucaria maura*. While the other stations had an open aspect, Glen Black Stone was very sheltered and shaded from the west by the Tornat Plantation on the hill beyond.

At Craigbrex, the rubble jetty fell steeply away to the bed of the Urr. The jetty, surrounded by salt marsh, was coated in substantial mud deposits upon the rock at all levels below the *Pelvetia* zone. Whilst obtrusive cobbles provided suitable sites for alae settlement, many were coated by mud and all algae other than *Pelvetia* experience a marked contact with the muddy substratum. Associated organisms, other than salt marsh plants were *Enteromorpha* sp. and *Ulothrix* sp. both of which were abundant, together with some *Balanus balanoides* and *Elminius modestus*.

Methods

Knight and Parke (1950) showed that the degree of branching in fucoid algae depends on age and the degree of exposure to wave action. Further, that once reproduction has ceased the fruiting fronds are shed. Bearing this in mind, the comparative study of length was carried out in February and March, 1986 since at this stage the onset of receptacle development could be observed, and whilst losses due to winter storms could not be corrected for, the major loss of frondage after reproduction would not affect the results. No attempt was made to consider the population structure at each station. A random sample of 25 or 50 of the larger plants of each species, at each station, was measured to the nearest 10mm upwards, in each case to the tip of the branch giving the greatest length. Because of its small, compact nature, *Pelvetia canaliculata* was not included.

In the study of dry/ash weights carried out in 1961-63 (Perkins and Williams, 1986), the algae with the exception of samples on 20 June 1962, were collected in the period at or about neap tides, either all samples were taken during the same tidal exposure or during the equivalent exposure on two successive days. Samples of ca 1 kg each of whole plants were placed in a strong polythene bag, taped tightly closed and transferred to the laboratory. Here they were first washed carefully to remove, as far as possible, the silt adhering to the fronds, and surplus water removed in a spin dryer. The sample was then dried to constant weight. Ashing of the dried sample was carried out, first by burning in a fume cupboard, and by completing the process in a muffle furnace. The ashed samples were then cooled and weighed. While the results of Williams, Perkins and Gorman (1965) have an obvious bearing upon the use of brown algae as indicator species in monitoring the impact of trace elements from anthropogenic sources, it is not intended to reopen the discussion of their results though their conclusions seem essentially fair. The intention here is to consider primarily the influence of estuarine position and climatic factors, viz., desiccation and rainfall upon the algae and then the importance of these factors in the process of monitoring. For this reason, the results obtained (Perkins and Williams, 1964; Williams, Perkins and Gorman, 1965) in this earlier work are recalculated and

presented as percentage composition of ash-free dry weight, thereby eliminating from the consideration any influence of silt firmly absorbed upon the algal surface. An influence which, as the analysis below indicates, may be significant.

In the consideration of desiccation and rainfall, no satisfactory system of measurement was available in the period of sampling. Evaporation was studied using a Piche evaporimeter retained in a Stevenson's Screen: results were considered as either the evaporation rate over 24h or the 6h day time evaporation rate expressed as a rate per 24h. Although spatial variations in rainfall are such that hydrologists do not require a close network of rain-gauges (e.g. Linsley and Kohler, 1951), or have a requirement for autographic instruments, their absence does impose constraints in some ecological studies. For all practical purposes the only Meteorological Office stations from which data could be applied to the present study were situated at the Mull of Galloway and Carlisle, and both were used in the analysis below.

Results

It will be noted, from the description of species associated with the four species of brown algae at each station above, that the characteristic change in algal species diversity and composition found in other estuaries is also evident in the Urr estuary.

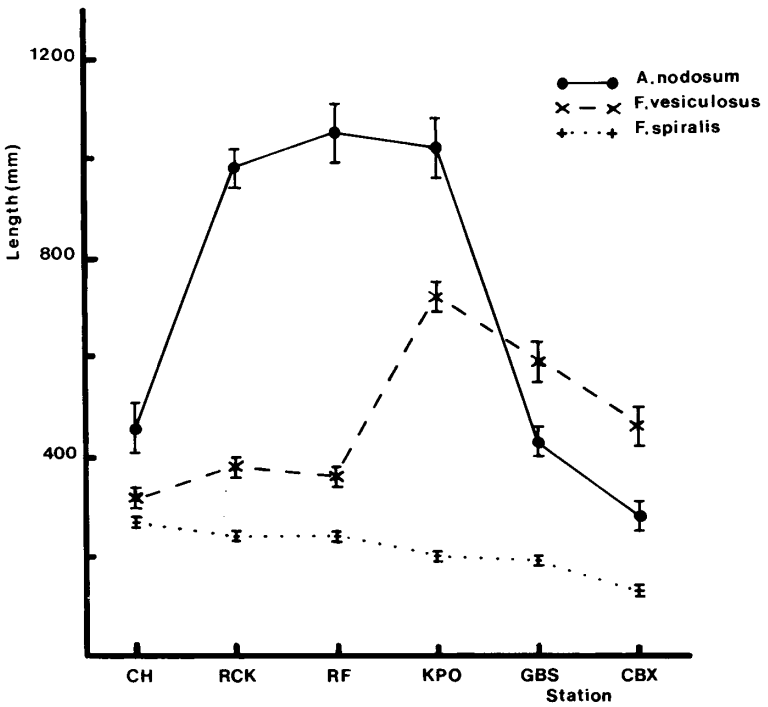

Fig. 2 The Mean Length of Brown Algae at Stations on the urr Estuary, 1986.
CBX - Craigbrex; CH - Castle Head; GBS - Glen Black Stone; KPO - Kippford Post Office; RCK - Rockcliffe; RF - Rough Firth.

TABLE 1

The mean length of brown algae in sheltered and exposed positions at Castle Head, 5.3.86.

	Mean Length (mm)			
Species	*"Sheltered"*	*Exposed*	*Combined Samples*	*Significance Level %*
F. spiralis	270±10	260±10	270±10	N.S.D.
F. vesiculosus	360±20	270±20	320±20	0.1
A. nodosum	770±50	150±10	460±50	0.1

Variations in frond length

Variations in the mean length of fronds of *Fucus spiralis*, *F. vesiculosus* and *Ascophyllum nodosum* along the Urr estuary are shown in Figure 2, in which they are compared with plants from Castle Head which faces directly on to the Solway Firth. The bay at Castle Head offers varying degrees of exposure to wave action and the mean lengths of algal fronds in more sheltered situations compared with those which are more exposed are given in Table 1. It will be seen that whilst there is no significant difference in the lengths of both groups of *F. spiralis*, the differences are significant at the 0.1% level for *F. vesiculosus* and *A. nodosum*. In the last species, many are strap-like and lack vesicles. In the comparison in Figure 2, the mean of all the frond lengths measured at Castle Head was used, and the statistical comparison of the other stations with Castle Head is given in Table 2. It will be seen that the response of the three species to changing environmental conditions differs. Thus *F. spiralis* gradually becomes smaller as the Urr estuary is ascended, and these differences compared with Castle Head were statistically significant. *F. vesiculosus* was shorter in the more open conditions of Castle Head and the Rough Firth, reached a maximum mean at Kippford P.O. and became shorter thereafter, though at both of the inner stations, it was markedly longer than at the three outer stations. *Ascophyllum* had the greatest mean length at Rockcliffe, Rough Firth and Kippford P.O.; indeed there was no statistical difference between the measurements at these stations. Upstream of Kippford P.O. the mean frond length shortened once more, there being no statistical difference between those at Glen Back Stone and Castle Head, but the plants at Craigbrex though significantly smaller than the combined sample from Castle Head, were nevertheless not significantly larger than the more exposed plants from Castle Head. It should be noted that there was no statistical difference between the mean lengths of *F. spiralis* at Rockcliffe and Rough Firth, similarly for *F. vesiculosus*.

It would appear from Figure 2, that the differences in wave exposure had little effect upon the mean length of *F. spiralis*, moreover the increasing shelter of the Urr offered no benefit to this species. Indeed, it apparently showed a response to reducing salinities by a gradual reduction in mean length. In contrast, both *F. vesiculosus* and *A. nodosum* initially derived benefit from the increasing shelter offered by the estuary. Thus, *F. vesiculosus* was evidently still influenced by exposure to wave action upstream to Rough Firth, though at Kippford P.O. it was sufficiently sheltered for growth to the maximum mean length, but growth thereafter

decreased under the influence of decreasing salinity. The plants from these inner stations were not, however, so severely affected by the increasing brackish conditions as the plants in the outer estuary were by exposure to wave action.

TABLE 2

Statistical significance of differences of mean length of brown algae along the Urr Estuary compared with those at Castle Head

Significance Level (%)

Species	*Rockcliffe*	*Rough Firth*	*Kippford P.O.*	*Glen Black Stone*	*Craigbrex*
F. spiralis	5.0	0.1	0.1	0.1	0.1
F. vesiculosus	0.1	1.0	0.1	0.1	0.1
A. nodosum	0.1	0.1	0.1	n	0.1

n = No significant difference

Mean length and reproduction

Williams, Perkins and Gorman (1965) showed that receptacle development of *Pelvetia canaliculata*, *Fucus spiralis*, *F. vesiculosus* and *Ascophyllum nodosum* proceeded to the mature state at all stations, though the process could be advanced or retarded by variations in temperature. Further, they showed that estuarine position had an influence upon the duration of the period when mature receptacles are present. No further evidence in this respect is offered herein. It should be noted, however, that the survey in varying forms has continued since 1964, and general notes taken indicate that populations at the estuarine stations are to be regarded as fully reproductive. Whilst the length measurements were undertaken early in the year, it was noted that receptacle development was proceeding normally at all stations. At Castle Head some 70% of the strap-like form of *Ascophyllum* (c.f ca 100% in the longer vesicular plants) were showing marked receptacle development, and this is consistent with observations at other stations e.g. Carrick in the Stewartry District and Lowca Point at St. Bees Head in Cumbria. At Lowca Point some 60% of the strap forms had well developed receptacles, while at St. Bees Head though plants of 65mm length bore well developed receptacles, these were present upon only 20% of the fronds, contrasting with ca 100% in the vesicular plants.

Ash free dry weights

The ash free dry weights are for sake of brevity referred to as A.F.D.W. in the following text.

The monthly means of A.F.D.W. of *Pelvetia canaliculata*, *Fucus spiralis*, *F. vesiculosus* and *Ascophyllum nodosum* at all stations are summarised in Table 3. It will be noted that these A.F.D.W. are subject to wide variations with no obvious relationship to seasonal change: a similar result is evident in Figure 3, which records the results from Kippford P.O. from September 1961 to April 1963. Similarly, there is no obvious gradient of A.F.D.W. from species to species, i.e. through the various zones of tidal exposure, and though the mean A.F.D.W. of *Pelvetia* was the highest, *F. spiralis* which might be expected in zonation terms to be next in order of magnitude was the lowest.

Intraspecific differences in ash free dry weight

The intraspecific variations in A.F.D.W. are recorded in Figure 4. Whilst *Pelvetia*, as a whole, apparently has a higher A.F.D.W. than other species at all stations, the relationships of the other species is far from clear. Taken as a whole, however, all four species tend to have lower A.F.D.W. at Craigbrex, the station furthest upstream, than at the other stations.

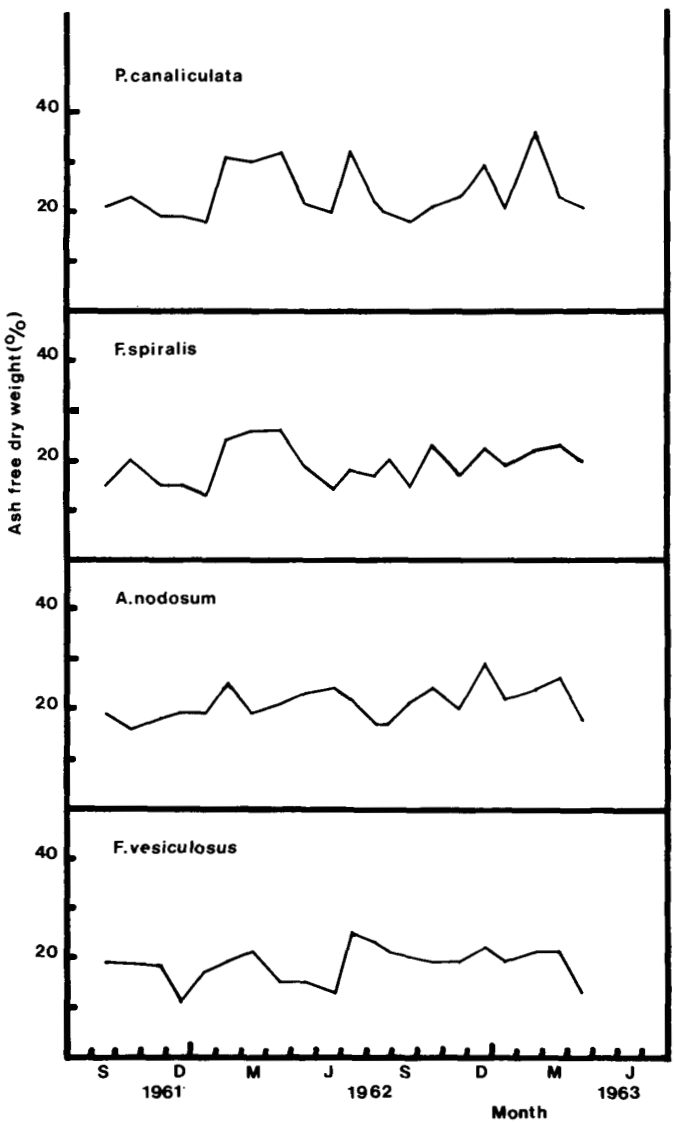

Fig. 3 Temporal Changes in the Ash Free Dry Weight of Brown Algae at Kippford PO. 1961-63.

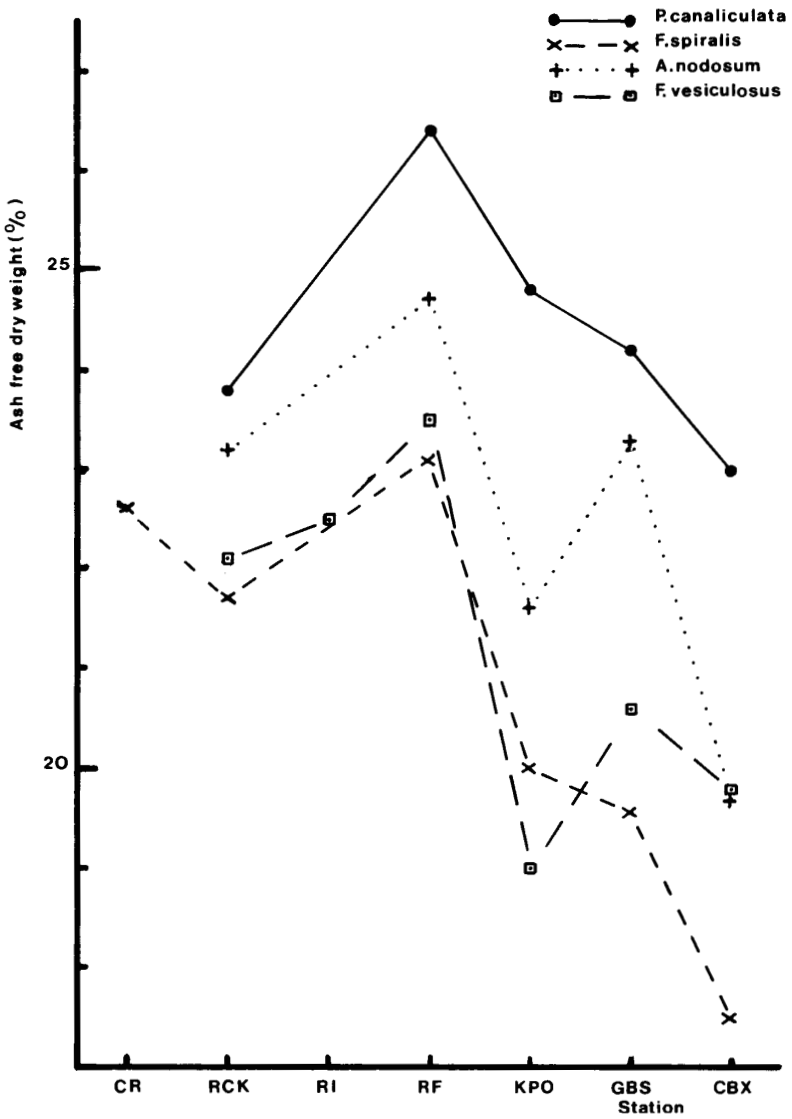

Fig. 4 Inter-station variations of Ash Free Dry Weight of Brown Algae in the Urr Estuary.
CR - Craig Roan; RI - Rough Island; others as Fig. 2.

Statistical analysis of this data either as a test of the significance of the difference of sample means, or as a comparison of the percentage A.F.D.W. in each sample by Student's t-test produced little clear evidence of a gradient in percentage A.F.D.W. The strongest discrimination was produced in the second of these tests (Table 4) from which it would seem that all four species at Craigbrex showed a reduction in A.F.D.W. to varying levels of significance. At Rockcliffe, though so far downstream, and apparently exposed to a higher salinity, the algae all showed a curiously low A.F.D.W. A similarly low mean of 21.4% A.F.D.W. was found in *F.*

TABLE 3

Monthly means of the ash free dry weight of the brown algae at all stations, 1962-63. Ash free dry weight expressed as percentage.

	Species							
	P. canaliculata		*F. spiralis*		*A. nodosum*		*F. vesiculosus*	
Date	*Mean*	*S.D.*	*Mean*	*S.D*	*Mean*	*S.D*	*Mean*	*S.D.*
17.1.62	20.2	2.3	17.1	2.6	23.4	4.8	20.1	4.5
14.2.62	27.8	7.0	24.3	2.4	23.9	1.6	21.0	4.1
14.3.62	29.3	6.0	21.3	3.9	19.9	4.8	26.3	5.8
18.4.62	23.0	6.3	23.0	2.1	20.7	5.2	18.5	4.2
16.5.62	24.6	5.7	24.0	6.0	23.5	7.5	16.7	2.7
28.6.62	23.9	3.7	16.2	2.2	25.5	2.8	15.4	2.7
12.7.62	32.5	2.7	20.4	4.4	22.4	4.0	31.0	3.8
23.8.62	22.4	2.5	14.9	3.4	21.6	3.2	20.6	1.2
20.9.62	21.4	3.4	17.4	3.3	20.5	3.4	22.5	3.4
18.10.62	19.4	4.0	18.3	5.2	21.2	3.5	21.8	3.0
22.11.62	25.0	4.2	19.1	3.8	22.5	2.9	20.6	2.5
19.12.62	21.5	4.6	21.1	2.8	25.5	5.0	20.9	3.2
16.1.63	21.9	2.7	20.7	3.1	22.7	1.5	20.7	3.1
21.2.63	34.0	3.7	23.4	3.3	25.9	3.0	22.2	2.5
20.3.63	24.3	2.6	26.0	3.6	24.4	5.3	21.4	1.9
17.4.63	20.4	3.9	19.7	1.9	17.3	1.4	15.2	2.4
Overall	24.5	—	20.4	—	22.6	—	20.9	—
Coefficient of variation (%)	17.7	—	15.5	—	10.3	—	18.4	—
Range (all samples)	14.0 — 38.6		12.6 — 32.0		11.6 — 32.9		12.8 — 34.7	

spiralis from White Horse Bay. The effect at Rockcliffe may be accounted for by the efflux of the Mill Burn reducing the salinity in the proximity of this station. At White Horse Bay, the influence of a reduced salinity is indicated by the presence of *Fucus ceranoides* which is characteristically associated with brackish conditions. This fucoid is found in the upstream reaches of the Urr estuary at Garden Reach, Palnackie, for example (Perkins, 1973). At Rough Firth, on the other hand where there is no comparable stream efflux, the A.F.D.W. were comparatively higher than at Rockcliffe, though in no species was the difference statistically significant. While the reduction of A.F.D.W. in *Pelvetia* and *Fucus spiralis* upstream of Rough Firth follows a pattern to be expected when ascending an estuary, the values for *Ascophyllum* and *F. vesiculosus* at first sight do not. These differences may, however, be explained in terms of the known hydrography of estuaries. Thus, for example, Day (1951) noted that in the middle reaches of an estuary, the water in the channel and the marginal banks up to half tide level will be exposed to sea water of a low and variable salinity. Above half tide level, however, when more saline water will have flooded the estuary, the margins are exposed to a higher and more stable salinity. Indeed this tendency to a higher salinity influencing higher shore levels even far up stream was shown by Newell (1962) to be an important influence in controlling the distribution of the gastropod mollusc *Hydrobia ulvae*. What seems to have happened upstream of Rough Firth, i.e. the point beyond which the channel narrows, is that *Pelvetia* and *Fucus spiralis* are influenced by a relatively sfable if

TABLE 4

Comparison of the statistical significance of intra-specific differences in the ash free dry weight (%) of brown algae at the different stations.
RCK = Rockcliffe; RF = Rough Firth; KPO = Kippford P.O.;
GBS = Glen Black Stone; CBX = Craigbrex.

Pelvetia canaliculata			**Significance Level (5)**		
	RCK	RF	KPO	GBS	CBX
RCK	—	n	n	n	n
RF	n	—	n	n	5
KPO	n	n	—	n	10
GBS	n	n	n	—	n
CBX	n	5	10	n	—
Fucus spiralis					
	RCK	RF	KPO	GBS	CBX
RCK	—	n	n	5	1
RF	n	—	2	0.1	0.1
KPO	n	2	—	n	2
GBS	5	0.1	n	—	10
CBX	1	0.1	2	10	—
Ascophyllum nodosum					
	RCK	RF	KPO	GBS	CBX
RCK	—	n	n	n	5
RF	n	—	2	n	1
KPO	n	2	—	n	10
GBS	n	n	n	—	10
CBX	5	1	10	10	—
Fucus vesiculosus					
	RCK	RF	KPO	GBS	CBX
RCK	—	n	0.1	n	n
RF	n	—	0.1	1	1
KPO	0.1	0.1	—	2	n
GBS	n	1	2	—	n
CBX	n	1	n	n	—

n = no significant difference

decreasing salinity. *F. vesiculosus* and *Ascophyllum* on the other hand were subject to the much more variable salinity to be expected at lower shore levels. The tendency to a reduction in A.F.D.W. consistent with the decreasing salinity is apparently negated by the results for Glen Black Stone, but this is not true. As noted in the station description, Glen Black Stone is characterised by a large rock outcrop which juts out into the main flow of the Urr, a condition which has persisted from 1961 to the present. The channel is narrow at this point and as a result of the water striking this outcrop, which is near vertical from the *Ascophyllum* zone downwards, substantial mixing of the water results so that *F. vesiculosus* in particular is exposed to a much lower salinity for longer in the ebb period than would otherwise be expected. *Ascophyllum* occupies a rather intermediate position and *Pelvetia* at the highest level being subjected to the most stable salinity has an A.F.D.W. consistent with more gradual reduction in mean A.F.D.W. and of salinity upstream of Rough Firth.

Interspecific differences in ash free dry weight (Table 5)

With respect to the interspecific differences in A.F.D.W. statistical analysis revealed that the overall mean A.F.D.W. of *Pelvetia* was significantly different from those of *F. spiralis* and *F. vesiculosus* at the 10 and 5% levels, but not from *Ascophyllum*, and no other difference reached significance. The differences between *Pelvetia* and the *Fucus* spp. became highly significant at Kippford P.O. and that with *F. spiralis* remained high at both Glen Black Stone and Craigbrex, however, the difference with *F. vesiculosus* was less significant (1.0% level) at Glen Black Stone and of a low order of significance (10% level) at Craigbrex. The difference between *Pelvetia* and *Ascophyllum* was significant only at Kippford P.O. and Craigbrex, i.e. at the 2 and 5% levels respectively. The difference between *F. spiralis* and *Ascophyllum* reached the 1.0% level at Glen Black Stone and the 10% level only at Kippford P.O. and Craigbrex. At no station were the differences between the two *Fucus* species significant. Taken as a whole the pattern is complex, with the ash free dry weights of *Pelvetia* being on the whole higher than that of the other species; this difference was not significant at Rockcliffe, of a very low order of significance at Rough Firth, but was highly significant at the remaining stations with respect to the *Fucus* spp, but less so for *Ascophyllum*. This pattern is in general consistent with that noted above with respect to the influence of estuarine position upon intra-specific differences. Indeed the general lack of a significant difference in the A.F.D.W. at Rockcliffe and Rough Firth supports this view and suggests that there is little intrinsic difference between these species, but that external hydrographic influences are important.

If this is true, one might therefore expect that the variations observed might follow a general pattern and that the A.F.D.W. of the species might be correlated. Regression analysis was therefore carried out using the mean values for all stations for each species. The analysis produced only one significant correlation viz between *Pelvetia* and *Fucus vesiculosis* with a correlation coefficient = 0.576 which was significant at the 2% level. There was a very weak correlation between *Pelvetia* and *F. spiralis* (cc = 0.428, 10% level of significance), but no other correlation was found.

Ash free dry weights and meteorological factors

Of course, while the underlying relationship may be controlled by the salinity gradient in an estuary, the phenomenon of zonation necessarily implies that the higher the shore level inhabited the more the organism is exposed to variations in atmospheric conditions, even at spring tides. During the neap tide periods, the existence of *Pelvetia*, in particular, is almost terrestrial. At this time, the processes of desiccation either by evaporation or freeze-drying and osmotic flooding in prolonged rainfall must be considered dominant factors. These phenomena may be observed during appropriate field work, and may be expected to have had an important influence on the samples under consideration. The effects are less easily analysed quantitatively.

To consider rainfall first, there was no recording raingauge available in 1961-63 and for the purposes of the analysis the most useful information available was that from Meteorological Office stations at the Mull of Galloway and Carlisle. Any link with the Urr was therefore tenuous. In each case, the rainfall of the 10 day period

prior to taking the samples was compared in a regression analysis with the mean A.F.D.W. of each species for all stations. The analysis produced very weak correlations between the A.F.D.W. of *Pelvetia* and rainfall at the Mull of Galloway and Carlisle, viz., correlation coefficients of 0.47 and 0.45 respectively, both significant at the 10% level. No correlation was found between rainfall and the other three species. This is probably the best that can be expected of such inherently weak data and may be taken to suggest that a link exists which is worth pursuing further in the presence of more adequate instrumentation.

The influence of evaporation in the desiccation of exposed seaweed cannot be explored directly since no evaporation gauge was operational in the area at the appropriate time. Nevertheless, an indirect analysis can be attempted. First of all, it is frequently observed both under the hot summer sun and during clear, cold days of winter accompanied by a strong wind, particularly from the east, that upon exposure by the receding tide, the brown algae, particularly *Pelvetia* and *F. spiralis* gradually darken and dry out to the point of brittleness. The results for the months of February to April and July 1962 at Kippford P.O. (Fig. 3) are consistent with this, assuming that the evaporation were similar in the two periods. The rate of evaporation is measured daily at Birkby, by means of a Piche evaporimeter (see for example, Prescott and Stirk, 1951) retained in a Stevenson's screen. Monthly results are not easily compared since in February the water column so often freezes and the evaporimeter has to be removed from the screen: a time which shore observation suggests provides the most severe drying conditions for the algae. The months of June and February are compared from 1983-86 in Table 6. It will be noted, as expected, that the mean rate of evaporation is always higher in the day than for the 24h period as a whole and similarly for June compared with February. It is, however, the range of values experienced during the day which are of greater interest, for it will be seen that the maximum rates in February may equal or even substantially exceed the mean rate for June. Moreover, the mean rate for February 1986 actually exceeded the mean rate for June 1984. Clearly, then, the potential for high A.F.D.W. to arise through desiccation exists to an equal degree in February and June, though the rates recorded by the screened Piche evaporimeter may be considerably lower than is experienced by dark algae exposed to a strong sun and wind.

Ash weights and ash free dry weights

It was a premise of this investigation that use should be made of A.F.D.W. to eliminate the influence of silt, attached to the algal surface, upon the ash weight. Whilst this at first sight seems a wise precaution, it is essentially unsubstantiated. To test the validity of this premise, it was considered that if the percentage ash and A.F.D.W. contents of the algae were related to intrinsic metabolic processes, that they ought to be correlated. These parameters were compared by regression analysis. It was found that those plants in the outer estuary likely to be subject to little direct deposition of silt did show a strong positive correlation (e.g. in *Pelvetia* at Rockcliffe the correlation coefficient = 0.778, significant at the 0.1% level). In the outer estuary and from Kippford P.O. upstream, where the plants came into contact with the silty substratum, the results tended to show no significant correlation and at Craigbrex the *Pelvetia* showed a negative correlation (correlation coefficient = -0.678) which was significant at the 1% level. Considering the ash content of

Pelvetia, in particular, the mean percentage composition of ash was 5.4, 5.8, 5.5, 6.1 and 22.1 in plants from Rockcliffe, Rough Firth, Kippford P.O., Glen Black Stone and Craigbrex respectively. Clearly, it may be particularly difficult to remove silt attached to algae taken from the muddy upper reaches of estuaries and great care is necessary in this respect.

Discussion

As stated in the introduction the original basis of this study was concerned with the impact of waste disposal and to a considerable degree the relevance of this data to this problem is a major part of its outcome. Nevertheless, the scope is much wider than this. Even in the present day, so many studies of benthos distribution of trace substances in benthic organisms, for example, are performed without reference to function and, in particular, the ability of the individual organism or community to reproduce successfully, or indeed to the mode of reproduction as a whole. That this is unwise was first, and very adequately, demonstrated by Buchanan (1966), and has since been elaborated by Perkins and Nottage (1983) for *Abra alba* and by Perkins (1984) for *Pagurus bernhardus*. While Buchanan (1966) showed that abundance is no criterion of reproductive ability, Perkins (1986) showed that size, particularly a small size is no indication that reproduction will not take place.

The present study in some measure widens the scope of this consideration, for the four species of algae, viz., *Pelvetia canaliculata*, *Fucus spiralis*, *F. vesiculosus* and *Ascophyllum nodosum* are all found to produce mature receptacles under a wide range of environmental conditions and at a wide range of sizes, including in the case of *Ascophyllum* reduction to a strap-form of 65mm length under exposure to strong wave action.

The variations in frond length within the Urr estuary were shown to be consistent with the salinity variations to be expected in such an estuary. Similarly, the influence of shelter in the outer estuary, or Rough Firth, upon *Ascophyllum nodosum* and in the inner estuary upon *F. vesiculosus* was consistent with the observations of Knight and Parke (1950) on *F. vesiculosus* and *F. serratus*, but contrasts with that on the coast of Nova Scotia studied by Mann (1972). *Fucus spiralis*, which has the largest plants in the exposed conditions at Castle Head, and becomes gradually shorter in the increasing shelter of the Urr, contrasts with their study also.

No detailed study of vesiculation of *A. nodosum* or *F. vesiculosus* was made, with regard to the former, it has already been noted that strap-like forms lacking vesicles occurred in the exposed conditions at Castle Head. Vesiculation of *Ascophyllym* was marked in the middle reaches of the estuary, but was much reduced at Craigbrex.

The ash free dry weights (A.F.D.W.) of these algae were shown to be highly variable, but with no clear relationship to season or zonation pattern. The most evident pattern to emerge could be related to the known hydrography of estuaries. No clear indication of interspecific differences in A.F.D.W. emerged though average values for *Pelvetia* were consistently higher and those for *F. spiralis* were consistently lower than those for the other species. This apparently does not conform to an expected zonation pattern. There is here a measure of similarity with the rates

of evaporation from these algae determined in the laboratory by Dorgelo (1976). Nevertheless, the apparent highly significant difference between *P. canaliculata* and *F. spiralis* at the upstream stations, was reduced to a very low level of significance at Rough Firth and was absent at Rockcliffe. Further, month to month variations at the individual stations are not consistent with this pattern either.

It might be expected that the A.F.D.W. of *P. canaliculata* and *F. spiralis* would be affected by rainfall, but a weak correlation was found for *Pelvetia* only. This is probably a consequence of the weak data used and should be pursued further with better instrumentation and an adequate knowledge of the fresh water flow of the R. Urr. Like rainfall, the potential influence of desiccation is evident in the data presented, but no direct data are offered here.

Given that the A.F.D.W. of these four species of algae is broadly controlled by the salinity regime of the waters to which they are exposed, it is clear that there are influences which produce wide day to day variations (Table 7). While the precise influence of rainfall and desiccation in producing the results obtained is uncertain, there is one clear consequence which follows from a knowledge of these variations. It seems generally true that in taking samples of algae for studies of trace element/residue content that the influence of these marked variations may be recognised and eliminated by relating the analyses to the dry weight of the sample (e.g. Black and Mitchell, 1952; Bryan and Hummerstone, 1973; Saenko *et al*, 1976) and for many comparative purposes this is clearly a valid approach. It does, however, beg the question of the concentrations to be expected in "wet" tissues and in consequence cannot provide any insight into the ecotoxicology including somatic function and reproductive capacity of those algae influenced by the natural variations of environmental and anthropogenic introductions of such substances. Clearly, there is a great deal to be learned of the influence of climatic and hydrographic factors in controlling the water content, and thereby the percentage dry weight of these algae. Perhaps, as a preliminary approach all values should be standardised to a particular dry weight. 20% or 25% say, which would at least provide a stricter means of comparison.

Simultaneously, the means whereby algal fronds may be cleansed of attached silt needs to be explored thoroughly, for it is in those situations where such attachment of particulate matter is most likely to occur that one may expect the highest concentrations of pollutants upon the silt particles anyway. Results for the Urr showed that this cleansing may be difficult and yet whatever method is used should not interfere with the intended measurements. These results for the Urr are consistent with those of Brian and Hummerstone (1973) who found that surface contamination could be removed by scrubbing, but the amount was such that it did not invalidate the results obtained when the algae were cleaned only by shaking in water. In the work of Bryan and Hummerstone (1973) the principal loss upon scrubbing occurred with iron and manganese and the assumption clearly was that all the iron and manganese loss was due to that adsorbed upon silt, but is this really so and would it be so for elements other than copper, lead and zinc which they also measured? Although the silt particles attached to the algae may carry a substantial burden of the trace substance being measured and thus influence the results, the silt even if it carries no trace substance whatsoever still influences the final result because

of its effect upon the total ash and dry matter content. Finally, since such quantities of silt, attached to or deposited upon the algae, may be both substantial and variable, the inherent influence of this silt upon the total performance of the algal species is surely worthy of further investigation.

TABLE 5

Comparison of the statistical significance of interspecific differences in the ash free dry weight (%) of brown algae at the different stations.

	Significance Level (%)			
Rough Firth				
	Pc	Fs	An	Fv
Pc	—	10	n	5
Fs	10	—	n	n
An	n	n	—	n
Fv	5	n	n	—
Kippford P.O.				
	Pc	Fs	An	Fv
Pc	—	0.1	2	0.1
Fs	0.1	—	10	n
An	2	10	—	2
Fv	0.1	n	2	—
Glen Black Stone				
	Pc	Fs	An	Fv
Pc	—	0.1	n	1
Fs	0.1	—	1	n
An	n	1	—	n
Fv	1	n	n	—
Craigbrex				
	Pc	Fs	An	Fv
Pc	—	0.1	5	10
Fs	0.1	—	10	n
An	5	10	—	n
Fv	10	n	n	—

An = *Ascophyllum nodosum*, Fs = *Fucus spiralis*, Fv = *F. vesiculosus*, Pc = *Pelvetia canaliculata*.
n = not significantly different.

N.B. In the same test carried out on data from Rockcliffe none of the differences were significant.

TABLE 6

Comparison of evaporation rates (mm per 24h) at Birkby, 1983-86.

Year	*Month*	*0900 - 1500*		*24h*	
		Mean	*Range*	*Mean*	*Range*
1983	June	27.1	7.3 - 52.3	14.8	4.9 - 27.4
1984	Feb	8.4	0 - 18.2	5.6	1.8 - 16.4
	June	14.0	0 - 26.8	9.2	3.0 - 18.5
1985	Feb	7.9	4.9 - 13.4	5.4	1.8 - 8.8
	June	17.6	4.8 - 42.8	11.3	3.3 - 27.0
1986	Feb	14.9	4.8 - 27.3	8.7	5.4 - 13.3

TABLE 7

The range of ash free dry weight in each species during each sampling period.

Species	*Ash free dry weight* (%)	
	Mean	*Overall*
Pelvetia canaliculata	10.2	5.6 - 17.5
Fucus spiralis	8.2	4.5 - 13.4
F. vesiculosus	7.7	2.9 - 11.8
Ascophyllum nodosum	9.4	3.2 - 20.1

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WILD PLANTS OF DUMFRIESSHIRE

(V-c 72 DUMFRIES). 1985

by

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Rogate, Lochmaben

Dumfriesshire is one of the few counties in south Scotland to be the subject of a full flora (*The Flora of Dumfriesshire including part of the Stewartry of Kirkcudbright*, Scott-Elliot 1896), but with the passage of time it had become rather outdated. This situation was rectified in 1972 when the previous Recorder, Dr. H. Milne-Redhead following many years of fieldwork, published in the *Transactions of Dumfriesshire and Galloway Natural History and Antiquarian Society* Vol. XLIX his Check-list of the Flowering Plants, Ferns and Fern-Allies of the Vice-Counties of Dumfries, Kirkcudbright and Wigtown. More recently, as a result of the work of the Recorders Stuart and Mary Martin and their helpers, there has been an extension of knowledge of the plants of Dumfriesshire and the present list is intended to itemize all those known to occur.

Records for the critical genera are based on determinations by accepted authorities. Other entries are based on detailed records on the Botanical Society of the British Isles' cards held by the current Recorder.

The Check-list is made out with English names to show gratitude to the people who love the countryside and like to know the names of what they see. There are many who may not realise the help, and encouragement to continue, that came from their attending Stuart Martin's Extra Mural classes on Wild Flowers. It is essential that by Field Meetings and friendly outings the number of known sites for each species should be increased throughout the county, and perhaps new plants found. Every plant being recorded, as well as noting those that do become lost, is an ideal very far from completion.

Books for reference

Full text, *Flora of the British Isles*, A. R. Clapham, T. G. Tutin, and E. F. Warburg, second edition.

Excursion Flora of the British Isles, A. R. Clapham, T. G. Tutin, and E. F. Warburg, third edition. Botanical names are mostly as used in this book.

Four BSBI Handbooks purposely written and factually illustrated for each taxon.

1. *Sedges of the British Isles*, A. C. Jermy, A. O. Chater, and R. W. David, 1981.
2. *Umbellifers of the British Isles*, T. G. Tutin, 1980.
3. *Docks and Knotweeds of the British Isles*, J. E. Lousley and D. H. Kent, 1981.
4. *Willows and Poplars of Great Britain and Ireland*, R. D. Meikle, 1984.

English Names of Wild Flowers, J G. Dony, C. M. Robb, and F. H. Perring.

Grasses, C. E. Hubard.

Signs and Contractions

A. after a species means it has been added since 1972. It may also mean refound from Scott-Elliot's time.

* Known or believed to have been introduced into the British Isles, or even from England to Scotland.

esc. Garden escapes via dumps and old sites.

P. Planted, more often applied to trees.

x Hybrid.

ssp. Subspecies, and var. for variety.

V-c 72 Dumfries (in the heading). Dr E. C. Watson, the doyen of recording, numbered all counties or suitable areas, from the south to the north, calling them Vice-counties. He gave Dumfriesshire No. 72 and boundaries were as in 1852. These are still used for Natural History recording in Scotland.

PTERIDOPHYTES

CLUBMOSSES

Lycopodium clavatum	Stag's-horn Clubmoss
Huperzia selago	Fir Clubmoss
Diphasiastrum alpinum	Alpine Clubmoss
Selaginella selaginoides	Lesser Clubmoss

HORSETAILS

Equisetum hyemale A.	Rough Horsetail or Dutch-rush
E. variegatum	Variegated Horsetail
E. fluviatile	Water Horsetail
E. arvense	Field Horsetail
E. pratense	Shady Horsetail
E. sylvaticum	Wood Horsetail
E. palustre	Marsh Horsetail
E. telmateia	Great Horsetail

FERNS

Botrychium lunaria A.	Moonwort
Cryptogramma crispa	Parsley Fern
Hymenophyllum tunbrigense	Tunbridge Filmy-fern
H. wilsonii	Wilson's Filmy-fern
Polypodium vulgare	Common Polypody
P. interjectum A.	Intermediate Polypody
P. australe A.	Southern Polypody
P. x *mantoniae* A. (*P. interjectum* x *vulgare*)	
P. x *font-queri* A. (*P. australe* x *vulgare*)	
P. x *shivasiae* A. (*P. australe* x *interjectum*)	
Pteridium aquilinum	Bracken
Phegopteris connectilis	Beech Fern
Oreopteris limbosperma	Lemon-scented or Mountain Fern
Asplenium scolopendrium (*Phyllitis*)	Hart's-tongue Fern
A. adiantum-nigrum	Black Spleenwort
A. trichomanes ssp. *trichomanes* A.	Maidenhair Spleenwort
ssp. *quadrivalens*	Maidenhair Spleenwort
A. viride	Green Spleenwort

A. ruta-muraria	Wall Spleenwort
Ceterach officinarum	Rustyback
Athyrium filix-femina	Lady Fern
Gymnocarpium dryopteris	Oak Fern
Cystopteris fragilis	Brittle Bladder-fern
Woodsia ilvensis	Oblong Woodsia
Polystichum aculeatum	Hard Shield-fern
P. setiferum A.	Soft Shield-fern
P. x *bicknellii* A. (*P. aculeatum* x *setiferum*)	
Dryopteris oreades A.	Mountain Male Fern
D. filix-mas	Male Fern
D. affinis	Scaly Male Fern
D. carthusiana	Narrow Buckler Fern
D. dilatata	Broad Buckler Fern
D. x *deweveri* A. (*D. carthusiana* x *dilatata*)	
Blechnum spicant	Hard Fern
**Matteucia struthiopteris* A.	Ostrich Fern

GYMNOSPERMS Conifers

Taxus baccata	Yew, (dioecious)
**Araucaria araucana P.*	Monkey Puzzle, (dioecious)
**Chamaecyparis lawsoniana*	False Cypress
Juniperus communis	Juniper, (dioecious)
**Thuja plicata*	Western Red Cedar
**Abies alba*	Common Silver Fir
**A. procera*	Noble Fir
**A. grandis*	Grand Fir
**Larix decidua*	European Larch
**L. kaempferi*	Japanese Larch
**L.* x *eurolepis* (*L. eurolepis* x *kaempferi*)	Hybrid Larch
**Picea abies*	Norway Spruce
**P. sitchensis*	Sitka Spruce
**Tsuga heterophylla*	Western Hemlock
**Pseudotsuga menziesii*	Douglas Fir
Pinus sylvestris	Scots Pine
**P. contorta*	Lodgepole Pine
**P. monticola*	Western White Pine

The 3 native species, Juniper, Scots Pine and Yew are known to regenerate within the county, but this may not always be so obvious in the case of Yew which has been so often planted. The introduced Monkey Puzzle has not yet been recorded as regenerating in the wild. For the other conifers I am grateful to the Forestry Commission and head foresters of Estates in the county for their help with this group, not an easy one for a Field Botanist to tackle. Foresters have also played a useful part by telling me of the existence of interesting hill and moorland plants within the apparent fastnesses of dark conifer areas.

ANGIOSPERMS

DICOTYLEDONS

RANUNCULACEAE

Caltha palustris	Marsh Marigold
Trollius europaeus	Globe Flower
Aconitum napellus A.	Monk's-hood
Anemone nemorosa	Wood Anemone
A. ranunculoides A.	Yellow Wood Anemone

Ranunculus acris	Meadow Buttercup
R. repens	Creeping Buttercup
R. bulbosus	Bulbous Buttercup
R. auricomus	Goldilocks
R. flammula	Lesser Spearwort
R. sceleratus	Celery-leaved Crowfoot
R. hederaceus	Ivy-leaved Water-Crowfoot
R. fluitans	Long-leaved Water-Crowfoot
R. omiophyllus	Lenormand's Water-Crowfoot
R. trichophyllus	Short-leaved Water-Crowfoot
R. peltatus	Common Water-Crowfoot
R. penicillatus var. *calcareus* (tentative)	
F. ficaria	Lesser Celandine
Aquilegia vulgaris	Columbine
Thalictrum flavum A.	Common Meadow Rue
T. alpinum	Alpine Meadow Rue
T. minus	Lesser Meadow Rue

BERBERIDACEAE

Berberis vulgaris A.	Barberry
**Mahonia aauifolium*	Oregon Grape

NYMPHAEACEAE

Nymphaea alba	White Water-lily
Nuphar lutea	Brandy Bottle
N. x *spennerana*	Hybrid Yellow Water-lily

CERATOPHYLLACEAE

Ceratophyllum demersum	Rigid Hornwort

PAPAVERACEAE

Papaver rhoeas A.	Field Poppy
P. dubium	Long-headed Poppy
**P. somniferum* A.	Opium Poppy
Meconopsis cambrica	Welsh Poppy
Chelidonium majus	Greater Celandine

FUMARIACEAE

Corydalis claviculata	Climbing Corydalis
**C. lutea*	Yellow Corydalis
Fumaria capreolata A.	White Ramping Fumitory
F. bastardii A.	Tall Ramping Fumitory
F. muralis ssp. *boraei*	Common Ramping Fumitory
F. officinalis	Common Fumitory

CRUCIFERAE

Brassica napus	Rape
B. rapa	Wild Turnip
Rhynchosinapis monensis	Isle of Man Cabbage
Sinapis arvensis	Charlock
Raphanus raphanistrum	Wild Radish
R. maritimus A.	Sea Radish
Crambe maritima	Sea Kale
Cakile maritima A.	Sea Rocket
Lepidium heterophyllum	Smith's Pepperwort
Coronopus didymus	Lesser Swinecress
**Cardaria draba*	Hoary Pepperwort
Thlaspi arvense A.	Field Penny-cress
Teesdalia nudicaulis A.	Shepherd's Cress

Capsella bursa-pastoris	Shepherd's Purse
Cochlearia anglica, (not confirmed)	English Scurvy-grass
C. officinalis ssp. *officinalis*	Scurvy-grass
ssp. *alpina*	
Subularia aquatica, (not refound)	Awlwort
Erophila verna	Whitlowgrass
Draba muralis A.	Wall Whitlowgrass
**Armoracia rusticana* A.	Horse-radish
Cardamine pratensis	Cuckooflower, Lady's Smock
double variety	Double Cuckooflower
C. amara	Large Bitter-cress
C. flexuosa	Wood, or Wavy Bitter-cress
C. hirsuta	Hairy Bitter-cress
**C. raphanifolia* A.	
**C. bulbifera* A.	Coralroot
Barbarea vulgaris	Winter-cress
**B. intermedia* A.	Medium-flowered Winter-cress
**Arabis caucasica*	Garden Arabis
A. hirsuta	Hoary Rock-cress
Nasturtium officinale	Green, or Summer Water-cress
N. microphyllum	One-rowed Water-cress
N. microphyllum x *officinale*	Brown, or Winter Water-cress
Rorippa sylvestris	Creeping Yellow-cress
R. palustris	Marsh Yellow-cress
**Hesperis matronalis* A.	Dame's Violet
**Erysimum cheiranthoides*	Treacle Mustard
Alliaria petiolata	Garlic Mustard
Sisymbrium officinale	Hedge Mustard
Arabidopsis thaliana	Thale Cress
**Camelina sativa*	Gold of Pleasure

RESEDACEAE

Reseda luteola A.	Weld, Dyer's Rocket

VIOLACEAE

Viola odorata	Sweet Violet
V. riviniana	Common Violet
V. canina A.	Heath Violet
V. palustris	Marsh Violet
V. lutea	Mountain Pansy
V. tricolor	Wild Pansy
V. arvensis ssp. *arvensis*	Field Pansy
ssp. *curtisii*	
V. arvensis x *tricolor*	Hybrid Wild Field Pansy

POLYGALACEAE

Polygala vulgaris	Common Milkwort
P. serpyllifolia	Thyme-leaved Milkwort

HYPERICACEAE

Hypericum androsaemum	Tutsun
H. perforatum	Perforate or Common St. John's-wort
H. maculatum	Imperforate St. John's-wort
H. ssp. *obtusiusculum* (not confirmed)	
H. x *desetangsii* (confirmed)	
(*H. maculatum* x *perforatum*)	
H. tetrapterum	Square-stalked St. John's-wort
H. humifusum	Trailing St. John's-wort
H. pulchrum	Slender St. John's-wort
H. hirsutum	Hairy St. John's-wort

CISTACEAE

Helianthemum nummularium	Common Rockrose

CARYOPHYLLACEAE

Silene vulgaris	Bladder Campion
S. maritima	Sea Campion
S. dioica	Red Campion
S. alba	White Campion
S. alba x *S. dioica*	Hybrid Red and White Campion
Lychnis flos-cuculi	Ragged Robin
Saponaria officinalis	Soapwort
Cerastium arvense A.	Field Mouse-ear Chickweed
**C. tomentosum* esc.	Snow-in-Summer
C. alpinum	Alpine Mouse-ear Chickweed
C. fontanum	Common Mouse-ear Chickweed
C. glomeratum	Sticky Mouse-ear Chickweed
C. diffusum	Dark Green Mouse-ear Chickweed
Stellaria nemorum	Wood Stitchwort
S. media	Chickweed
S. holostea	Greater Stitchwort
S. palustris	Marsh Stitchwort
S. graminea	Lesser Stitchwort
S. alsine	Bog Stitchwort
Sagina apetala ssp. *erecta*	Annual Pearlwort
S. maritima	Sea Pearlwort
S. procumbens	Procumbent Pearlwort
S. nodosa	Knotted Pearlwort
Honkeyna peploides	Sea Sandwort
Moehringia trinervia	Three-leaved Sandwort
Arenaria serpyllifolia ssp. *serpyllifolia*	Thyme-leaved Sandwort
ssp. *leptoclados* A.	More Slender Thyme-leaved Sandwort
Spergula arvensis	Spurrey
Spergularia rubra	Sand Spurrey
S. media	Greater Sea Spurrey
S. marina	Lesser Sea Spurrey

ILLECEBRACEAE

Scleranthus annuus	Knawel

PORTULACEAE

Montia fontana ssp. *fontana*	Blinks
ssp. *variabilis*	
**M. sibirica*	Pink Purslane, (white), Claytonia

CHENOPODIACEAE

Chenopodium bonus-henricus	Good King Henry
C. album	Fat Hen
Atriplex patula	Common Orache
A. glabriuscula	Babington's Orache
A. prostrata	Hastate Orache
Suaeda maritima	Herbaceous Seablite
Salsola kali A.	Saltwort
Salicornia agg. A.	Glasswort, Marsh Samphire, 2 species

TILIACEAE

Tilia x *vulgaris*	Common Lime

MALVACEAE

Malva moschata — Musk Mallow
M. sylvestris — Common Mallow

LINACEAE

Linum catharticum — Purging Flax

GERANIACEAE

Geranium pratense — Meadow Cranesbill
G. sylvaticum — Wood Cranesbill
**G. phaeum* A. — Dusky Cranesbill
**G. macrorrhizum* A. esc.
G. dissectum — Cut-leaved Cranesbill
G. molle — Dove's-foot Cranesbill
G. lucidum — Shining Cranesbill
G. robertianum — Herb Robert
Erodium cicutarium — Common Storksbill

OXALIDACEAE

Oxalis acetosella — Wood-sorrel
var. with red-purple flowers
**O. corniculata* A. — Procumbent Yellow Sorrel
**O. europaea* A. — Upright Yellow Sorrel

BALSAMINACEAE

**Impatiens parviflora* — Small Balsam
**I. glandulifera* — Policeman's Helmet

ACERACEAE

**Acer pseudoplatanus* — Sycamore
**A. platanoides* — Norway Maple

HIPPOCASTANACEAE

**Aesculus hippocastanum* — Horse-chestnut

AQUIFOLIACEAE

Ilex aquifolium — Holly

CELASTRACEAE

**Euonymus europaeus* P. — Spindle Tree

BUXACEAE

Buxus sempervirens P. A. — Box

LEGUMINOSAE

**Laburnum anagyroides* — Laburnum
Genista tinctoria — Dyer's Greenweed
G. anglica A. — Petty Whin
Ulex europaeus — Furze, Gorse, Whin
U. gallii — Dwarf Furze
Cytisus scoparius — Broom
Ononis repens — Restharrow
O. spinosa — Spiny Restharrow
Medicago lupulina — Black Medick
Trifolium pratense — Red Clover
T. medium — Zigzag Clover
**T. hybridum* — Alsike Clover
T. repens — White or Dutch Clover
T. fragiferum A. — Strawberry Clover
T. campestre — Hop Trefoil

T. dubium	Lesser Yellow Trefoil
Anthyllis vulneraria	Kidney Vetch, Ladies' Fingers
Lotus corniculatus	Common Bird's-foot Trefoil
L. uliginosus	Greater Bird's-foot Trefoil
Ornithopus perpusillus	Bird's-foot
**Coronilla varia* A.	Crown Vetch
Vicia cracca	Tufted Vetch
V. orobus	Wood Bitter Vetch
V. sylvatica	Wood Vetch
V. sepium	Bush Vetch
V. sativa ssp. *sativa*	Common Vetch
ssp. *nigra*	
spp. *bobartii*	
V. lathyroides A.	Spring Vetch
Lathyrus pratensis	Meadow Vetchling
L. montanus	Bitter Vetch

ROSACEAE

**Spiraea douglasii* A.	Willow Spiraea
Filipendula ulmaria	Meadow Sweet
Rubus chamaemorus	Cloudberry
R. saxatilis	Stone Bramble
R. idaeus	Raspberry
R. fruticosus	Bramble, Blackberry
R. nessensis	
R. scissus	
R. plicatus	
R. latifolius	
R. nemoralis	
R. leptothyrsos	
R. polyanthemus	
R. rhombifolius	
R. lindebergii	
R. errabundus	
R. ulmifolius	
R. procerus	
R. vestitus	
R. infestus	
R. echinatoides	
R. dasyphyllus	
Potentilla palustris	Marsh Cinquefoil
P. sterilis	Barren Strawberry
P. anserina	Silverweed
P. argentea	Hoary Cinquefoil
P. crantzii	Alpine Cinquefoil
P. ssp. *erecta*	Tormentil
ssp. *strictissima* A.	
P. anglica	Trailing Tormentil
P. reptans	Creeping Tormentil
Fragaria vesca	Wild Strawberry
**F. ananassa*	Garden Strawberry
Geum urbanum	Wood Avens, Herb Bennet
G. rivale	Water Avens
G. x *intermedium*	Hybrid Avens
Agrimonia eupatoria	Agrimony
A. procera	Fragrant Agrimony
**Alchemilla conjuncta*	Lady's Mantle
A. filicaulis ssp. *filicaulis*	
ssp. *vestita*	
A. xanthochlora	
A. glabra	
A. wichurae	
Aphanes arvensis	Parsley-piert
A. microcarpa	Slender Parsley-piert
Sanguisorba officinalis	Great Burnet

Rosa arvensis	Field Rose
R. pimpinellifolia A.	Burnet Rose
R. rugosa A.	Japanese Rose
R. canina (group)	Dog Rose
R. caesia	
R. tomentosa (group)	Downy Rose
R. sherardii	
R. mollis	
R. rubiginosa (group) A.	Sweet-briar
Prunus spinosa	Blackthorn, Sloe
**P. domestica* A.	Wild Plum
**P. cerasifera* A.	Cherry Plum
P. avium	Cherry
P. padus	Bird Cherry
**P. laurocerasus* A.	Cherry Laurel
**Cotoneaster microphyllus*	Small-leaved Cotoneaster
**Crataegus laevigata* P.	Midland Hawthorn
C. monogyna	Hawthorn
Sorbus aucuparia	Rowan
**S. intermedia* A.	Swedish Whitebeam
Malus sylvestris A.	Wild Apple

CRASSULACEAE

Sedum rosea	Rose Root
S. telephium	Orpine, Livelong
S. anglicum	English Stonecrop
S. acre	Biting Stonecrop
S. villosum	Hairy Stonecrop

SAXIFRAGACEAE

Saxifraga nivalis	Alpine Saxifrage
S. stellaris	Starry Saxifrage
**S. spathularis* x *umbrosa* A.	London Pride
**S. hirsuta* x *spathularis* A.	St. Patrick's Cabbage hybrid
S. granulata	Meadow Saxifrage
S. hypnoides	Mossy Saxifrage
S. oppositifolia	Purple Saxifrage
**Tellima grandiflora* A.	
**Tolmiea menziesii*	
Chrysosplenium oppositifolium	Opposite-leaved Golden Saxifrage
C. alternifolium	Alternate-leaved Golden Saxifrage

PARNASSIACEAE

Parnassia palustris	Grass of Parnassus

GROSSULARIACEAE

Ribes rubrum	Red Currant
R. nigrum	Black Currant
R. alpinum P. A.	Mountain Currant
R. uva-crispa	Gooseberry

DROSERACEAE

Drosera rotundifolia	Sundew
D. intermedia	Long-leaved Sundew

LYTHRACEAE

Lythrum salicaria	Purple Loosestrife
L. portula	Peplis Portula

ONAGRACEAE

Epilobium hirsutum	Great Hairy Willow-herb
E. parviflorum	Lesser Hairy Willow-herb
E. montanum	Broad-leaved Willow-herb
**E. ciliatum*	American Willow-herb
E. adnatum	Square-stemmed Willow-herb
E. obscurum	Dull-leaved Willow-herb
E. palustre	Marsh Willow-herb
E. anagallidifolium	Alpine Willow-herb
E. alsinifolium	Chickweed Willow-herb
**E. brunnescens*	New Zealand Willow-herb
Chamerion angustifolium	Rosebay Willow-herb
Circaea lutetiana	Enchanter's Nightshade
C x *intermedia*	Upland Enchanter's Nightshade

HALORAGACEAE

Myriophyllum spicatum A.	Spiked Water Milfoil
M. alterniflorum	Alternate-flowered Water Milfoil

HIPPURIDACEAE

Hippuris vulgaris A.	Mare's-tail

CALLITRICHACEAE

Callitriche stagnalis	Common Water-starwort
C. hamulata	'Bicycle'-spanner Water-starwort
C. hermaphroditica	Autumnal Water-starwort

CORNACEAE

Cornus suecicum	Dwarf Cornel

ARALIACEAE

Hedera helix	Ivy

UMBELLIFERAE

Hydrocotyle vulgaris	Pennywort, White-rot
Sanicula europaea	Sanicle
Chaerophyllum temulentum	Rough Chervil
Anthriscus sylvestris	Cow Parsley
**Myrrhis odorata*	Sweet Cicely
Conopodium majus	Pignut, Earthnut
Pimpinella saxifraga	Burnet Saxifrage
Aegopodium podagraria	Goutweed, Bishopweed
Berula erecta	Narrow-leaved Water-parsnip
Oenanthe lachenalii	Parsley Water-dropwort
O. crocata	Hemlock Water-dropwort
Aethusa cynapium	Fool's Parsley
Meum athamanticum	Spignel
Conium maculatum	Hemlock
**Bupleurum lancifolium* A.	A variety of Hare's-ear
Apium inundatum	Lesser Marshwort
Cicuta virosa	Cowbane
Carum verticillatum	Whorled Caraway
Angelica sylvestris	Wild Angelica
**Peucedanum ostruthium*	Master-wort
Heracleum sphondylium	Cow Parsnip, Hogweed
**H. mantegazzianum*	Giant Hogweed
Torilis japonica	Upright Hedge Parsley
Daucus carota	Wild Carrot

EUPHORBIACEAE

Mercurialis perennis	Dog's Mercury
Euphorbia helioscopia	Sun Spurge
E. peplus	Petty Spurge

POLYGONACEAE

Polygonum aviculare	Common Knotgrass
P. arenastrum	Equal-leaved Knotgrass
P. oxyspermum (*P. raii*) A.	Ray's Knotgrass
P. viviparum	Alpine Bistort
P. bistorta	Common Bistort, Snake-root
P. amphibium	Amphibious Bistort
P. persicaria	Redshank, Persicaria
P. lapathifolium	Pale Persicaria
P. hydropiper	Water Pepper
P. minus	Small Water Pepper
**P. polystachyum* A.	Himalayan Knotweed
Fallopia convolvulus	Black Bindweed
**Reynoutria japonica* esc.	Japanese Knotweed
**R. sachalinensis* esc. A.	Giant Knotweed
Oxyria digyna	Mountain Sorrel
Rumex acetosella	Sheep's Sorrel
R. acetosa	Common Sorrel
**R. alpinus* A.	Monk's Rhubarb
R. longifolius	Northern Dock
R. crispus	Curled Dock
R. obtusifolius	Broad-leaved Dock
R. x *pratensis* (*R. crispus* x *obtusifolius*)	A common hybrid Dock
R. conglomeratus	Clustered Dock
R. sanguineus	Wood, or Red-veined Dock

URTICACEAE

Urtica urens	Small Nettle
U. dioica	Stinging Nettle

CANNABIACEAE

**Humulus lupulus*	Hop

ULMACEAE

Ulmus glabra	Wych Elm
U. procera P.	English Elm

MYRICACEAE

Myrica gale	Bog Myrtle, Sweet Gale

PLATANACEAE

Platanus x *hybrida* P. A.	The London Plane

BETULACEAE

Betula pendula	Silver Birch
B. pubescens	Birch
Alnus glutinosa	Alder
**A. incana* A.	Grey Alder

CORYLACEAE

Carpinus betulus P.	Hornbeam
Corylus avellana	Hazel

FAGACEAE

Fagus sylvatica	Beech
**Castanea sativa*	Sweet Chestnut
**Quercus cerris* A.	Turkey Oak
Q. robur	Pendunculate or Common Oak
Q. petraea	Sessile or Durmast Oak
Q. rosacea A.	Hybrid Oak
(*Q. robur* x *petraea*)	

SALICACEAE

Willows are trees and bushes that hybridise readily. Formerly these hybrids were mistaken for separate species and were given names. Now that parents are identified it is usual to follow the hybrid name with the names of the parent species.

Salix pentandra	Bay Willow
S. alba	White Willow
S. fragilis	Crack Willow
S. fragilis var. *decipiens*	
S. purpurea	Purple Willow
S. x *rubra* A.	Basket-maker's Willow
(*S. purpurea* x *viminalis*)	
**S. daphnoides* P. A.	
S. viminalis	Osier
S. caprea	Goat Willow
S. x *sericans* A.	
(*S. caprea* x *viminalis*)	
S. cinerea ssp. *cinerea*	Grey Sallow
ssp. *oleifolia* A.	Rusty Sallow
S. x *strepida* A.	
(*S. cinerea* x *myrsinifolia*)	
S. x *smithiana* A.	
(*S. cinerea* x *viminalis*)	
S. aurita	Eared Willow
S. x *multinervis* A.	
(*S. aurita* x *cinerea*)	
S. x *ambigua* A.	
(*S. aurita* x *repens*)	
S. myrsinifolia (*nigricans*)	Dark-leaved Willow
S. phylicifolia	Tea-leaved Willow
S. repens	Creeping Willow
R. repens var. *argentea*	
S. lapponum	Downy Willow
S. herbacea	Dwarf Willow
Populus tremula	Aspen
P. x *canescens* P.	Grey Poplar
(*P. alba* x *tremula*)	
P. canadensis var. *serotina* P. A.	
P. trichocarpa P. A.	Balsam Poplar

ERICACEAE

**Rhododendron ponticum*	Rhododendron
Andromeda polifolia	Marsh Rosemary
Arctostaphylos uva-ursi	Bearberry
Calluna vulgaris	Ling, Heather
Erica tetralix	Cross-leaved Heath
E. cinerea	Bell Heather

Vaccinium vitis-idaea	Cowberry
V. myrtillus	Blaeberry, Bilberry
V. uliginosum	Bog Bilberry
V. oxycoccus	Cranberry

PYROLACEAE

Pyrola minor	Common Wintergreen
Orthilia secunda	Serrated Wintergreen

EMPETRACEAE

Empetrum nigrum ssp. *nigrum*	Crowberry
ssp. *hermaphroditum*	Mountain Crowberry

PLUMBAGINACEAE

Limonium vulgare	Sea Lavender
L. humile (not confirmed)	Lax-flowered Sea Lavender
Armeria maritima	Thrift, Sea Pink

PRIMULACEAE

Primula vulgaris	Primrose
Lysimachia nemorum	Yellow Pimpernel
L. nummularia	Creeping Jenny
L. vulgaris	Yellow Loosestrife
Trientalis europaea A.	Chickweed Wintergreen
Anagallis arvensis	Scarlet Pimpernel
Glaux maritima	Sea Milkwort
Samolus valerandi	Brookweed

OLEACEAE

Fraxinus excelsior	Ash
Ligustrum vulgare	Privet

APOCYNACEAE

Vinca minor	Lesser Periwinkle
**V. major* esc. A.	Greater Periwinkle

GENTIANACEAE

Centaurium erythraea	Common Centaury
**V. littorale*	Seaside Centaury
Gentianella campestris	Field Gentian
G. amarella A.	Felwort

MENYANTHACEAE

Menyanthes trifoliata	Buckbean, Bogbean

POLEMONIACEAE

**Polemonium caeruleum* esc. A.	Jacob's Ladder

BORAGINACEAE

Symphytum officinale A.	Common Comfrey
**S.* x *uplandicum*	Russian Comfrey
S. tuberosum	Tuberous Comfrey
**Pentaglottis sempervirens* P.	Alkanet
Anchusa arvensis	Bugloss
**Pulmonaria officinalis* A.	Lugwort
**Pulmonaria var.*	Mawson's Blue, a garden cultivar
Myosotis scorpioides	Water Forget-me-not
M. secunda	Creeping Water Forget-me-not
M. stolonifera	Pale Forget-me-not
M. laxa	Small-flowered Water Forget-me-not

M. sylvatica	Wood Forget-me-not
M. arvensis ssp. *arvensis*	Common Field Forget-me-not
ssp. *umbrata* A.	Field Forget-me-not
M. discolor	Yellow-and-blue Forget-me-not

CONVOLVULACEAE

Convolvulus arvensis	Field Bindweed
Calystegia sepium ssp. *sepium*	Hedge Bindweed
* ssp. *pulchra*	Hairy Bindweed
* ssp. *silvatica*	Large Bindweed

SOLANACEAE

Solanum dulcamara	Bitter Sweet

SCROPHULARIACEAE

Verbascum thapsus	Mullein, Aaron's Rod
**Misopates orontium* (Birdseed) A.	Lesser Snapdragon
**Linaria purpurea* A.	Purple Toadflax
L. repens	Pale Toadflax
L. vulgaris	Yellow Toadflax
L. x *sepium* A. (*L. repens* x *vulgaris*)	Hybrid Toadflax
Chaenorhinum minus	Small Toadflax
**Cymbalaria muralis*	Ivy-leaved Toadflax
Scrophularia nodosa	Figwort
S. umbrosa	Green Figwort
**Mimulus guttatus*	Monkey Flower
**M. guttatus* x *luteus*	Hybrid Monkey Flower
**M. cupreus* A.	
**Erinus alpinus* A.	Fairy Foxglove
Digitalis purpurea	Foxglove
Veronica beccabunga	Brooklime
V. anagallis-aquatica	Water Speedwell
V. scutellata	Marsh Speedwell
V. officinalis	Heath Speedwell
V. montana	Wood Speedwell
V. serpyllifolia	
ssp. *serpyllifolia*	Thyme-leaved Speedwell
ssp. *humifusa*	
V. arvensis	Wall Speedwell
V. hederifolia	Ivy-leaved Speedwell
V. persica	Common, or Large Speedwell
V. agrestis	Green Speedwell
**V. filiformis*	Slender Speedwell
Pedicularis palustris	Marsh Lousewort
P. sylvatica	Lousewort
Rhinanthus minor	
ssp. *stenophyllus*	Yellow Rattle
ssp. *monticola*	More upland Yellow Rattle
Melampyrum pratense	Common Cow-wheat
Euphrasia micrantha	Eyebright
E. scottica	
E. frigida	
E. confusa	
E. arctica ssp. *borealis*	
E. rostkoviana ssp. *rostkoviana*	
ssp. *montana*	
Odontites verna	Red Rattle

OROBANCHACEAE

Lathraea squamaria	Toothwort
Orobanche rapum-genistae	Greater Broomrape

LENTIBULARIACEAE

Pinguicula vulgaris	Common Butterwort
Utricularia intermedia A.	Intermediate Bladderwort
U. minor	Lesser Bladderwort

LABIATAE

Mentha arvensis	Corn Mint
M. x *verticillata* (*M. arvensis* x *aquatica*)	Whorled Mint
M. aquatica	Water Mint
M. x *piperita* A. (*M. aquatica* x *spicata*)	Pepper Mint
M. spicata	Spearmint
M. x *villosa* A. (*M. spicata* x *suaveolens*)	Large Apple Mint
M. suaveolens A.	Apple Mint
Lycopus europaeus	Gypsy-wort
Thymus praecox ssp. arcticus	Wild Thyme
Clinopodium vulgare	Wild Basil
Prunella vulgaris	Self-heal
Betonica officinalis	Betony
Stachys arvensis A.	Field Woundwort
S. palustris	Marsh Woundwort
S. sylvatica	Hedge Woundwort
S. x *ambigua* (*S. palustris* x *sylvatica*)	Hybrid Woundwort
**Lamiastrum galeobdolon* esc. A.	Yellow Archangel
Lamium amplexicaule A. (cleistogamous form)	Henbit
L. molucellifolium A.	Intermediate Dead-nettle
L. purpureum	Red Dead-nettle
L. album	White Dead-nettle
**L. maculatum* esc. A.	Spotted Dead-nettle
Galeopsis tetrahit ssp. *tetrahit*	Common Hemp-nettle
ssp. *bifida* A.	Smaller Hemp-nettle
G. speciosa	Large-flowered Hemp-nettle
Glechoma hederacea	Ground Ivy
Scutellaria galericulata	Skull-cap
Teucrium scorodonia	Wood Sage
Ajuga reptans	Bugle
A. pyramidalis A.	Pyramidal Bugle

PLANTAGINACEAE

Plantago major	Greater Plantain
P. lanceolata	Ribwort Plantain
P. maritima	Sea Plantain
P. coronopus	Buck's-horn Plantain
Littorella uniflora	Shore-weed

CAMPANULACEAE

Campanula latifolia	Large, or Giant Bellflower
C. rotundifolia	Harebell, Scottish Bluebell
**C. rhomboidalis* A.	
Jasione montana	Sheep's-bit
Lobelia dortmanna	Water Lobelia

RUBIACEAE	
Galium cruciata	Crosswort
G. odoratum	Sweet Woodruff
G. boreale	Northern Bedstraw
G. mollugo ssp. *mollugo*	Hedge Bedstraw
G. x *pomeranicum* (*G. mollugo* x *verum*)	Hybrid Yellow Bedstraw
G. verum	Lady's Bedstraw
G. saxatile	Heath Bedstraw
G. sterneri	
G. palustre	Common Marsh Bedstraw
G. uliginosum	Fen Bedstraw
G. aparine	Goosegrass, Cleavers
CAPRIFOLIACEAE	
Sambucus nigra	Elder
**S. racemosa*	Red-berried Elder
Viburnum opulus	Guelder Rose
**Symphoricarpos rivularis*	Snowberry
Lonicera periclymenum	Honeysuckle
ADOXACEAE	
Adoxa moschatellina	Townhall Clock, Moschatel
VALERIANACEAE	
Valerianella locusta	Lamb's Lettuce
Valeriana officinalis	Valerian
V. dioica	Marsh Valerian
**V. pyrenaica*	Pyrenean Valerian
**Centranthus ruber* A.	Red Valerian
DIPSACACEAE	
Dipsacus fullonum	Teasel
Succisa pratensis	Devil's-bit Scabious
COMPOSITAE	
Bidens cernua	Nodding Bur-Marigold
B. tripartita	Trifid Bur-Marigold
Senecio jacobaea	Ragwort
S. x *ostenfeldii* A. (*S. aquaticus* x *jacobaea*)	Hybrid Ragwort
S. aquaticus	Marsh Ragwort
**S. squalidus*	Oxford Ragwort
S. sylvaticus	Wood Groundsel
S. viscosus	Sticky Groundsel
S. vulgaris forma *vulgaris*	Groundsel
forma *lingulatus* A.	Rayed Groundsel
Doronicum pardalianches	Leopard's-bane
Tussilago farfara	Colt's-foot
Petasites hybridus	Butterbur
P. albus A.	White Butterbur
**P. fragrans* A.	Winter Heliotrope
Filago minima	Slender Cudweed
Gnaphalium sylvaticum	Wood Cudweed
G. uliginosum	Marsh Cudweed
Antennaria dioica	Cat's-foot, Mountain Everlasting
Solidago virgaurea	Golden-rod
**S. canadensis* esc. A.	Canadian Golden-rod

Aster tripolium	Sea Aster
**A. novi-belgii* ssp. *novi-belgii* A.	Michaelmas Daisy
**A. salignus* A.	
Bellis perennis	Daisy
Achillea millefolium	Yarrow, Milfoil
A. ptarmica	Sneezewort
Tripleurospermum maritimum	Sea Mayweed
T. inodorum	Scentless Mayweed
Matricaria recutita A.	Wild Chamomile
**M. matricarioides*	Pineapple Weed, Rayless Mayweed
Chrysanthemum segetum	Corn Marigold
Leucanthemum vulgare	Marguerite, Ox-eye or Moon Daisy
**Tanacetum parthenium*	Feverfew
T. vulgare	Tansy
Artemisia vulgaris	Mugwort
Carlina vulgaris	Carline Thistle
Arctium minus	Lesser Burdock
A. nemorosum A.	Larger Lesser Burdock
Carduus acanthoides	Welted Thistle
Cirsium vulgare	Spear Thistle
C. palustre	Marsh Thistle
C. arvense	Creeping Thistle
C. helenoides	Melancholy Thistle
Saussurea alpina	Alpine Saussurea
Centaurea nigra	Lesser Knapweed, Hardheads
Serratula tinctoria A.	Saw-wort
Lapsana communis	Nipplewort
Hypochaeris radicata	Cat's Ear
Leontodon autumnalis	Autumnal Hawkbit
L. hispidus	Rough Hawkbit
L. taraxacoides	Hairy, or Lesser Hawkbit
Tragopogon pratensis	Goat's-beard
Sonchus arvensis	Field Milk Thistle
S. oleraceus	Smooth Sow Thistle
S. asper	Prickly Sow Thistle
**Cicerbita macrophylla*	Blue Sow Thistle

HIERACIUM. Hawkweeds, (— indicates pre 1950)

SECT. SUBALPINA
- —27 *senescens*
- 36 *centripetale*
- 37 *longilobum*
- —40 *callistophyllum*
- 45 *chrysolorum*
- 48 *dasythrix*
- 49 *petrocharis*

SECT. CERINTHOIDEA
- 57 *langwellense*
- —59 *anglicum*
- 60 *iricum*

SECT. OREADEA
- 69 *fratrum*
- —74 *saxorum*
- 84 *nitidum*
- 86 *leyi*
- —91 *sommerfeltii*
- 93 *vagense*
- 94 *argenteum*
- 100 *caledonicum*
- —104 *subrude*
- 105 *orimeles*
- 106 *chloranthum*

SECT. VULGATA
- 107 *exotericum* agg.
- 109 *grandidens*
- 131 *duriceps*
- 134 *pictorum*
- 139 *pseudosarcophyllum*
- 149 *anguinum*
- 152 *subhirtum*
- 155 *oistophyllum*
- 162 *rhomboides*
- 163 *caesiomurorum*
- 164 *stenophyes*
- —168 *euprepes*
- 176 *diaphanoides*
- 183 *rubiginosum*
- 184 *vulgatum*
- 186 *craveoniense*

SECT. PRENANTHOIDEA
- 207 *prenanthoides*

SECT. TRIDENTATA
- 212 *sparsifolium*

SECT. FOLIOSA
- 231 *latobrigorum*
- 232 *subcrocatum*
- 234. *strictiforme*
- —235 *reticulatum*

SECT. UMBELLATUM
- 240 *umbellatum* ssp. *umbellatum*

SECT. SABAUDA
- 245 *perpropinquum*

Hieracium pilosella	Mouse-eared Hawkweed
ssp. *melanops*	
ssp. *micradenium*	
ssp. *trichosoma*	
H. aurantiacum	Orange Hawkweed
ssp. *aurantiacum*	
ssp. *brunneocroceum*	
Crepis capillaris	Smooth Hawk's-beard
C. paludosa	Marsh Hawk's-beard

TARAXACUM. The currently known Dandelions are arranged in alphabetical order within their sections.

ERYTHROSPERMA
brachyglossum
lacistophyllum

SPECTABILIA
faeroense

NAEVOSA
euryphyllum
maculosum
pseudolarssonii
stictophyllum
subnaevosum
unguilobum

CELTICA
adamii
landmarkii
nordstedtii
raunkiaerii

HAMATA
atactum
hamatum
hamatiforme
subhamatum

VULGARIA
alatum
altissimum
aurosulum
cyanolepis
dahlstedtii
exacutum
incisum
insigne
latisectum
obliquilobum
pannucium
polyodon

MONOCOTYLEDONS

ALISMATACEAE

Alisma plantago-aquatica	Water Plantain

HYDROCHARITACEAE

**Elodea canadensis*	Canadian Pondweed
**E. nuttallii* A.	An invading Pondweed

JUNCAGINACEAE

Triglochin palustris	Marsh Arrow-grass
T. maritima	Sea Arrow-grass

ZOSTERACEAE

Zostera noltii	Grass-wrack

POTAMOGETONACEAE

Potamogeton natans	Broad-leaved Pondweed
P. polygonifolius	Bog Pondweed
P. x *zizii* (*P. gramineus* x *lucens*)	A hybrid Potamogeton
P. gramineus	Various-leaved Pondweed
P. alpinus A.	Red Pondweed
P. praelongus A.	Long-stalked Pondweed
P. perfoliatus	Perfoliate Pondweed
P. pusillus A.	Lesser Pondweed
P. obtusifolius	Blunt-leaved Pondweed
P. berchtoldii	Small Pondweed
P. crispus	Curled Pondweed
P. pectinatus	Fennel Pondweed

RUPPIACEAE

Ruppia maritima A.	Beaked Tasselweed

LILIACEAE

Narthecium ossifragum	Bog Asphodel
Polygonatum multiflorum A.	Solomon's Seal
Ornithogalum umbellatum A.	Star-of-Bethlehem
Hyacinthoides non-scripta	Bluebell
Allium vineale	Crow Garlic, Wild Onion
A. oleraceum	Field Garlic
**A. carinatum*	Keeled Garlic
**A. paradoxum* A.	Few-flowered Leek
A. ursinum	Ransoms

TRILLIACEAE

Paris quadrifolia	Herb Paris

JUNCACEAE

Juncus squarrosus	Heath Rush
**J. tenuis*	Slender Rush
J. compressus A.	Round-fruited Rush
J. gerardi	Mud, or Saltmarsh Rush
J. bufonius	Toad Rush
J. inflexus	Hard Rush
J. effusus	Soft Rush
J. conglomeratus	Conglomerate Rush
J. maritimus	Sea Rush
J. acutiflorus	Sharp-flowered Rush
J. articulatus	Jointed Rush
J. bulbosus	Bulbous Rush
Luzula pilosa	Hairy Woodrush
L. sylvatica	Greater Woodrush
**L. luzuloides*	White Woodrush
L. campestris	Field Woodrush
L. multiflora var. *congesta*	Many-headed Woodrush

AMARYLLIDACEAE

Galanthus nivalis	Snowdrop
Narcissus pseudonarcissus	Daffodil

IRIDACEAE

Iris pseudacorus	Yellow Flag
**Crocus vernus*	Purple Crocus

ORCHIDACEAE

Listera ovata	Common Twayblade
L. cordata A.	Lesser Twayblade
Neottia nidus-avis A.	Bird's-nest Orchid
Hammarbya paludosa A.	Bog Orchid
Coeloglossum viride	Frog Orchid
Gymnadenia conopsea	Fragrant Orchid
Pseudorchis albida	Small White Orchid
Platanthera chlorantha A.	Greater Butterfly Orchid
P. bifolia	Lesser Butterfly Orchid
Orchis mascula	Early-purple Orchid
Dactylorhiza fuchsii	Common Spotted Orchid
D. maculata ssp. ericetorum	Heath Spotted Orchid
D. incarnata	Marsh Orchid
D. purpurella	Northern Fen Orchid

ARACEAE

**Acorus calamus*	Sweet Flag
**Arum maculatum*	Lords-and-Ladies, Cuckoo Pint

LEMNACEAE

Lemna trisulca	Ivy Duckweed
L. minor	Duckweed

SPARGANIACEAE

Sparganium erectum	Bur-reed
S. emersum	Unbranched Bur-reed
S. minimum	Small Bur-reed

TYPHACEAE

Typha latifolia	Great Reedmace, Cat's-tail
T. angustifolia	Lesser Reedmace

CYPERACEAE

Eriophorum angustifolium	Common Cotton-grass
E. latifolium	Broad-leaved Cotton-grass
E. vaginatum	Hare's-tail Cotton-grass
Trichophorum cespitosum	Deer-grass
ssp. *cespitosum*	
ssp. *germanicum*	
Eleocharis acicularis	Needle Spike-rush
E. quinqueflora	Few-flowered Spike-rush
E. multicaulis	Many-stemmed Spike-rush
E. palustris	Common Spike-rush
E. uniglumis	Slender Spike-rush
Scirpus maritimus	Sea Club-rush
S. sylvaticus	Wood Club-rush
Blysmus compressus	Flat-sedge or Broad Blysmus
B. rufus	Saltmarsh Flat-sedge
Schoenoplectus lacustris	Common Club-rush or Bulrush
S. tabernaemontani	Grey Club-rush
Isolepis setacea	Bristle Scirpus
Rhynchospora alba	White Beak-sedge
Carex :	
Subgenus VIGNEA	
Carex paniculata	Great Tussock Sedge
C. diandra	Lesser Tussock Sedge
C. otrubae	False Fox Sedge
C. muricata ssp. *lamprocarpa*	Prickly Sedge
C. arenaria	Sand Sedge
C. disticha	Brown Sedge
C. remota	Remote Sedge
C. ovalis	Oval Sedge
C. echinata	Star Sedge
C. dioica	Dioecious Sedge
C. elongata (now extinct)	Elongated Sedge
C. curta	White Sedge
Subgenus CAREX	
C. hirta	Hairy Sedge
C. lasiocarpa A.	Slender Sedge
C. acutiformis	Lesser Pond Sedge
C. rostrata	Bottle Sedge
C. vesicaria	Bladder Sedge
C. pendula	Pendulous Sedge

C. sylvatica	Wood Sedge
C. capillaris	Hair Sedge
C. flacca	Glaucous Sedge
C. panicea	Carnation Sedge
C. vaginata	Sheathed Sedge
C. laevigata	Smooth-stalked Sedge
C. binervis	Green-ribbed Sedge
C. distans	Distant Sedge
C. extensa	Long-bracted Sedge
C. hostiana	Tawny Sedge
C. x *fulva* (*C. hostiana* x *lepidocarpa*)	
C. lepidocarpa	Long-stalked Yellow Sedge
C. demissa	Common Yellow Sedge
C. pallescens	Pale Sedge
C. caryophyllea	Spring Sedge
C. pilulifera	Pill Sedge
C. limosa	Mud Sedge
C. magellanica	Bog Sedge
C. atrata	Black Alpine Sedge
C. aquatilis	Water Sedge
C. bigelowii	Stiff Sedge
C. nigra	Common Sedge
C. acuta	Slender Tufted Sedge
Subgenus PRIMOCAREX	
C. pauciflora	Few-flowered Sedge
C. pulicaris	Flea Sedge

GRAMINEAE

Phragmites australis	Common Reed
Molinia caerulea	Purple Moor-grass
Danthonia decumbens	Heath-grass
Glyceria fluitans	Floating Sweet-grass
G. plicata	Plicate Sweet-grass
G. declinata	Small Sweet-grass
G. maxima	Reed Sweet-grass
Festuca pratensis	Meadow Fescue
F arundinacea	Tall Fescue
F. gigantea	Giant Fescue
F. altissima	Wood Fescue
F. rubra	Red Fescue
F. ovina	Sheep's Fescue
F. tenuifolia A.	Fine-leaved Sheep's Fescue
F. vivipara	Viviparous Fescue
F. pratensis x *Lolium perenne* A. (*Festulolium* x *loliacium*)	
Lolium perenne	Perennial Rye-grass
**L. multiflorum*	Italian Rye-grass
Vulpia bromoides	Squirrel-tail Fescue
V. myuros A.	Rat's-tail Fescue
Puccinellia maritima	Common Saltmarsh-grass
Poa annua	Annual Meadow-grass
P. nemoralis	Wood Meadow-grass
P. balfourii	Balfour's Meadow-grass
P. pratensis	Smooth Meadow-grass
P. subcaerulea A.	Spreading Meadow-grass
P. trivialis	Rough Meadow-grass

P. palustris	Swamp Meadow-grass
**P. chaixii*	Broad-leaved Meadow-grass
Dactylis glomerata	Cock's-foot
Cynosurus cristatus	Crested Dog's-tail
Briza media	Quaking Grass
Melica uniflora	Wood Melick
M. nutans	Mountain Melick
Bromus ramosus	Hairy or Wood Brome
B. sterilis A.	Barren Brome
B. thominii	Lesser Soft Brome
B. hordeaceus	Lop-grass
B. commutatus A.	Meadow Brome
Brachypodium sylvaticum	Wood or Slender False-brome
Agorpyron caninum	Bearded Couch
A. repens	Common Couch or Twitch
A. pungens	Sea Couch
Elymus arenarius	Lyme-grass
Hordeum jubatum A.	Fox-tail Barley
Trisetum flavescens	Yellow Oat-grass
Avena fatua A.	Wild Oat
Helictotrichon pratense	Meadow Oat-grass
H. pubescens	Downy Oat-grass
Arrhenatherum elatius	False Oat-grass
Holcus lanatus	Yorkshire Fog
H. mollis	Creeping Soft-grass
Deschampsia cespitosa	Tufted Hair-grass
D. flexuosa	Wavy Hair-grass
Aira praecox	Early Hair-grass
A. caryophyllea	Silver Hair-grass
Ammophila arenaria	Marram
Agrostis canina ssp. *canina*	Velvet Bent
A. canina ssp. *montana* A.	Brown Bent
A. tenuis	Common Bent
A. gigantea	Black Bent
A. stolonifera	Creeping Bent
Phleum bertolonii A.	Smaller Cat's-tail
P. pratense	Timothy
P. arenarium	Sand Cat's-tail
Alopecurus pratensis	Meadow Fox-tail
A. geniculatus	Marsh Fox-tail
A. alpinus	Alpine Fox-tail
Milium effusum	Wood Millet
Anthoxanthum odoratum	Sweet Vernal-grass
Phalaris arundinacea	Reed Canary-grass
P. canariensis	Canary-grass
Parapholis strigosa	Sea Hard-grass
Nardus stricta	Mat-grass
Spartina anglica A.	Common Cord-grass

CHARACEAE Stoneworts

Nitella translucens
Nitella flexilis
Chara vulgaris
Chara globularis

TWO BRONZE ANIMAL FIGURINES OF PROBABLE ROMAN DATE RECENTLY FOUND IN SCOTLAND

by

Miranda Green[1], Trevor Cowie[2] and David Lockwood[3]

Introduction (TC)

Within a few months of each other in 1983, two separate finds of zoomorphic bronze objects were brought into the National Museum for identification. The first of these was a small and somewhat stylized dolphin, found near the Roman forts at Milton in Annandale, Dumfriesshire and subsequently donated to Dumfries Museum. The second was a more naturalistic model of a goat with exaggerated horns, discovered near Dumbuck by the River Clyde and now in the collections of the Hunterian Museum, Glasgow. Such animal figurines are rare in Northern Britain and it was felt that they merited wider notice. At the invitation of the National Museum therefore, Dr Miranda Green of the Open University in Wales has very kindly contributed a discussion of the affinities and significance of each of these finds.

Fig. 1 Location map.
1: Milton, Dumfriesshire;
2: Dumbuck, Dunbartonshire.

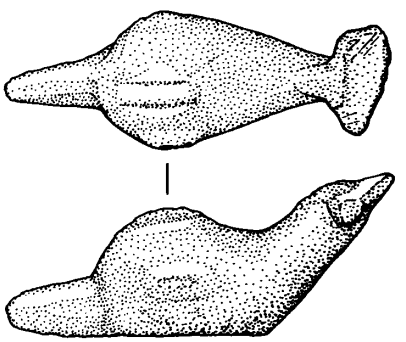

Fig. 2 Model dolphin from Milton, Dumfriesshire. Scale 2/3

1. The Open University in Wales, 24 Cathedral Road, Cardiff.
2. Royal Museum of Scotland, Queen Street, Edinburgh.
3. Dumfries Museum, The Observatory, Dumfries.

The dolphin (Figs. 1-3)

Description (TC, DL)

The model dolphin was found in December 1982 by Mr Robert Fitzsimmons while metal detecting around the area of the Roman forts at Milton, Beattock, Dumfriesshire (Clarke 1952). The object was found on the steep bank on the E side of the modern track which runs from Milton Farm to Bearholm Farm (NGR: NT 0937 0134). The soil was loose and stony and the dolphin was about 7 cm below the surface. The find-spot lies on the eastern margin of the important complex of 1st and 2nd century AD forts and fortlets which occupied the crest of the ridge, on the line of the main Roman road which ran from Birrens northwards through Annandale and on into the Clyde Valley (St Joseph 1952, 14-17, pl V. B-C).

The dolphin is one of over a hundred items that have been found by metal detection or field-walking in the fields around the forts at Milton since 1982: these include many fragments of bronze and lead, lead weights and spindle whorls, sherds of *terra sigillata* and coarse pottery, and coins including five of the Republican period. These items are now in the collections of Dumfries Museum: the accession number of the dolphin is DUMFM 82.70.1.

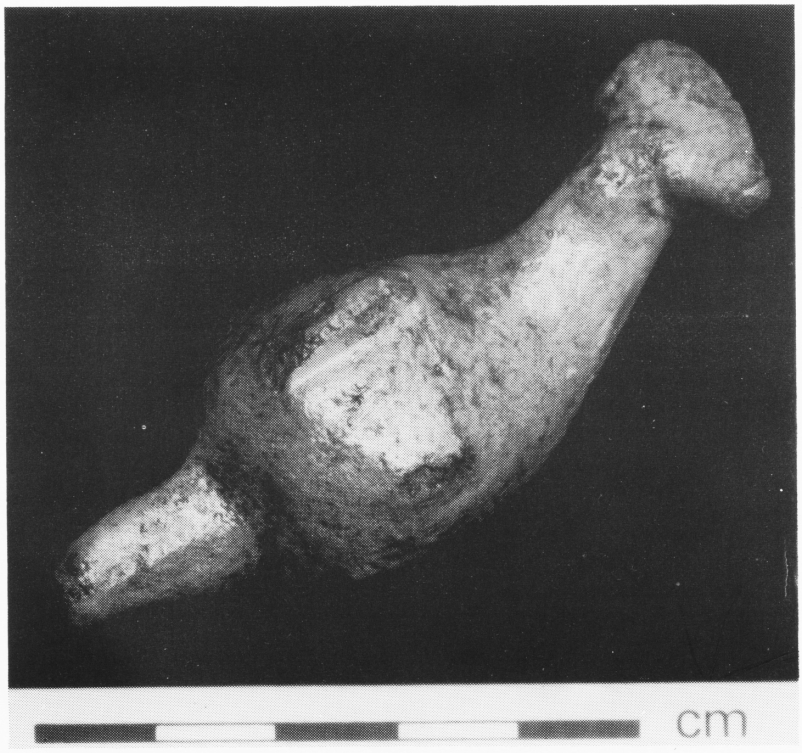

Fig. 3 Model dolphin from Milton, Dumfriesshire.

The features of the dolphin have not been modelled in detail, but the snout and the tail flippers are quite distinctive. The absence of detail has perhaps been compounded by wear or damage, particularly around the ventral and dorsal fins — now no more than low stumps — and the tail flippers. Nevertheless, the condition of the surface is generally good and it has a green patina. The overall length of the model is 79 mm and its weight is 144 g.

Discussion (MG)

Dolphin-figurines are not common in British contexts, this being the sole example recorded from Scotland, although mention may be made here of the swimming dolphin motif on a sardonyx intaglio from Newstead (Elliot and Henig 1982, 297, no 14). One figurine is known in northern England, from York (Green 1978, 76, pl 76). In southern Britain, Verulamium (Green 1976, 206-207), Leicester (*ibid.* 166, pl XXIXe) and Fishbourne (Cunliffe 1971, vol II, 118 no 142, fig 50) have each produced small bronze dolphins, and Verulamium has also yielded a bone example (Green 1977, 302). The most interesting item, however, is the bronze "sceptre-terminal" from Willingham Fen, Cambridgeshire. Here, a dolphin is accompanied by a young naked god, a wheel, an eagle and the head of a triple-horned bull (Green 1976, pl X; 1979, no 42; 1984, 350, pl 81). In other provinces of the western Roman Empire, dolphins are more common. One may cite bronzes from Lisović, Yugoslavia (Veličkovik 1972, pl 142, inv no 2702/111); the River Waal at Nijmegen, Holland (Zadoks-Josephus-Jitta 1969, 156, no 67); Vienne (Boucher 1971, no 82); and Lyon (Boucher 1973, no 264).

Dolphins occur constantly in Graeco-Roman art, associated with the sea-god Poseidon/Neptune (for example on a mosaic from Frampton Villa, Dorset: Toynbee 1964, 250-51), and with Aphrodite/Venus or her son Eros/Cupid (Toynbee 1973, 207). Venus Anadyomene possessed this marine symbol in recognition of her birth from sea-foam (or the semen of her father Neptune) (Stebbins 1929, 119; Grigson 1978). The association between goddess and dolphin is admirably illustrated by a Hellenistic carving from Thasos, depicting Aphrodite and Eros seated on a dolphin (Dr G. Lloyd-Morgan: *pers comm*). The beast appears frequently in sepulchral contexts in Roman funerary art, as a symbol of the Journey of the Soul across the Ocean to the Isles of the Blest (Toynbee 1973, 207); Toynbee *(op cit)* cites a 4th century Christian sarcophagus from Rome bearing dolphin motifs. Linked to this was the Greek custom (Glück 1965, 315ff) of placing dolphin-tokens in the hands of the dead to ensure a safe voyage for those traversing the uncharted regions of the afterlife (Green 1984, 190-91). The alleged sepulchral context of a bronze dolphin from Sardis in Asia Minor, would endorse this funerary association (Ashmolean Museum, Acc. no. 1937-236). The dolphin as a cult-animal was identified particularly with the Nabataean goddess Allat, whose main centre of worship was at Khirbet Tannur in the Roman province of Arabia. Allat's cult was linked with that of Venus and this may partly account for the dolphin-identification. But Glück (1965) makes the point that the beast, as a swift marine traveller, capable of covering vast distances (note the use of dolphins to adorn the central *spina* of Roman circuses), may symbolise not only journeys of the dead but could also be a motif associated with travellers and fair weather. From this, it would be no great step to see the dolphin as a general good-luck token. It should be remembered that the dolphin was revered in Roman times partly because of its curious affinity with and friendship to man.

It is tempting to link the discovery of the dolphin with the nearby Roman fort of Milton. It was very possibly the personal property of a soldier or someone associated with the military establishment. If it had a cult-purpose or symbolism, a number of possible interpretations could be advanced. It could have been a love-motif, perhaps dedicated to Venus or Cupid; it could be funerary; it may simply have been a good-luck talisman.

The goat (Figs. 1, 4-5)

Description (TC)

The second discovery was made by Mr John Hunter during cable-laying operations near Dumbarton in 1982 (fig 1). The bronze was found in upcast spoil from the cable trench at a point near the southern embankment of the railway line from Glasgow to Dumbarton where it runs past the Dumbuck junction of the A814 and the A82 trunk road (approximate location of find-spot: NS 424 741). No other details of the context are available. The assumed Roman or Romano-British attribution of the piece rests on its stylistic affinities, discussed below by Dr Green, but the proximity of several local sites of that period may be noted here. Although the termination of the Antonine Wall at Old Kirkpatrick lies some 3.5 km to the east, the Military Way appears to have extended westwards, possibly as far as Dumbarton (Macdonald 1934, 186-88, 337). Dumbuck itself was the northern access point for an important ford across the Clyde, likely to have been in use in Roman times (Steer 1949, 28; 1964, 7), while the Dumbuck crannog, one of several along the shores of the Clyde in this vicinity, lay only approximately 1 km westwards from the find-spot (Bruce 1900, 437-42).

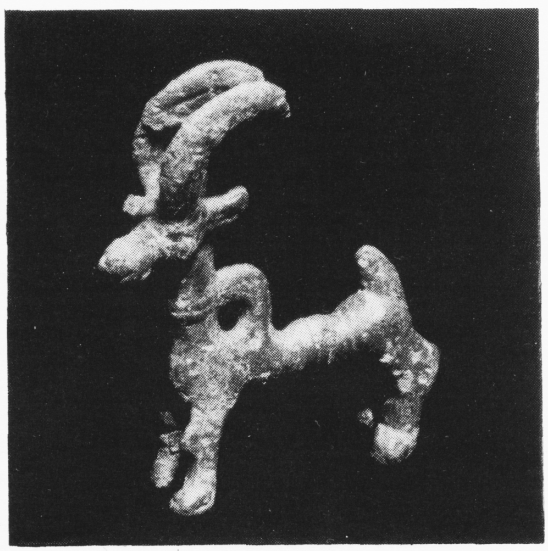

Fig. 4 Model goat from Dumbuck, Dunbartonshire. Scale: approx. nat. size.

When found, the surface condition of the metal was rather poor and its features were blemished by several areas of corrosion. In addition what appeared to be the lower right foreleg was detached when the find was handed in to the museum (some months after its discovery) and this again appeared to be due to corrosion. Treatment of the model was subsequently undertaken by staff of the National Museum's Conservation Laboratory.

The goat has a maximum length of 53 mm and is 61.5 mm in height to the top of its horns. It is quite slender in its overall proportions being only 9-10 mm in width at the shoulders and rump and narrowing even further to 5-7 mm at the midriff. The horns are exaggerated, however, with a spread of 11 mm, and, as Dr Green points out below, this is almost certainly a reflection of their symbolic significance. Although lacking fine detail, the major features of the head have otherwise been modelled with some attempt at realism. Two rounded knobs behind the horns represent the ears and swellings on either side of the head mark the eye sockets. A low rounded projection emerging from the brow is of uncertain significance, although Dr Green has noted below that the addition of an extra horn to bull's heads was a feature of Celtic iconography. The head and horns are now turned slightly to the left but this may possibly be the result of damage.

Fig. 5 Model goat from Dumbuck, Dunbartonshire, showing the right foreleg detached (see text). Scale x 1½.

About half-way down the length of the elongated neck is a double moulding joined by a loop for suspension to the back of the animal behind its shoulders. A further double moulding around the midriff ends in a slight projection representing the goat's sexual organ. The rear legs are slightly set back and, coupled with the short erect tail, this feature almost gives the animal a stocky dog-like posture. Individually, the legs have also been represented with some care in the provision of knee-joints and feet. However, one unresolved and intriguing feature of the model is the apparent absence of the original lower right foreleg. Following conservation of the bronze, the staff at the laboratory were surprised to discover that the supposed fragment of leg handed in by the finder did not join the cleaned stump. For several reasons, including marked differences in their thickness, absence of a modelled knee joint and foot, and the condition of the metal, it appears that the detached portion of leg was not simply an original feature that had broken off. It appears likely that, perhaps following miscasting or a breakage, a piece of bronze of only roughly the correct size and shape was attached to make good the leg. Such a repair would then have been more prone to corrosion and hence renewed damage at the time of discovery.

At the request of the finder the model goat has been presented to the Hunterian Museum, University of Glasgow (Accession no: F.1985.286).

Discussion (MG)

This statuette possesses two distinctive features which are of interpretative interest. It has a suspension-loop behind the neck and exceptionally large horns which have been deliberately exaggerated in relation to the rest of the object.

Goat-figurines are fairly widely distributed both in Britain and other western provinces in the Roman world. Trier, for instance, has produced a naturalistic bronze goat with large horns (Schindler 1977, no 185); and several British sites, mainly in the south-east (Green 1976, 195, 214, 217, 218, 221) have produced statuettes of this beast. But a goat is recorded also from Caerleon in south-east Wales, and of special interest in the present context, Birrens (Dumfries & Galloway) has yielded a bronze mounting in the form of a goat accompanied by a horned, anthropomorphic deity (Robertson 1975, 124, fig. 35).

Goats were cheap and readily available sacrificial victims in the ancient world (Toynbee 1973, 166); the goat was, in addition, a fertility emblem both in Graeco-Roman and Celtic contexts. Kids are constantly mentioned in Latin literature as offerings to such deities, concerned with rustic fecundity, as Faunus and Silvanus (eg Horace *Odes* I, 4, 12; III, 13, 3; Martial *Epigrams* X, 92, 6-7). Faunus-figurines are frequently depicted wearing goat-skins and the god appears to have had two sides to his nature — the benevolent associated with a goat and the malevolent with a wolf (Johns 1984). The great Greek god Pan, the principal rural fertility deity, is usually portrayed horned and with the hindlegs of a goat (Johns 1982, 44). Goats sometimes accompany the god Mercury, probably with the same fertility-symbolism as his other ovicaprid associate, the ram. A face-urn from Colchester has goat-horns and a phallus (Ross 1967, 161-62) and this association endorses the fertility interpretation of goat-horns in a Romano-British context.

The overlarge horns on the Scottish find under discussion appear deliberately to emphasise the fertility symbolism of this particular figurine. Horns represented a potent force in the Celtic world, and many gods, especially in North Britain (Ross 1961) are depicted wearing bull or goat horns. We should also remember the Celtic custom in iconography of adding an extra horn to a normal bull's head. Perhaps this model should be seen in the context of the Birrens bronze where the power of a local horned god seems to be enhanced or augmented by his caprid companion.

Most animal-figurines from Britain and Gaul (apart from those used as attachments and whose primary function was probably ornamental) are either free-standing statuettes possibly offered in temples or dedicated in domestic shrines, or they were originally part of cult-groups. This Scottish goat-figurine is distinctive in possessing a suspension-loop, indicating its probable use as an amulet. It may be that this lively little figure, with its aggresively prominent horns, was a personal talisman — gaining special power from contact with the human body — with the purpose of promoting sexual potency, of encouraging crops and flocks to flourish, or acted simply as a general good-luck charm, with the apotropaic role of protecting the wearer against evil and calamity.

Acknowledgements

We are grateful to the finders Mr Robert Fitzsimmons of Dumfries and Mr John Hunter of Penicuik for reporting their respective discoveries, and for their subsequent co-operation in the preparation of this paper. Thanks are also due to several members of the staff of what was then the National Museum of Antiquities of Scotland: Tom Bryce and Linda Hill of the NMAS Laboratories for their work on the conservation of the model goat; Helen Jackson for preparing figures 1 and 2; Ian Larner and Doreen Moyes for their photographic work; and finally, Sheila Collins for her typing, Mrs Lesley Ferguson, National Monuments Record of Scotland, and Mrs Lily Linge, Historic Buildings and Monuments Directorate, SDD, very kindly provided map extracts and details of sites in the vicinity of the two discoveries. Finally, thanks are due to Dr Lawrence Keppie of the Hunterian Museum, University of Glasgow and Colin Wallace for reading and commenting on a draft of this paper.

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WIGTOWN:

PROFILE OF A MEDIEVAL BURGH

by Daphne Brooke

This article describes the medieval town of Wigtown roughly between 1470 and 1513. That is the space of little more than a generation, the first for which sufficient source material survives. The physical layout of the town and its main features: church, friary, the site of the castle, the streets, vennels, gardens and tenements — and the open fields beyond — materialise from the documents, and can be visualised against the essentially ancient town-plan of the burgh. This scene is peopled by the burghal families, provosts, baillies, and alderman; the clergy and the landed proprietors involved in the life of the burgh; and its most distinguished regular visitor, James IV, on pilgrimage to Whithorn. A view emerges of a living environment in which the interaction of families, individual personalities, and local political alignments are vividly seen.

The records that make this description possible break like a shaft of sunlight into the darkness which covers so much of Galloway's past. The simile is the more appropriate because the picture presented is not unsmiling. The existence of records at all is sufficient testimony that after the ruin and isolation brought by the fourteenth-century wars, life in Wigtown had settled back into some degree of public order, and the operation of trade and law.[1]

The practise in the burgh of two or three Notaries, the frequent litigation before the Lords of Council who met in Wigtown every few years, and the business of the criminal court, which have provided most of the evidence, are indications of a state which we gratefully call normality. The vitality of this material and the vernacular in which much of it is recorded, ask to be communicated. We are indebted for much of the available information to the work of two local historians — the late Gordon Fraser, and especially the late R. C. Reid. While this study draws upon a wider range of material, the documentation published in Dr Reid's *Wigtownshire Charters* is inevitably a central source. Reid's commentary accompanying his collection of charters, makes it unnecessary here to do more than refer to his account of the rivalry between the port and burgh of Wigtown with those of Whithorn: and no attempt is made to duplicate his note of the shipping, or his lists of provosts and parish priests.[2]

In any general ordering of the medieval burghs of Scotland, Wigtown ranks as of minor importance. Its trade consisted of buying the produce of the countryside, some of it for export, and importing such things as iron, salt, wine, and wax. Customs were levied (by a custumar appointed by the burgh court) on all the staple local products: cattle, sheep, skins, hides, timber, and on malt, meal, and wool and woollen cloth. This argues that tanning, fulling, and weaving were industries within the burgh, and significantly enough the first Provost whose name is preserved in record was Gilbert the weaver in 1330 *(ER)*. The medieval burgh operated a monopoly over the

1. This is not to ignore the disorders of James III's reign which affected Galloway only marginally.
2. R. C. Reid: *Wigtown Charters*. 1960 and his Notes on Pre-Reformation Wigtown in *D. & G. Trans.* 12, 239.

exchange of goods, which brought the Community of Wigtown into sharp collision with two natural enemies — the burgh of Whithorn with its better haven for ships at the Isle of Whithorn, and individuals trading outside the privilege of the burgh — the chapmen. Their buying and selling of any of the staple products already named infringed the 'liberty of the Community of Wigtown' and laid them open to instant confiscation.[3]

Both commercially and as a social centre, Wigtown benefited by being the last stage on the pilgrims' route to Whithorn. In addition to the advent of extra trade and liveliness, it brought James IV almost annually to Wigtown, which led to a closeness between king and burgh. Local men, and institutions like the friary, benefited in terms of patronage, and the gaiety which surrounded James, his English fool, and the dancers and musicians he loved, and his own zestful presence, cannot have failed to bring colour and festivity.[4] There would have been an enjoyable sense too of being important — in touch with the centre of affairs. The contrast with the present-day town could scarcely be greater. Now, drained of business by the eighteenth-century town of Newton Stewart, and superseded by the port of Stranraer for Court and Local Government, Wigtown has the look of a small community left behind by time. In consequence however it preserves the old town plan despite the relatively modern aspect of the buildings or their frontages. Both castle and friary have gone, and the medieval church has long been replaced by a newer building. The port, never large, died with the silting of Wigtown Bay and the coming of ever larger merchant ships. Even the Bladnoch changed its course in 1818.[5] The town centre today invites a mental reconstruction of the medieval burgh, once the main artery of trade and administration for the whole Shire.

Wigtown was anything but a new town in the fifteenth century. It is not known with certainty when it acquired burghal status. The date was debated with Wigtown's commercial rival, Whithorn, in the course of an interminable series of lawsuits lasting from 1510 to 1539, documented in *Wigtownshire Charters*. The Community of Wigtown alleged that Whithorn was wrongfully usurping the privileges of the burgh and defrauding the Crown of customs by 'drawing strangers and their ships from the havens of the said free burgh . . . to the Isle of Whithorn'. The Prior of Whithorn offered to show Whithorn's old infeftments — 'older than the town of Wigtown had'.

The earliest document that Wigtown was able to produce was a Crown charter of 1457. Whithorn (a settlement probably a thousand years old at that time) had a charter from Robert I (1325). It was urged on behalf of Wigtown that James II had made Wigtown a free burgh with all privileges within the bounds 'from mid-stream of the Cree west to the Ireland Sea,' and that the inhabitants of Wigtown had been in possession of that freedom 'past memory of man' *(Wigt Chrs)*. This was substantially

3. The King in Privy Council wrote in 1503 to the Sheriff and his deputes, and the aldermen and baillies of the Burgh of Wigtown apparently to strengthen their hands in dealing with chapmen, by stressing the power and duty of escheat (forfeiture).
4. His domestic accounts proclaim the man: fond of fine clothes, of hunting, hawking and other sports, open-handed to musicians, jugglers, dancers, easily moved by a hard-luck story, passionately devoted to the church, and particularly St Ninian, something of a medical expert. Because he had so much to offer, Scotland finds it hard to forgive his incompetence as a general, but he must have been a delightful person to know. (*ER, Treasurer Acct,* and *RRS*).
5. Angus Graham: Some Old Harbours of Wigtownshire. *D. & G. Trans.* 1979.

true : the Crown charter of 1457 was a transumpt of Robert I's charter confirming the privileges of Wigtown in pursuit of his policy of restoring Scotland's institutions to their condition in the time of Alexander III. Professor Duncan stated with some confidence that the burgh dated from the pacification of Galloway in 1235[6] and the evidence is generally consistent with this. It appears to be the time that the sheriffdom was established, and the large medieval castle developed. This had been dismantled around 1313, but some measure of fortification had replaced it, possibly on the orders of Edward Balliol, for the royal charter of 1451 refers to 'the tower and burgh of Wigtown' *(RMS ii)*. Wigtown's pre-eminence as an administrative centre appears to date from the thirteenth century. In 1257 the parish was the living of the rural dean *(CPL i)*. In 1341 the town was described, in David II's charter conferring the Earldom of Wigtown on Malcolm Fleming, as 'the principal manor in the whole sheriffdom'.

So much for past history and for the standing Wigtown retained into the period under review. What was the town really like? There is no need to posit the platitudinous time-machine. Familiarity with the documents leaves one with the sense of having been there. First, the documentation of the fifteenth-century tenements brings the town plan clearly before us. For example, in 1474 a notarial instrument refers to the 'tenement on the south side of the burgh between the tenement of Thomas Murthosoun on the east and the tenement of Thomas McGarvey on the west'. In 1495 'a tenement on the north side of the burgh between the lands of Finlay MacBlain on the east and the lands of Alan McCulloch on the west.' *(Wigt Chrs)*. In the mind's eye the tenements begin to line up facing approximately north and south across the wide main street.

Thus in 1495 the vicar of Penninghame endowed a chaplaincy with a 'dwelling house on the south side of the burgh between the tenement of Duncan Makke and Simon McCristen, and another tenement on the north side between the tenement of Gilbert McConnyl and the said Simon's, one on the south side between the lands of Affrica Macdowell lady of Torhouse, one croft on the north side between the lands of Gilbert Makcristyn and Simon Makcristin; one croft on the north side between the lands occupied by Gilbert the carpenter and the lands occupied by John Makdowel' *(RMS ii)*. A feeling of the intimacy of the community of Wigtown begins to communicate itself as well as the physical alignment of its main street.

The central thoroughfare running north-east and south-west uphill from the sea and the old harbour, was as M'Kerlie, writing in 1870 described it, 'built in the form of a parallelogram. The principal street is wide, with enclosed pleasure grounds in the centre' [7]. The width may be judged by the tennis courts and bowling green shown in the middle of the main street by the Ordnance Survey map of 1908 (25 inches to the mile). The tofts and crofts set either side of this exceptionally wide space recall the plans of certain Northumbrian villages where cattle were traditionally confined at night[8], and this feature of the medieval town is vouched for by C. H. Dick, who wrote

6. A. A. Duncan: Burghs before 1296. *Hist. Atlas of Scotland.* 1975.
7. P. H. M'Kerlie: *The History of the Lands and their Owners in Galloway.* Vol. i. 1870.
8. This essentially Anglian lay-out is discussed by H. Thorpe: The Green Villages of Durham. *Proc. Inst. of British Geographers.* 1951. The OE place-name *wic-tun* (Wiketon 1257) meaning 'farm village' or 'dairy farm village' supports my view that this was a Northumbrian settlement.

of Wigtown as late as 1916: 'one cannot pass through the town without noticing a two storey house projecting from the line of the other houses at the west end of the square. It formed a side of the West Port. So recently as the middle of the eighteenth century the inhabitants used to drive their cattle within the port every evening, and the gates were closed until morning. The gates were very narrow and were subsequently swept away'.[9]

At the West Port stood the mercat cross. At the east end on the north side and outside the burgh proper, lay the parish church. The ruins of a twelfth-century church still remain and a fragment of a cross of the Whithorn school, probably tenth-century was found in the kirkyard. The dedication of the church to St Machutius marks the foundation as even older[10]. Main street was crossed by the High and Low Vennel of which the Low Vennel was probably the older, for it appears in an instrument of sasine of 1515-16 as 'the common Vennel'.

Whether any of the tenements of the fifteenth century were built of stone as they are today is uncertain. Many were probably of timber-framed construction. Commonly in medieval burghs the houses were fronted by booths or stalls where goods were displayed for sale — a feature that can be seen in some old-fashioned green-grocers shops today, still open to the street. That the tenement houses had stables and crofts behind, and sometimes gardens, appears from the documents; and some had cellars beneath.

No account of the interiors is to be found, but an inventory of some of the household goods fills out the picture. In 1495 Jonet Buyt, her husband Henry Mundwell, and her sister Beatrice Buyt, sued Alan McClellane, a burgess, and Gilbert Dykkyson of Claunch for the 'wrangwis detencioun from the said Jonet . . . of certain gudis of heritage : a basyng, a eware (value ten shillings), a pot (twenty shillings), a kist (three shillings), a pewter plait (two shillings), a pan (three shillings), ane irne cruk (thirty shillings), 2 coddis (four shillings), a brasyn chandelare (three shillings), twa trestis, twa formes (four shillings)' *(ADC)*. The total value of these items is equivalent to the annual rent of a considerable estate.

Our tour of the fifteenth-century town is completed at the Friary. The house of St Mary of the Preaching Friars lay, according to Symson, on the south-east of the town[11]. It has been said that the house was founded by Devorgil de Balliol in 1267. Whether she founded it is not recorded but it is certain that the Friary was sufficiently well-established in 1262 to assist in the negotiation of the return to the kingdom of Scotland of the Isle of Man. *(ER i)*. The involvement of the house with the affairs of the town was demonstrated in the next century when in 1331 Friar Patrick McEwyn was Provost.

Because it was consistent with the Dominicans' ministry to live in the towns and preach to the urban poor, sharing their property, their communities were not endowed with lands and estates such as were possessed by the older monastic Orders.

9. Rev. C. H. Dick: *Highways and Byways in Galloway and Carrick*. 1924. p 186-87.
10. Professor Macqueen identifies *Machutius* as *Mo-Cuta*, Abbot of Lismore in Ireland who died c 637 (Gaelic-speakers in Galloway and Carrick. *Scottish Studies* 1973) but I am more inclined to identify him with *Machutius* the British saint of St Malo. The wine trade brought Wigtown in contact with Brittany, and the contact may have been of long standing, or the Anglian settlement may have incorporated a Cumbric church. *Machutius* is honoured at Lesmahagow in Strathclyde.
11. Andrew Symson: *A Large Description of Galloway*. 1692. (Appended to William Mackenzie: *History of Galloway*. 1841.) Symson says in his day the very ruins of the Friary were 'allmost ruined.'

The friars accepted only 'housekeeping' — rents and annual gifts in kind, for the support of their house. Robert I granted (or confirmed) alms to the Friars of Wigtown, but their income from royal sources is first detailed in 1456. They then received annually twelve bolls of meal from the king's grange of Baldoon, six from Lybrack (both in Kirkinner), another chalder and two bolls were the alms of Robert I 'as appears in the ancient rolls' *(ER vi)*. A proportion of the moneys collected by the itinerant justices went to them, and they received ten merks (£6.13.4d) annually from the burgh of Wigtown and 'from ancient alms one merk' with the fishings on the north side of the Bladnoch *(ER viii)*. For years in the late fifteenth century the Prior, Brother Ninian Schankis, gave receipts in person for the burgh's alms, and in 1480 'by letter under his seal' *(ER ix)*. It was at the Friary that James IV usually lodged on his visits to Wigtown, spending two nights there on his way to Whithorn, and two nights on the return journey.

The town lay surrounded by unenclosed arable fields divided into the strips or rigs of cooperative cultivation, and the common grazings associated with it. The burgh lands and Kirklands lay to the north of the town. These were listed in Robert I's charter, as copied in the transumpt of 1457, as 'Borowmers (Borrowmoss), Braidfelde (Broadfield), Clachary (Claucherie), Creveny (Kirvennie), and Philliplande (now identifiable only by Phillip Hill) 'and the rest of the acres of the common lands and the mill and the fishings' *(RMS ii)*. To these must be added Culquhork (Culquhirk) which was confiscated from John Schaw in 1455, and described by the Exchequer in 1456 as 'belonging to the Community of Wigtoun and one poor tenant' *(ER vi)*. To the south of the burgh lay Cotland and Maidland, the latter part of the glebe, hemmed in by the Bladnoch. Cotland belonged to two tenants-in-chief, the Foulartons and the Mures. The infeftment in half the lands of Cotland of Alexander and Mariota Foularton in 1458 (and their successor David Foulartoune 1471 and 1495) is documented in *RMS* and the Respond Book of *ER x*. In 1498 Ninian Mure was infeft in the 'three merkland of Coteland', presumably the other half. Maidland is not recorded until the sixteenth century. The Kirklands were the subject of a lawsuit in 1484. Alexander Scot, 'parsone of Wigtoun' brought a suit before the Lords of Council for teinds withheld by an agent, and for the possession of the Kirklands and the glebe. This is discussed later.

The minutes of the burgh court available for the last decade of the sixteenth century demonstrate how the cultivation of the burgh lands by the burgesses and indwellers and their servants was regulated, and are some guide to earlier times. Sharelands were 'sett' annually for a rent, and their cropping controlled. The terms 'aiker', 'oxgang', 'zok' (yoke), and 'rude' (rood) were used apparently synonymously. The Provost and baillies met in the Tolbooth to consider the burgesses of Wigtoun 'quha hes pait ye tounis meilis' for the year, and to make arrangements for the next season. Some control over the standard of husbandry was maintained and an official was responsible for this to the burgh court.[12]

Between the north Main street and the burgh fields lay the small manor of Monkhill. A crown charter of 1485 confirming one of the previous year by the provost, baillies and Community of Wigtown who were apparently the superiors,

12. Gordon Fraser: *Lowland Lore*. 1880.

listed the house, orchard, meadow and hill, when conveying the property to Simon Mcristin on the resignation of his father, John Macristin. Simon was to pay an annual rent of twelve pence, and provide pasture for the Abbot of Glenluce's horse, whenever he should visit the burgh *(RMS)*. Their occupation of Monkhill marks the eminence of the Macristins among the burghal families. John McCristyne had been Provost in 1459 and 1470-71. Simon McCristyne to whom Monkhill was conveyed in 1484 was then a burgess. By 1495 another John Makcristin was a baillie and another Simon was baillie in 1523. (There was still a John Macristin of Monkhill in 1630). But their social ascent from burgesses to the ranks of the landed gentry was already accomplished in the late fifteenth century.

In 1471 John Makristen bought two merksworth of the lands of Carseriggan in the parish of Kirkcowan, from Gilbert Makdowell of Ravenstone. The purchase was confirmed by the Crown in 1485 (*RMS ii*). This seems to be the family's first acquisition of a rural estate, but it was not their first property outside the burgh of Wigtown. In 1473 the same John McCrystin had leased out a tenement in the burgh of Whithorn to Duncan McCulloch. Part of the bargain was that Duncan should provide stabling for two horses whenever John McCrystin should go to Whithorn on business or for religious observance. He presumably expected to take a servant with him. In 1488 the Crown confirmed the purchase in 1484 by John's son Simon, burgess of Wigtown, of another country estate, this time at Claunch in the parish of Sorbie. It consisted of a twenty shilling land plus a further half merksworth containing the manorhouse, garden, orchard, and paddock. This did not mean that the Makristins became the sole lords of Claunch (any more than at Carseriggan) for Gilbert Dickonson, the tenant-in-chief, who sold the property to Simon, remained in possession of seven and a half merksworth of the lands, and continued to be styled Gilbert Dickonson of Claunch. This subinfeudation of large estates was common.

In 1498 Gilbert's son Patrick Dikonsoun exchanged the two merksworth of Claunch 'which Simon had by the charter of Gilbert Dikonsoun, Patrick's father' (plus a sum of money) for four merksworth of Kilsture, the adjoining lands. Tenure was to be blenche ferm for a silver penny a year. Royal confirmation was enacted on one of James IV's visits to Wigtown and was witnessed by Rankin Mure, Alan Makklellane, John Maknay, Michael Maknay, Thomas McKilchaff, Thomas Maklellane, Richard Burn and Thomas Burn, burgesses of Wigtown. The Macristen family from this time forward was securely established in their dual status as country proprietors and burgesses. When the hereditary Sheriff, Quentin Agnes, who was mentally defective, was made subject to curatory in 1498-9 (*RSS*) Simon became Sheriff depute, and effectively, Sheriff in the Shire, though not in the Stewartry.

The puritan pattern of the successful merchant and public servant — honest, long-headed, and long-faced, which was to be perfected in the ensuing century, did not fit Simon Macristen. He was a hot-tempered man, and a bully — not above snatching up a weapon with intent to kill, not above beating up a woman, not above sharp business practice and the use of intimidation and appropriation in his official capacities. By the time the Justice in Ayre came to Wigtown in 1513, sweeping up the accumulated criminal charges over nearly a decade, Simon Macristen had to answer for 'hame-sukkin done to John Kells,[13] coming upon him wishing to slay him;

13. Hamesucken: assaulting of a man in his own house. *Chambers 20th C. Dictionary.*

oppression done to Mc-Calvin dochter, wife to John Acarsane . . . cruelly striking her and beating her; for common oppression done to the neighbours of Wigtoun, arresting them and troubling them at the courts.' He and an accomplice, Dominick Maclellan were allowed to compound for 'oppression done to the Community of Wigtoun in taking the best merchandise coming in ships to the said burgh and keeping thereof in their cellars, and for gathering the profits of the town and the burrolandis' (Pitcairn). It is a comprehensive catalogue of the abuse of power, and had provoked the inevitable hostility. The neighbours of Wigtown had not taken all of it lying down. At the same session Duncan McKe was found guilty of coming upon Simon for his slaughter; and Patrick Mure, whom we shall meet again, was charged with 'forethought felony done to Symon M'Cristin in Wigtoun by chacing him with a drawn quhinzeare'.[14] So we may deduce that Simon Macristen could run faster.

Some explanation of Simon's doings may have lain in the increasing involvement in burgh affairs of the McClellans of Bombie, and the feuding which divided the landed families of the period. According to the charge against Simon Macristen, he had arrested the neighbours and brought them into court 'because they would not be his man'. He was further charged with 'breaking the Act of Parliament because he is the lord of Bomby's man'. The Act had been passed in 1491. It 'statit and ordanit that within the burrowis throwout the realme that na legis nor bandis be made na zit na quocacioun na rising of the commonis in the hendring of the commoun law bot at the command of thare hed officiare and gif that ony dois in the contrare and knawlege and taynt be gotten therof thare gudis that are fundin gilty therein to the confiskit to the King and their livis at the Kingis will. And that na man duelland within burgh be bundin in manrent na ride na rout in fere of were with na man bot with the King.'[15] The legislation might have been designed for Wigtown; and the courts were zealous in its enforcement.

To some extent it was a case of Canute and the incoming tide. For whatever the landed gentry did inevitably involved the burgesses of Wigtown. The dividing line between the two social groups was anything but rigid. The country gentry's habit of keeping a town house was already established. The tenement in the Main Street belonging to Affrica Macdowell, lady of Torhouse, has been mentioned. In 1473 the King granted to John Carlile of Torthorwald just such a tenement with a garden. (*Wigt Chrs*). Gilbert Dikonsoun of Claunch was involved in a dispute over a tenement in 1495 (*ADC*), and the laird of Bombie's tenement is mentioned in an Instrument of Sasine in 1515-16 (*Wigt Chrs*).

When James IV confirmed the endowment by Mr William McGarve, Vicar of Penninghame, of a chaplain for the altar of St Mary and St Ninian in the parish church in 1495, the charter was witnessed by Patrick MagKee of Cumlodan (parish of Minnigaff), Uchtred Makdowell of Mindork (Kirkcowan), Rankin Mure, and Norman McCulloch of Torhouse (*RMS ii* 2273). It was natural enough that the

14. A quhinzeare or whinear was a short stabbing sword. M. Robinson: *Concise Scots Dictionary*. 1985, also spelled whinger. *Chambers 20th C. Dictionary*.

15. T. Thomson: *Acts of the Parliaments of Scotland. 1814-75*. Simon McCorstin, and John, Gilbert, and Donald McCorstin were named as accomplices of Sir Thomas McClellan in 1500, when he was charged on behalf of the Crown with 'the disobeying . . . of our soverane Lordis letteris commandments, and chargis direct under Privy seal and signet charging thame and al utheris our soverane Lordis legis til haf answerit and obeyit til Jhone Lindsay custumar of Wigtown', and obstructing John Lindsay and his deputes in the execution of their office. (*ADC*).

county set should attend the King on his visits to Wigtown, but the same surnames — McGhie or McKee, Macdowell, Mure, McClellan and McCulloch, appear repeatedly in the records of the burgh at this period and in the century that followed. To them should be added the Mundwells and Hannays and some others. The traditionally landed families of Wigtownshire were not merely residents in the burgh, but burgesses. Henry Mundwell of Eggerness and Gaitgil, whose financial difficulties bring him before us more than once, owned several estates and was at the same time burgess of the burgh; and this was not unusual. Equally the younger sons of landed proprietors can be found trading in the burgh, sometimes so successfully as to be able to buy estates for themselves.

A key figure in this context, whose name is mentioned many times in record between 1474 and 1506, was Rankin Mure. He came of the landed family who were lords of the great estate of Craighlaw in Kirkcowan, Bardrochwood in Minnigaff, and proprietors of part of Torhouse in the parish of Wigtown. Adam Mure, a contemporary of Rankin's, probably his brother, was Chamberlain to the Exchequer in Galloway.[16] They were a powerful and prestigious family.

For most of his life Rankin does not appear in record as having owned land, though he leased Kilbreen in Stoneykirk in 1480, and six and a half merklands of Kilhern in 1481 (*ER ix*). After his acquisition, by what means will appear, of part of the superiority of Conchieton in Borgue, he was occasionally styled Rankin Mure of Conchieton. More often he appears in witness lists directly after the names of the important landowners out of deference to his breeding, simply as 'Rankin Mure'. This catches somehow the character of the man: independent, high-handed, careless of public opinion, needing no title to give him consequence. How long he was a burgess of Wigtown is not clear — perhaps as long as thirty years. It is only occasionally, as in a witness list to a Crown charter dated in Edinburgh in 1496 that his name is placed so as to be unequivocally among the burgesses (*RMS ii* 2337).

To what extent he traded as a merchant we do not know. What is quite clear is that he was a financier — a banker and moneylender, lending against the security of land. This is made explicit in a Crown charter of 1490-91 (*RMS ii* 2018). Henry Mundwell had pledged a two merkland of Eggerness (in Sorbie) for one hundred merks, which James McCulloch gave him to redeem from Rankin Mure a two and a half merkland of Conchieton (which was also called Gaitgill Mundwell) on condition that he would lease the lands once they were redeemed to James for nineteen years. Henry, beset with embarrassments, failed to redeem the lands, and he subsequently sold the proprietorship of the two and a half merkland and the superiority of a five merkland to Rankin Mure in 1497, presumably at a knockdown price.

It is probable that the initial loan against the security of the lands of Conchieton was of long-standing. Rankin's first appearance in record was as a member of a jury who were charged in 1474 with an erroneous service affecting the inheritance of the lands of Gaitgill McGilvernock (now Gaitgil) (*ADA*). His presence on the jury

16. Reid refers (p 172) to Rankin Mure, son of Adam Mure. That there was such a person is clear from an obligation of 1513 which is concerned with a tack 'which Rankin Mure has' implying he was still alive. In the same year Thomas Mure, tailor, was found guilty of breaking open Rankin Mure's cellar, again implying that he was alive at the time of the hearing. But Rankin Mure, father of Patrick Mure, was dead in 1506 (*Wigt Chrs* no. 196). The two were probably uncle and nephew.

argues local interest, and he may already have been occupying the two and a half merkland of Conchieton or Gaitgill Mundwell, which adjoined. The conclusion of the matter — Henry Mundwell's sale of the lands to Rankin — was clearly to Henry a last resort, and it had taken the exertion of some pressure. This is the explanation of Rankin Mure's unwarranted occupation of the burgh tenement that was the patrimony of Jonete Buyt, Henry Mundwell's wife, in 1495. Others seized the household goods, but Rankin took possession of the house, and drove his own cattle onto the croft behind. (*ADC*). The message was clear enough. The sequence of the transactions between the two men show Henry Mundwell gradually reduced to a condition where he was at Rankin Mure's mercy as a consequence of the failure to repay the initial loan, a process familiar to the clients of moneylenders the world over.

Rankin did not always come out on top. His earliest and certainly his most disastrous crisis appears to have resulted from his acting as agent for the parson of Wigtown, Magister Alexander Scot, who was clerk register to the Privy Council and Master of the Rolls (*CPL xiii*). Scot, of necessity an absentee priest or frequently away from home, seems to have entrusted Mure with the management of his lands and the collection of his teinds. In 1484 Scot sued Mure 'for wrangwis withhaldin of £30 of the rest of a mare soume aucht to him for the teinds and froittis of the Kirk of Wigtoun, and the wrangwis occupacioun and manuring of the Kirklands and the glebe'. Rankin Mure had presumably lent the moneys collected and was unable to disburse the accumulated teinds. Perhaps because Scot was a royal official, and because church property was involved, the Lords of Council took a far more serious view of Rankin Mure's failure to pay than was usual when a private individual sued for debt. They ordained that Rankin should find a surety, and depart from the lands, and 'he sal pay the said somez er he pas furth from this toun (the case was heard in Edinburgh) or els . . . enter his person in ward in the castel of blacnes'. This was in 1484. *(ADC).*

Similar difficulties led to his being sued in 1491 by Patrick McKee of Cumloden and Effric Makdowell, his wife, for the sum of twenty-five and a half merks 'quhilk wes gevin to the said Rankin . . . in keping be the said Patrick McKee, Normand McCulloch and George McCulloch' (*ADC*). Rankin was called in court and did not compear, and their Lordships confined themselves on this occasion to making an order for the distraint of his lands and goods if he did not pay. The largeness of the sum indicates the scope of Rankin Mure's financial enterprises and risks. In modern terms his apparently unethical procedures and bad legal record stemmed from his inability to regulate his cash flow. As society and finance were organised in his day, without insurance or the concept of limited liability, proceedings against him in the civil courts were a constant occupational hazard.[14]

Apart from his transactions with Henry Mundwell, where there may have been some measure of personal animosity, Rankin seems to have pursued his debtors by

17. Taking possession of land and collecting the rents was the only effective means available of getting a return on capital loaned out and obtaining security for repayment of the capital sum. The medieval church forbade usury (charging interest) and whether to do so invited the attention of the ecclesiastical courts, any such arrangement would have been unenforceable.

legitimate means. In 1492 he sued the Sheriff Quentin Agnew for £15 owed to him by Quentin's late father, Andrew Agnew *(ADC)*; and in the same year brought Nichol Makgee of Balmaghie before the Lords of Council for recovery of an outstanding debt.

In 1498 he was once more in trouble over the retention of the rents of Glenturk (parish of Wigtown) which he had apparently collected over a term of nineteen years. Once more he seems to have taken on the function of an agent, or rent-collector, and was unable to hand over the money in due time. He died in 1506 and his son, Patrick, was sued as late as 1519 for the profits of a nine merkland of Torhouse and Cotland in conformity with a summons served by the late Ninian Mure on the late Rankin (*Wigt Chrs* no. 229). Meanwhile Patrick Mure had inherited Conchieton from his father, and sold it immediately, and had also inherited Cotland from Ninian Mure (he was sued by Ninian's daughter). He was sometime styled Patrick Mure of Cotland.

To what extent Rankin's business had prospered is difficult to say. Patrick Mure was an alderman of Wigtown at the time of his father's death, and was to be five times provost. That suggests he was a man of substance. His burghal office may nevertheless have been due to political pressure, for he quickly emerges after Rankin's death as a leader of the opposition to the McClellan faction in Wigtown. He and his servants were responsible for a number of tumults and personal assaults, the most innocent being 'contempt done to the King in taking one called Lang McKe furth of the stokis wherein he had been placed by Simon McCristin, Sherrif depute, for hurting a spaniard.' (Pitcairn).

An older school of historians rejoiced to find pre-Reformation society corrupt and violent, and it is with caution that evidence deriving from the courts of justice should be assessed. Here we see the evil that men do living after them, and the intermingled good duly interred. It may be on record after five hundred years that a man swindled the church, or chased the Sheriff depute with a drawn quhinzeare, while nothing remains to inform posterity that he was kind to his wife, spoiled his children, and doted on his horse. The personal shortcomings of Simon Macristen for example, were less of a threat to public order than the extent to which provosts were the tools of the landed bosses whose struggle for power was most frequently expressed in feud and civil disorder. The two ugliest incidents recorded in Galloway in the generation we have been studying seem to have been thus motivated. The Castles of Dunskey and Ardwell in the Rhins were burned and looted about 1489, by a mob led by the MacDowells of Garthland. Several people were killed. A few years later the McClellans' castle of Lochfergus near Kirkcudbright was burnt. Both affrays appear to have been manifestations of a feud. By comparison disorders in the burgh of Wigtown consisted of noisy brawling with very little real harm done.

Parliament's measures to combat feuding, and especially the illegitimate control of the burghs, could be seen being enforced and there seemed a hope that the law might become stronger than the feud. Men might abuse their office, and the courts might move with excruciating slowness, but the neighbours of Wigtown were not at this time totally without redress. The careers of both Simon Macristen and Rankin Mure suggest that the courts were becoming more effective than either of them had expected them to be. So when the final reckoning is made, for a generation what the

records reveal is not a lawless society, but the courts upholding contracts, and the people resorting to the law as their protection.

It is coincidence that the period of this study corresponds to the forty years of James IV's life. The study closes logically with the session of the criminal court of 1513 rather than with the battle of Flodden. But the continued preservation of order in Galloway depended on a strong administration at home, and peace across the southern Border. The relevance of Flodden is therefore inescapable, for it was part of the tragedy that such hopes as these were among the casualties. For Galloway it marked the end of a respite from Border warfare and internal lawlessness; and the burgh of Wigtown probably never again saw such a heyday as perished with James IV.

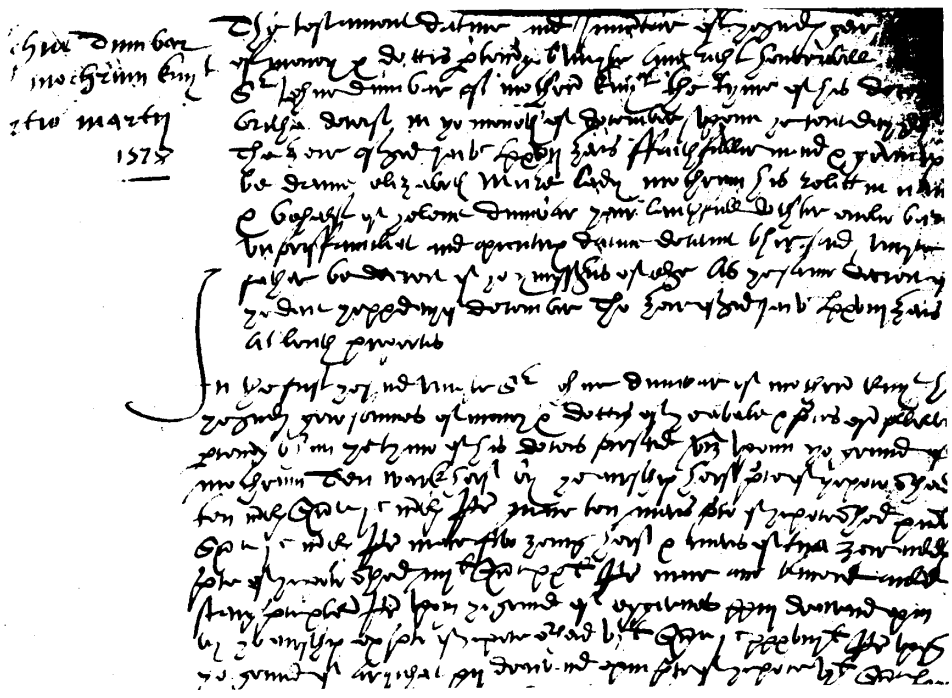
INVENTORY OF THE ESTATE OF THE LATE SIR JOHN DUNBAR OF MOCHRUM
WHO DIED ON 10th DECEMBER, 1577

edited by
W. F. Cormack and A. E. Truckell

General

This Inventory (SRO ref. CC8/8/6) was referred to by the late Dr. R. C. Reid during a Society Outing to the Old Place of Mochrum on 30th June 1934 — for an account see these *Transactions* Vol. 19 p.144 but owing to the amount of social and other information contained in it the editors felt it should be published in full, and they gratefully acknowledge that this is done with permission of the Controller of H.M. Stationery Office. The text has been transcribed by A. E. T. while the comments are by W.F.C.

An attempt has been made to make this paper of value to other researchers by numbering and adhering to the lines of the original but to make the Inventory more readable for the average Society member the editors have expanded all abbreviations, y (for anglo-saxon *thorn)* has been rendered th, but consonantal y *(yogh)* has been kept as z to pass on to the reader some of the flavour of the original. U. v and w are usually all rendered in the original by u, however the editors have altered this to conform with modern convention. Superscript L for pound has been rendered as £.



Portion of the original Inventory.
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Where difficulty in reading occurs this is noted by asterisks before and after the uncertainty. Although the Edinburgh clerk has misread many of the Galloway place names most can be equated with confidence.

Prices are given generally in pounds, but sometimes in merks of which each is two thirds of a pound. The numerals are perhaps not immediately recognisable — single units are shown as i but, where more than one, the last as j, hundreds and thousands by superscript c and m respectively while reckoning is occasionally in scores which are indicated by a superscript xx. Thus £212 appears as ij^{c}xij£ and 92 can be shown as lxxxxij or iiij^{xx}xij (i.e. four score and twelve).

The text with footnotes, is followed by a brief discussion which is not intended to be exhaustive but to stress the wealth of information contained in the Inventory. The discussion is followed by indexes of persons and places which it is hoped will be useful.

Inventory

Johne Dumbar
of Mochrum Knycht
Tertio Martij
1578

The testament dative and Inventar of the guds geir soumes of money & dettis pertening to umquhyle ane richt honorabill man Sir Johne dumbar of Mochrum Knycht the tyme of his deceis Quha deceist in the moneth of december upoun the tent day thairof The zeir of God jmv^{c} Lxxvij zeris ffaithfullie maid & gevin up be dame elizabeth Mure lady mochrum his relict in name & behalf of helene dumbar thair lauchfull dochtir onlie barne unforisfamiliat and executrix dative decernit to hir said umquhyle father be decreit of the Commissaris of edinburgh as the same decreit of the dait the xx day of december The zeir of god jmv^{c} Lxxviij zeris at lenth proportis.

In the first the said umquhyle Sir Johne dumbar of Mochrum Knycht had the guds geir soumes of money & dettis of the avale & priceis efter following pertening to him the tyme of his deceis foirsaid viz upoun the grund of Mochrum ten wark horss by the airship horss price of the pece overheid ten merks Summa j^{c} merks Item mair ten meirs price of the peice overheid x merks Summa j^{c} merk Item mair five zoung horss & *meris* of twa zeir auld price of the pece overheid iiij £ Summa xx£ Item mair ane tolmont auld staig price xlv£ Item upoun the grund of eggirnes xxiij drawand oxin by the airship ox price of the pece overheid vj£ summa j^{c}xxxviij£ Item upon the grund of *arquhat* xij drawand oxin price of the peice vj£ Summa lxxij£

l.1 *Dumbar*: This is the spelling throughout, showing the contemporary pronunciation.
l.2 *umquhyle* = the late.
l.4 date: Sir John died on 10th December 1577. His daughter Helen was decerned executrix on 20th December 1578 while Confirmation was granted on 3rd March following — which was still 1578 under the Old Style calendar then in force.
l.6 *Elizabeth Mure*. Daughter of Kentigern Mure of Rowallan. For an account of the Mures in Galloway see Reid, R. C. (Ed.) *Wigtownshire Charters* pp 171 and 181.
l.8 *unforisfamiliat* i.e. had not discharged her right to her share in the estate.
l.13 *avale* = *value*.
l.15 *airship*: See discussion on heirship moveables.
l.16 *merk* = 13sh.4d.Scots. At this time the Scots pound was tariffed at six to the pound sterling.
l.18 *tolmont* = twelvemonth.
l.19 *staig* = stag (stallion).
l.21 *drawand* = draught, *arquhat*: see note to l.80.

Item in the may Ten drawand oxin price foirsaid Summa lx£ Item in
aryquhat aucht zoung stottis quhairof foire of thame foire zeir auldis
price of the peice iiij£ and foire of thame five zeir auldis price of the peice v£
Summa xxxvj£ Item in craiglarin aucht twa zeir auld stottis price of
the pece xl£ Summa xvj£ Item in the tennantis handis of darquhreill
of teilbow guds fourty ky price of the pece five pund Summa ij^{c}£ Item
in the tennants hands in tallowgleis thretty ky set in teilbow
price of the pece v£ Summa j^{c}l£ Item mair thair aucht oxin price
of the pece vj£ Summa xlviij£ Item in the tennents hands of arelyk
sextein ky set in teillbow to thame price of the pece v£ summa lxxx£
Item in the tennents hands of the may twelf ky set in teillbow
to thame price of the pece v£ summa lx£ Item in the tennents hands of
of (sic) *craiggieaucht* twelf ky in teillbow price of the pece v£ summa lx£
Item in the tennantis hands of craiglarrie aucht ky set in teilbow
price foirsaid Summa xl£ Item in Kerequhillioch in the tennents hands
thairof ten ky set in teillbow price foirsaid l£ Item in the tennents hands
of Shang aucht ky set in teilbow price foirsaid Summa xl£ Item in the
tennents hands of the parkhyles twentie ky set in teilbow price foirsaid Summa j^{c}£
Item pasturing upoun the grund of craiglairie sextene thrie
zeir auld quey beistis price of the pece iij£ Summa xlviij£ Item
pasturing upoun the grund of *Kereynhillaucht* aucht thrie zeir
quey beistis price of the pece iij£ foirsaid Summa xxiij£
Item in pasturing upon the grund of arelyk sex tolmont auld
beistis price of the pece xxss Summa vj£ Item pasturing upon the
grund of tallowglas sevin tolmont auld beistis price of the pece
xxss Summa vij£ Item in the hands of Johne Mcburney & Alex^{r}
coltrane tennentis in arelyk of teilbow clippit schepe quhilk thai
ressavit mony zeris syne with the grund auchtene scoir of auld
clippit schepe price of the scoir xx merks Summa xij^{xx}£ Item in the hands
of andro herron and *leweis* frassir tennantis in the Chang of
teilbow schepe aucht scoir clippit auld schepe price foirsaid Summa
viij^{xx} merks Item in the hands of alex^{r} mcalex^{r} tennent in
Kerreyquhillauch of teilbow clippit auld schepe ten scoir price of
the scoir foirsaid Summa ij^{c}merks Item in the foire tennentis hands of
craiggraucht & craiglairie nynescoir clippit auld schepe in
teilbow price foirsaid Summa vj^{xx}£ Item in the hands of bartilmo
mcdowell tennent in the may fiftie clippit auld schepe in
teilbow price foirsaid Summa 1 merk Item in the hands of gilbert Mc
dowell tennent in parkhillis fourtie clippit auld schepe in teilbow
price foirsaid Summa 1 merks Item in the hands of david hunter tennent

l.23 *aryquhat*: see note to l.80.
l.25 *craiglarin* = Craiglairie (Mochrum p.)
l.26 *darquhreill*: Probably for Barquhill (Kirkcowan p.) since the adjoining properties Kiladam (l.70) and Clugston (l.114) in the same parish feature in the Inventory.
l.27 *teilbow* = steelbow, i.e. goods let to a tenant along with the land.
l.28 *tallowgleis* = Challochglas (Mochrum p.)
l.34 *craiggieaucht* = Craigeach (Mochrum p.)
l.36 *kerequhillioch*: Probably Corhulloch (Mochrum p.)
l.38 *shang*: Now Changue (Mochrum p.)
l.39 *parkhyles* (expanded from *pkhyles*) = Parkhills, adjoining Old Place of Mochrum.
l.42 *kereynhillaucht*: see note to l.36.
l.51 *leweis frassir:* a Lewis Fraser was Reader at Longcastle in 1567 then Exhorter or Reader at Mochrum until 1586 (*Fasti Ecc. Scot.* 1917). Readers and Exhorters were in effect lay preachers in the Reformed Kirk, and his designation as "Minister" of Mochrum in a deed of 1568 (*Corr. of Sir P. Vaus* p.43) is an elevation not supported by the *Fasti*.

in garquhurie auchtein scoir of clippit auld schepe price foirsaid
Summa xij^{xx}£ Item in the hands of John Coltrane tennant in
garguiry lxxxxij clippit auld schepe in teilbow price foirsaid
Summa lxj£ vjs viij Item in the hands of patrik coltrane and
michell Mcteir tennents in dirblair five scoir cleppit auld
schepe in teilbow price foirsaid Summa j^{c}merks Item in the hands
of michell Mcilvayne tennent in tallowglas sex scoir cleppit
auld schepe price foirsaid Summa lxxx£ Item in the hands of Johne
Mc*clurney* tennent in kiladam thrie scoir cleppit auld schepe
in teilbow price foirsaid Summa xl£ Item in pasturing upoun
the grund of eggirnes xlj rouch auld schepe price of the scoir overheid
xvj£ Summa xxxij£ xvjs Item in the hands of the foire tennentis
of craiglairie fiftie cleppit hoggis price of the pece xss Summa xxv£
Item in the hands of patrik garroch tennent in arrequhillart
xxx clippit hoggis price foirsaid Summa v£ Item in the barne &
barnezaird of eggirness nyne scoir bollis aittis price of the boll
with the foddir xxx ss Summa ij^{c}lxx£ Item mair thair xxvij bolls *beir*
price of the boll with the foddir iij£ Summa lxxxj£ Item in the barne &
barnezaird of arquhart lx bollis aittis price of the boll with the foddir
xxx ss Summa lxxxx£ Item mair thair xiij bolls corne price of the boll with the
foddir iij£ Summa xxxix£ Item the tyme of the said umquhyle lardis
deceis foirsaid intromettit with be patrik dumbar of *crealuith* the
said umquhyle lairds purss and thairin of gold & silver ane hundreth punds
Item of *zuldir* silver in pots twa hundreth twa pund x^{ss} Item
xxxvj auld edward angellis nobillis price of the pece iij£ Summa j^{c}viij£
Item ten xliiij^{s} peces of gold of the duiks cunze price of the pece
iiij merks Summa xl merks Item ane thriepund pece of gold of the same
cunze price iiij£ Item ane portingall doukat price xxiiij£ Item
ane rois nobill price v£ xss Item ane aucht pund of gold callit ane
spanies ryell & lykewyis ane doubill doubill ducat price nyne £
Item sevin doubill ducattis price of the pece iiij£ xss Summa xxxj£ xss
Item his haill silver wark by the airshippis estimat to ane hundreth
merks Item in utensilis & domicilis with the abulzements & ornamentis
of his body by the airschip estimat to foure hundreth punds

Summa of the Inventar — iiij^{m}lxix£

ffollowis the dettis awand to the deceased

Item thair wes awand to the said umquhyle Sir John dumbar of mochrum
knycht be the tennents of bankill for the fermes of the crope & zeir of
god jmv^{c} lxxvij zeris xxx bollis beir price of the boll iij£ Summa lxxxx£

1.62 *garquhurie*: Probably Garheugh (Mochrum p.)
1.64 *garguiry* = Gargrie, now part of Drumblair (Mochrum p.)
1.66 *dirblair*: Now Drumblair.
1.80 *arquhart* (or *arquhat*): Now part of Penkiln or Eggerness (Kirkmadrine p. in Farnes, later united with Sorbie).
1.83 *crealuith* (or *trealuith*) = Crailoch (Mochrum p.). *patrik dumbar* — he seems to have been a nephew and former ward of Sir John's.
1.85 *zuldir silver*, perhaps gulder silver i.e. coined silver.
1.86 etc. The coins mentioned would require numismatic study but they seem to describe the following gold coins:— Angels of Edward IV of England, Portuguese ducat, English rose noble, Spanish ryal, double ducat, and four ducat piece. The 44/- and £3 piece of the Duke's coinage must surely be the Scots coins of those denominations issued by Mary in 1553 and 1559 respectively, but would there be a duke in Scotland at that time?
1.94 *utensilis & domicilis* = domestic vessels and household effects. *abulzementis & ornamentis* = body linen, dress and ornaments.
1.99 *bankill* = *Penkiln (Kirkmadrine p. in Farnes).*

Item be *. . . . . * in the zettoun for her ferme beir in
anno domini foirsaid xx bollis beir pri foirsaid Summa lx£ Item be the tennents of
culdurrie for thair ferme beir in anno foirsaid ten bolls beir price
foirsaid Summa xxx£ Item be the tennents of *Kilmytrey* for thair ferme beir
in anno foirsaid vij bolls beir price foirsaid Summa xxj£ Item restand awand
be the tennents of the schang for thair ferme beir in anno lxxvij zeris five
bollis beir price foirsaid Summa xv£ Item be the tennents of culdirrie
for thair ferme meill in anno lxxvij zeris vj bollis mele price of the boll ls
Summa xv£ Item restand awand be the wedow of *. . . . . .* viij bolls
aittis price of the boll xxx s Summa xij£ Item restand awand be the
tennentis of chalcarro^{ch} xx bollis aittis price foirsaid Summa xxx£ Item be
the tennents of the schang ten bollis aittis price foirsaid Summa xv£ Item
be the tennents of the may Lx bollis aittis price of the boll xxx ss Summa
lxxxx£ Item awand be the tennents of clugstoun xx bolls aittis price
foirsaid Summa xxx£ Item restand awand be the fermoraris of the
myln of mochrum for thair ferme mele in anno lxxvij zeris xxx bollis
of mele price of the boll ls Summa lxxv£ Item restand awand
be the tennents of culgroit & glentripplo^{ch} for thair ferme meile in
anno lxxvij zeris fyftie bollis mele price of the boll ls Summa j^{c}xxv£
Item awand be david Murray of brochtoun the soum of aucht hundreth merks
Item awand by symon mccristene in clonche conforme to ane
decreit obteinit befoir the secreit counsall aganis him the soume of
ane hundreth & thrie scoir punds Item awand be patrik mcgowan
provest of quhitherne for nyntein puncheonis of wyne price
of the puncheon xv£ Summa ij^{c}lxxxv£ Item ane hundreth pund wecht of
plumedalmuis price of the staine xiijs iijd Summa v£ Item be george
marteine in portzerrok ane puncheoun of wyne price xv£ Item
be symon mcculloch in myrtoun souertie for umquhyle thomas mcchollum in cultis
quha wes addettit for wyne & freis xlij£ Item be margaret
mckie & dene Johne m'teir vicar of langcastell hir spous for
his intirest twa puncheones of wyne price xxx£ Item be patrik Mckie
of larg souertie for duncan mcKie burges in quhitherne quha wes
addettit for ane puncheoun of wyne price xv£ Item be robert pyper
in portzarrok & wm forrester of kiddisdaill air to umquhyle george
forrester souertie for the said robert quha wes addettit in ane punscheoun
of wyne price xv£ Item be *petire* akinheid in quhitherne ane punscheoun
of wyne price xv£ Item be wm forrester air to umquhyle george forrester
his father quha wes addettit for xij elnis of freis price iiij£ & *. . . . . .* s

l.101 *zettoune* = Yetton, now part of Penkiln or Culscadden.
l.103 *culdurrie* = Culderry (Kirkmadrine p. in Farnes).
l.104 *kilmytrey*: Probably for Killantrae (Mochrum p.)
l.111 *chalcarroch* = Chilcarroch (Mochrum p.)
l.118 *culgroit* = Culgroat (Stoneykirk p.) — see discussion.
l.120 *brochtoun* = Broughton (Sorbie p.)
l.121 *clonche* = Claunch (Sorbie p.) A Symon McCristene is mentioned in the *Correspondence of Sir Patrick Vaus* p.484.
l.126 *plumedalmuis* = prunes (lit. "Damascus plums")
l.129 *freis* = perhaps cloth raised in the weaving.
l.130 *dene Johne M'teir vicar of langcastell:* Not named in the *Fasti* as a minister or reader of Longcastle parish, McTeir may have been a former priest who was now a lay holder of the vicarage rights of this parish which was to be united with Kirkinner in 1630. Was McTeir's wife running an ale house on the old established route which passes the site of the kirk?.

Item to andro dumbar burges in quhitherne souertie for cristiane wallace
thair quha wes addettit for ane punscheoun of wyne price xv£ Item be
Johne gordoun of barskeo^{ch} souertie for wm Inglis his sservand for ane
punscheoun of wyne xv£ Item mair the said Johne gordoun cautioner
for umquhyle Johne *McKyno^{ch}* in barnecorky twelf *mucheounes* of wyne
price xxx merks Item by alex^{r} hannay of sorby souertie for thomas mccullo^{ch}
in balfairne for twa punscheones of wyne xxx£ and for five
elnis of kelt xls Item mair the said Johne grodon cautioner for
. . . . . Johne mccullo^{ch} in barnholme
twa puncheounes of wyne price xxx£ Item be andro mcchernoquhen
in *clairend* ane puncheoun of wyne price xv£ Item be david
Murray in brochtoun executor *at* the leist intromettor with the guds and
geir of umquhyle Johne murray in orchartoun quha wes addettit in
the soum of vij£ iiijss for kelt Item be thomas mcdowall of
dunnance thrie punscheounes wyne price thairof xlv£ Item be henry
cornovan in quhitherne for vj punscheounes of wyne price thairof lxxxx£
Item be Johne craufurd air to umquhyle alex^{r} craufurd of balgreggan
for the rest of ane punscheoun of wyne coft be the said umquhyle alex^{r}
vij£ xss Item be alex^{r} stewart of garleis elder for ellevin
puncheounes of wyne price thairof aucht scoir five punds Item be alex^{r}
stewart of garlies sone and air to umquhyle alex^{r} stewart of garlies
zounger his father for sex punscheounes of wyne price lxxxx£ Item
mair the said umquhyle alex^{r} as cautioner for umquhyle francis
Murray in quhitherne for twa punscheounes of wyne & *certane*
freis price thairof xlij£ Item be margaret hannay & patrik molleing
hir spous for his interest ane punscheoun of wyne price xv£ Item be
mr ro^{t} stewart in glassertoun twa punscheounes of wyne price xxx£
Item be Johne gordoun of craichlaw sone & air to umquhyle williame
gordoun his father quha wes restand awand for ane punscheoun of
wyne & certane freis price thairof xv£ xvj ss Item be alex^{r} mcculloch of
killaser for the rest of ane punscheoun of wyne xj£ x ss Item be
W^{m} forrester sone & air to umquhyle george forrester his father quha wes
catiouner & souertie for Niniane *kenzie^{ch}* in quhitherne for kelt
vj£ Item be thomas mcke of monygof & Johne gordoun of Lochinver
his cautioner for twa punscheounes of wyne price xxx£ Item be
george stewart burges in quhitherne for twa punscheounes of wyne
price xxx£ and for kelt and freis viij£ Item be wm mckerlie in
quhitherne for lij elnis of kelt price of the eln viij s Summa xix£ iiij s
Item be agnes hannay relict & intrometto^{r} with the guds & geir of
umquhyle nicholas murray for twa punscheounes of wyne price xxx£
Item be fergus clugstoun in quhitherne for ane punscheoun of wyne

l.139 *andro dumbar:* An Andrew Dunbar was provost in 1582 *(Corr. of Sir Patrick Vaus* p.260).
l.143 *barncorky* = Barncorkrie (Kirkmaiden p. in the Rinns), *mucheounes* = ? mutchkins
l.147 The line commences with *thomas mcculloch in balfairne* which is then deleted.
l.149 *clairend*: perhaps Clary (Penninghame p.)
l.153 *dunnance* = Dinnans (Whithorn p.)
l.156 *coft* = bought.
l.165 *mr. robert stewart.* The prefix Mr. implies that he was a university graduate. He was not a protestant minister of Glasserton (*Fasti*), so may have been a chaplain or secretary. He is likely to be equated with Robert Stewart, Chamberlain in Whithorn of Lord Robert Stewart, Commendator of Whithorn (*Corr. of Sir Patrick Vaus* p.105 etc.).
l.171 *kelt* = freize cloth, generally of native black wool.

price xv£ and for freis five £ Item be dene wm tailzefeir vicar
of crugelton for xj elnis of freis price iiij£ viij s Item be elizabeth mcguffok
intromettor with the guds & geir of umquhyle bessie mcdowell hir mother
in portnessock quha wes addettit for ane punscheoun of wyne xv£
and Johne douglas spous to the said elizabeth for his interest Item be george
Kirstaine in *. . . . . .* for vj elnis kelt price xlviij s Item be patrik
McKie in craigrynie intromettor with the guds & geir of umquhyle ar^{d}
McKie of strathurde for ane punscheoun of wyne fyfteine punds
Item be williame dumbar of Balshear addettit for wyne & kelt
the soum of threttie sex pundis

Summa of the dettis awand to the decd ij^{m} vj^{c} £
Summa of the Inventar with the dettis vj^{m} j^{c} lxix£
To be devidit in thrie pairtis the deids pairt is ij^{m} ij^{c} xxiij£
Quhairof the thrid is comprisit for *. . . . . .*

(then follows the formal decree by Mr Robert Maitland confirming the appointment of Helen Dunbar as executrix dative to her late father).

l.180 *dene william tailzefair* (Telfer): Dene William had a *curriculum vitae* truly worthy of the Vicar of Bray. Until the Reformation he was a canon of Whithorn Priory *(Wigtownshire Charters* p.215), in 1563 he was arrainged before a tribunal for celebrating mass in Cruggleton Castle and sentenced to imprisonment in Dumbarton Castle — one of his judges being Sir John *(Pitcairn's Trials* quoted in Mackenzie's *History of Galloway* i p.492). By 1566 however he was back at Cruggleton as Protestant Reader (Mackenzie *op. cit.* i p.497), while here in Sir John's Inventory in 1577 he is drawing the vicarage emoluments. He remained Reader until 1580 *(Fasti)*.

l.183 *portnessock*: Now known as Port Logan.

l.186 *craigrynie*: Probably Craigonery (Penninghame p.).

l.187 *strathurde* = Stranord (Minnigaff p.)

Discussion

A few biographical notes on Sir John are given by Dr. Reid in his paper already referred to[1] and these can be added to from his *Wigtownshire Charters*[2] and M'Kerlie[3]. Special powers of justiciary within the barony were conferred on him and he became Coroner of Wigtownshire. He must have been a supporter of the reformed faith to have been one of the tribunal referred to in the footnote to line 180, indeed since he and his wife had acquired some of their Kirkmadrine properties, or at least the superiority rights in them, from the Church it was to his interest, like that of so many landowners of his day, that the Reformation should not be reversed. As well as being a landed proprietor his commercial interests seem to have been successful for it was from the profits of these that he built the later (16th Century) tower house at Old Place of Mochrum.[4]

1. Reid, R. C., Old Place of Mochrum, these *Transactions* Vol.19 (1936) p.144. There is further information particularly on the division of the barony of Mochrum into the two half baronies of Mochrum Loch and Mochrum Park in Radford C.A.R. Castle Loch, Mochrum these *Transactions* Vol.28 p.41.
2. Reid, R. C. (ed.) *Wigtownshire Charters*, Scottish Hist.Soc. (1960) Vol.51.
3. M'Kerlie, P. H. *History of the Lands etc. in Galloway* (1906) Vol.ii p.56 etc.
4. Reid, R. C. *op. cit* (1936) p.151.

He and his wife left three daughters but no male heir. Of the former Eupheme married Alexander Vaus and had Longcastle settled on her. The oldest daughter Grizel was married, following the custom in the Dunbar family in the absence of a male heir, to another of the same surname, in her case Alexander Dunbar of Conzie — accordingly Sir John settled his heritable property, or at least his Mochrum estate, on them. The third daughter, Helen was still unmarried at her father's death and so fell heir to his moveable estate described in the Inventory, subject possibly to a share falling to Elizabeth Mure, the widow. Certain moveable property however fell into the category of heirship moveables i.e. certain work horses (line 15), mares (line 16) draught oxen (line 20) and also more understandably family silver, jewellery, furniture and clothing (lines 94-95) and so would pass to Grizel and her husband along with the heritage.

When settling his land on his daughter and her husband he presumably retained the liferent otherwise the outstanding rents would not have appeared as part of his estate. Although he was also drawing rents from three farms in Kirkcowan parish[5] and from properties in the former Kirkmadrine Parish[6] his ownership of them should not necessarily be inferred — indeed there are good grounds for thinking that the latter properties were owned jointly by himself and his wife.[7] Furthermore one rent was due from the tenants of Glentriplock and Culgroat (line 118), a seemingly unmanageable holding since the two components are situated some 25 miles apart in Mochrum and Stoneykirk parishes. However M'Kerlie suggests[8] that he may have held these properties in wadset i.e. security of a loan, possibly to the Hays of Airyolland, which would explain this anomaly.

The land use is of interest — some properties seem to be "in hand"[9] while in some cases the landlord has his own stock grazing on tenanted land, perhaps as a co-occupier of runrig or other jointly farmed land[10]. Other holdings are let in steelbow[11], an indication perhaps of the inability of the tenants to stock the land adequately. In other cases the tenants themselves seem to own the stock. Prior to the 18th and 19th Century agricultural improvements, many farms in Scotland were held by a number of joint tenants. Two holdings here seem to have had four joint tenants[12], and others two[13]. In one case, Mochrum Mill (line 115), the property is let on ferm for a fixed rent while the "fermoraris" would recoup the rent and make their living from milling dues and multures. All the outstanding rents are in grain — bear, oats, 'corn' or ferm meal — but perhaps the rent of the mainly grazing holdings such as Airylick, which is not mentioned in this part of the Inventory, would have been due in cheese and wool, already paid by the date of death so do not appear in the Inventory.

With regard to the cash listed — the gold is no doubt, as stated by Dr. Reid, mainly Sir John's foreign exchange, but it is not always fully appreciated how much

5. Clugston, Killadam and Barquill.
6. Properties in Kirkmadrine p. in which he had an interest were Eggerness, Arquhat, Penkiln, Yetton and Culderrie.
7. See for example charters 353 and 356 in Reid *op. cit.* (1960).
8. M'Kerlie *op. cit.* i p.369.
9. Eggerness and Arquhat.
10. Particularly the May on which he had draught oxen.
11. All the Mochrum and Kirkcowan farms except Clugston.
12. Craigeach and Craiglairy.
13. Airylick, Chang, Drumblair and Penkiln at least.

foreign currency circulated in Scotland — almost every hoard, or detailed inventory exemplifies this.

The commodities traded in are wine, cloth and dried fruit. It is quite remarkable to see to what extent, and by whom, wine, an imported luxury, was being consumed in what we consider to have been a relatively poor part of Scotland. Sir John's customers range right through the social classes — from well known landed families such as the Stewarts of Garlies, ancestors of the Earls of Galloway, Hannay of Sorbie, Murray of Broughton, Gordons of Craichlaw and McCullochs of Myrton and Killaser, through burgesses and indwellers in Whithorn, two or three gentlemen of the cloth, to William Inglis, servant. Some of the debtors sound like traders e.g. William McKerlie in Whithorn (line 175) could be a draper, while notwithstanding Dr. Reid's comments on Provost McGowan's thirst, with his nineteen puncheons of wine and a hundred pounds of prunes (line 124), if he was not in the retail liquor trade, he had perhaps to supply the wherewithal to oil the wheels of the Council's weighty deliberations.

A good many of the customers appear to have been considered not credit worthy without a cautioner or surety — and some of the better off, particularly George Forrester of Kidsdale seem to have been over generous in obliging them — and yet it was not he but his son William who was left to pick up the check at the end of the day. One wonders how old some of the debts were and how much Helen Dunbar would eventually gather in at a time when the wine and "plumedalmuis" were doubtless only a pleasant memory. She was rightly diligent to claim against "intromitters" with the estates of deceased customers. This category is of course still liable under present Scots law. Indeed law students are still warned about one unfortunate mourner who tried on the hat of a deceased relative, and who was thereby found liable for the whole of his debts.

The geographical spread of Sir John's customers is much as one would expect, with sales generally confined to the Machers but with two or three customers in the Rinns and the same number across the Cree to the north east — but what is perhaps noticeable is that none are situated in the Burgh of Wigtown. Seemingly the trade rivalry between Whithorn, which Sir John seems to have supplied, and Wigtown, which had brought these Burghs face to face in the Court in Edinburgh at the start of the century[14], was still very much alive in the 1570s.

In conclusion one might add that of all the residences and houses mentioned in the inventory the only one which is apparently still occupied is Sir John's own — the Old Place of Mochrum.

14. Reid, R. C. *op. cit.* (1960) pp.137 to 146.

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BALSARROCH HOUSE, WIGTOWNSHIRE

by
Ian M. Smith
RCAMS

Balsarroch represents the earliest surviving non-defensive/non-tower-like generation of buildings associated with middle-ranking lairds in western Galloway. Dating probably from the last quarter of the 17th century, it can be regarded as a 'missing link' between medieval towers and domestic houses of the 18th and 19th centuries. The emergence of houses of this general status and character has been detected elsewhere in the country, those in Lothian and Fife appearing somewhat earlier in the 17th century, but this is the first that has been recognised in south-west Scotland. Its plan-form, with the apparent emphasis upon ground-floor hall and chamber, represents a tradition virtually unrecognised in Scotland but sharing some affinity with the hearth-entry arrangements of houses in the N and W of Ireland.[1] Parallels can also be found in some of the early farmhouses with part upper storeys in Orkney and Shetland (cf. Old Hall of Brough, Burravoe) and, to an extent, with the early two-storeyed houses of Highland tacksmen.[2] None the less, there are a number of features which are clearly derived from local building practices.

The house is situated on a slight eminence (NW 9935 6913) in an area of otherwise low-lying and lightly wooded ground 484m SSW of Cairnbowie farmsteading. It comprises ranges on the W and E sides of a courtyard (18m square overall), screened by walls on the N and S (with only a portion of that on the N surviving) and entered on the N through an arched opening (Fig. 1). During the 19th century a walled garden was added on the E. Its walls, of mortared rubble, remain in part to define its extent (44m square overall) and a semicircular bowed projection is incorporated central to that on the E. A recently restored single-storeyed cottage, incorporating the remains of a double gable-ended structure of 19th-century date, now occupies the SE corner of the courtyard. All that remains of the E range is a fragment of walling.

The dwelling, which is gable-ended, has occupied the W range. It is rectangular on plan and measures 18m in overall length from N to S and varies from 6.4m to 6.6m in average width (Fig. 1). The walls, which have a tendency towards a slight wayward alignment, are of clay-bonded rubble masonry construction, and were originally limewashed. They vary in thickness between 0.7m and 0.9m, and stand to an average height of about 4m externally. The S gable and sections of the E wall have collapsed, and towards the N end of the W wall a 4.8m stretch has been removed altogether. Irregularities in the masonry at the S end of the W wall may indicate that it was at some stage rebuilt. The ground-level falls slightly from S to N.

1. Gailey, A. 1976 'Vernacular Dwellings in Ireland', *Revue Roumaine D'Histoire De L'Art*, xii (1976), 135-55 at 138: 1984 *Rural Houses of the North of Ireland*, Edinburgh, 163.
2. A surviving, but ruinous, laird's house at Old Hall of Brough, Burravoe, built about 1672, provides a particularly close parallel, though the product of a different pattern of tenurial landholding; other Shetland examples include the houses at Busta and Jarlshof, RCAMS 1946 *Inventory of Shetland*, nos. 1714, 1113 and 1139; and in Orkney, Howan, Langskaill, Mossetter (NMRS ORR/6/1) and Nether Benzieclett (NMRS ORR/8/1), RCAMS 1946 *Inventory of Orkney*, nos. 612, 312 and 675. See also Dunbar, J. G. 1960 'Pitcastle, A cruck-framed House in Northern Perthshire', *Scottish Studies*, 4 (1960), 113-17; 1966 *The Historic Architecture of Scotland*, London, plate 192; and, for the hall as a principal component in the ground-floor plan, the farmhouse (now demolished) at Over Croy, Stell, G. 1982 'Over Croy Farmhouse, Croy, Dunbartonshire' *Vernacular Building*, 7 (1981-82), 1-19.

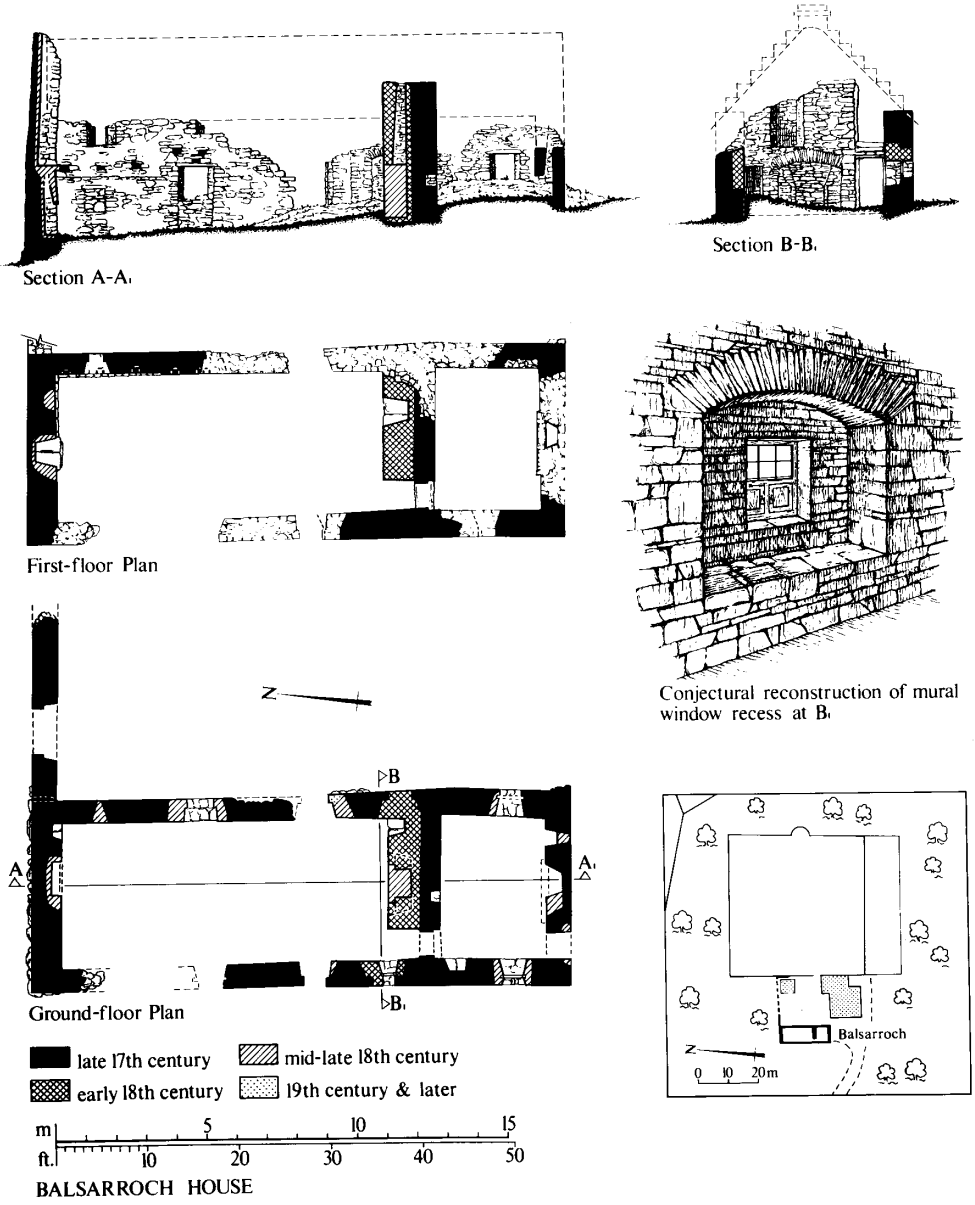

Fig. 1 Balsarroch House: plans and section.

The N gable stands almost to its full height but is bowed towards the interior (Fig. 2). It has boulder footings, which project externally on the downslope side, and is finished with built-up masonry skews and slab-lined crow-steps.[3] The roof was originally thatched but there is little evidence to point to the form of its structure. The walls are load-bearing and it would probably have been a common rafter rather than a trussed rafter roof. Window- and door-openings are lintelled and have rubble surrounds. The interior is divided into two compartments by a chimneyed mid-gable with the principal compartment on the N measuring 10.8m by about 4.7m.

Although the dwelling has been subject to structural modifications on a number of occasions, the absence of specifically datable features precludes a precisely dated sequence. In its earliest form the building was characterised by its crow-stepped gables, narrow single-light windows on the ground floor, and in the provision of aumbries, a fireplace with a corbelled canopy and two arched mural recesses, set in opposing walls, each designed to take a window. Provision must also have been made to heat the ground-floor hall. It seems likely that the hearth was set away from the entrance and against the mid-gable as this would accord with the evidence for the inglenook-type mural window-recesses in the two side-walls. The hearth would probably have been fitted with a canopied fireplace of clay-daubed wattle or plastered laths. During the early 18th century the mid-gable was thickened to receive fireplaces on the ground- and first-floors and, during the mid- to late 18th century, framed window openings, possibly enlarging upon existing openings, were disposed at ground- and first-floor level and fireplaces were incorporated in the N gable. During the early years of this century, probably reflecting a change in internal layout, window- and door-openings in the E wall were modified.

The earliest dwelling appears to have comprised a ground-floor hall communicating, by a door at the W end of the mid-gable, with an end room on the S; lofts were provided at the two ends of the house. All traces of timber plenishings have, however, been removed and the interior has been gutted. A rebated opening towards the N end of the E wall may be on or near the site of an original door, though in its existing form it does not reveal anything of its earlier character. A splayed slit-window, which was subsequently blocked, is set at the N end of the E wall and in the N gable there is an aumbry. Two mural recesses in the side-walls, on either side of the mid-gable, appear to have been designed to take windows central to their back-walls (Fig. 1). Each recess, measuring about 1.50m wide, 0.55m deep, and up to 1.20m high, was internally splayed, has a masonry relieving-arch and was lintelled externally: that on the E (Fig. 3) was partially blinded by the thickening of the mid-gable and was consequently infilled; that on the W was modified to take a low-level window which retains a timber frame with nailed tenoned corner-joints. These recesses bear some resemblance to those occasionally incorporated in the rear-walls in inglenook hearths as, for instance, at Broadwoodside Farm, East Lothian.[4] A rebated doorway, crooked for external hinges, at the W end of the mid-gable, gave access to the end room which has an original fireplace and a splayed

3. The crow-steps are of a type paralleled in the 16th century tower-houses at Lochnaw (NW 9913 6283) and Meikle Galdenoch (NW 9735 6324).
4. Marshall, R., 1984 'The Ingleneuk Hearth in Scottish Buildings: A Preliminary Survey'; *Vernacular Building*, 8 (1984), 29-48 at 41.

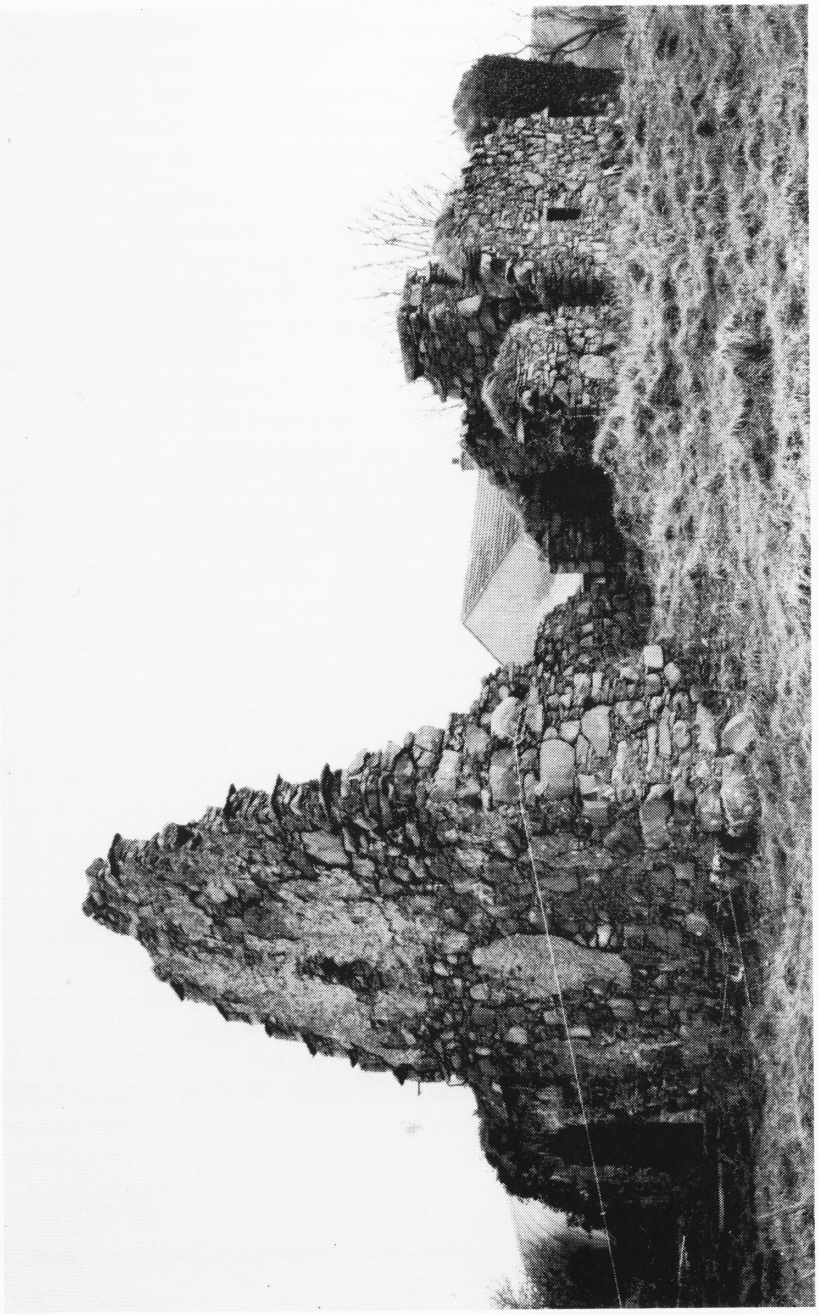

Fig. 2 Balsarroch House from the NNW.

window-embrasure (blocked on the exterior) in the S gable, and aumbries in its N and W walls. The canopy of the fireplace, provided with a masonry relieving-arch, is corbelled out from the wall face and has a slightly bowed projection; the lintel has been removed and during the 19th century the hearth was reduced in size. A doorway, directly above that on the ground floor, gave access to the loft. A corresponding loft at the N end of the house is represented by three joist sockets disposed above a scarcement in the E wall to the N of the original door. Two additional sockets, set above this opening, point to a stepped floor-level (with the lower bay on the N) and may be related to the flooring-over of the hall. A straight stair could have been located against the W wall, but the position of the stair is a problem, and can only be determined by excavation.

In the early 18th century the mid-gable was thickened on the N to accommodate a feathered flue for fireplaces on the ground and first floors (Fig. 4). That on the ground floor was provided with a masonry relieving-arch and was originally lintelled; it was contracted in size, possibly during construction. A mural cupboard was incorporated at the E end of the mid-gable and a rebated window opening, with internal splay, was opened to the N of the blocked mural recess in the E wall. Flooring was extended over the hall, and windows, with straight reveals and internal splays, were disposed at eaves level; however, some of these could be later in date.

Fig. 3 Balsarroch House: the blocked E mural window recess.

Fig. 4 Balsarroch House: the interior looking S.

During the mid- to late 18th century windows were opened in the W wall, in corresponding positions to openings at the N end of the E wall. A pair of windows, possibly enlarging upon existing openings, were inserted in the side-walls at the S end of the building; they were splayed internally and externally and were designed to incorporate timber frames. Fireplaces on ground and first floors, sharing a common flue, were inserted in the N gable (and the surrounding masonry was consolidated with mortar); that on the first floor was subsequently contracted in size. A mural cupboard on the first floor was infilled, as also was the ground-floor fireplace in the mid-gable.

During the early years of this century the opening at the N end of the E wall was partially built up to form a window and that on the S was dropped to form a door; a fragment of brick is incorporated in the S jamb. A doorway, with a boat's timber in re-use as a lintel, was inserted at the W end of the S gable.

Tusking was provided at the respective angles of the range to bond with N and S walls screening the courtyard. A fragment of the adjoining wall on the N, provided more recently with a weathering-course and a coped wall-head, incorporates an original semicircular arched opening with internal rebate and masonry voussoirs. The wall, of late 17th-century date, is of mortar-pointed rubble construction but utilises sandstone blocks in the jambs to mount the crooks for external hinges. A drain is incorporated at the base of the wall on the W. A sundial, with gnomon still in place, has been removed from the walled garden and is now in Stranraer Museum. All that remains of the E range is a fragment of its E side-wall at the NE angle measuring 5m long from N to S, 0.85m thick and at least 2.80m high externally. It is of clay-bonded rubble masonry construction, with mortar pointing and has traces of its rendering still adhering; it incorporates, at ground-floor level, a splayed slit-window which has been blocked externally.

Two early photographs of the house reveal additional detail. The first,[5] taken at the turn of this century, shows the N end of the dwelling viewed from the SE. The walls are limewashed and the roof is thatched and stitched in place along the ridge and eaves; clay or mortar flashing has been applied to the base of the stack of the chimneyed mid-gable and the verge of the gable cope. On the ground floor the opening towards the N end of the E wall is in use as a door and that to the S as a window fitted with a glazed frame of eight panes; three windows are disposed at eaves level on the N side of the mid-gable. The second photograph (Fig. 5), published in 1914,[6] provides a view of the house from an avenue of trees on the NNW (the original approach to the house). The high-chimneyed N gable of the E range is visible, and, though by no means clear, appears to be crow-stepped and roofed with thatch; an outshot on the N has a lean-to roof. The dwelling, although evidently dilapidated, retains its thatched roof and a partial rendering of limewash. Two windows are visible on the ground floor together with a double door (panelled and glazed) at the N end of the W wall. Four windows are disposed at eaves level. On the S there is an outshot with a slated roof.

5. Photograph NMRS A3239.
6. *Country Life*, July 11th 1914, xxxvi, 70-1.

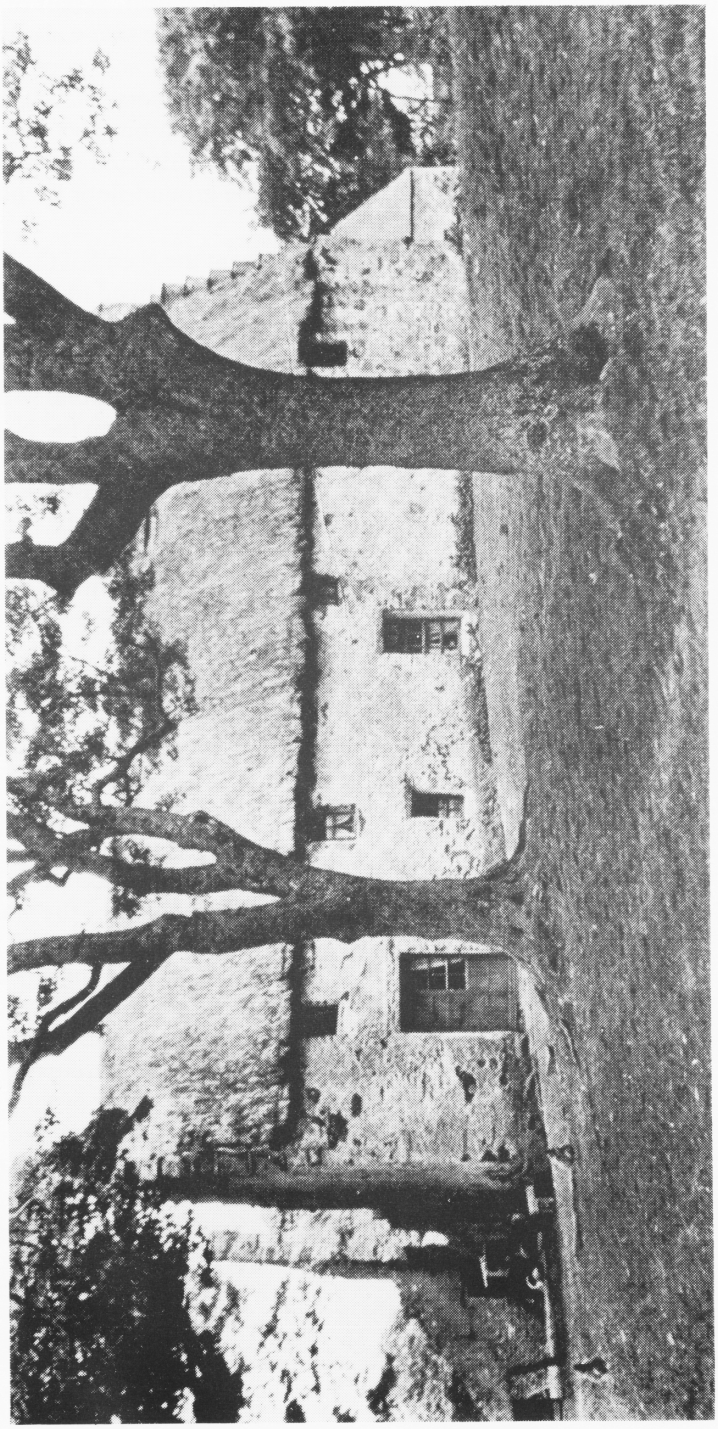

Fig. 5 Balsarroch House about 1914.

A 19th-century estate plan[7] depicts the house, its walled garden and wooded policies. The W range is depicted much as it is today; that on the E is shown as a squat rectangular block. An L-shaped block formed the S side of the courtyard.

The lands of Balsarroch formed part on the barony of Corsewall. During the 16th and 17th centuries the property belonged to the Campbells, one of whom was presumably responsible for erecting the house. By the early 18th century it had passed to the family of Ross, and during the early 19th century it was purchased by the 2nd Earl of Stair.[8]

Acknowledgements

The writer is especially indebted to Mr R. J. W. Deacon, the owner of Balsarroch, for permission to carry out the survey. Thanks are also due to my colleagues on the staff of the Royal Commission and in particular to Mr Geoffrey Stell, who helped in the preparation of this paper, to Mr Jim Mackie, for the photographs, and Messrs Sam Scott and John Borland for the drawings. The illustrations are Crown copyright, Royal Commission on Ancient Monuments, Scotland.

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7. Plan of Drumdow and Balsarroch; SRO Register House Plan 4650.
8. The Arctic navigators, Rear-Admiral Sir John (1777-1856) and Sir James Clark Ross (1800-1862) were descendants of the Rosses of Balsarroch. Sir James was the third son of George Ross who had sasine of the forty shilling land of Balsarroch on the 18th May 1792: *Retours*, Wigtown, No. 95; Agnew, A. 1893 *The Hereditary Sheriffs of Galloway*, (2nd ed.), Edinburgh, ii, 202-3; Stephen, L. and Lee, S. (eds.) 1937 *The Dictionary of National Biography*, (reprinted), London, xvii, 265-9; M'Kerlie, P. H. 1906. *The History of the Lands and their Owners in Galloway*, Edinburgh, i, 415-17.

THE POPULATION OF THE SOUTH-WEST OF SCOTLAND FROM THE MID-EIGHTEENTH CENTURY TO 1911

by

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Recent studies of the demographic history of Scotland have noted that the experience of the south-west sometimes diverged from other regions.[1] The buoyancy of the growth of its population in the early nineteenth century warrants detailed investigation of its distribution between parishes in the four districts of Carrick, Nithsdale, Kirkcudbrightshire and Wigtownshire. They constitute an integrated area, with many common features, but one sufficiently diverse to provide illuminating contrasts. Though extending to the borders of Ayr and Dumfries, the area excludes both and so has no major urban district within it.

In each of the four separate divisions the population increased from Webster's census of 1755 until the middle of the nineteenth century, with only a brief downturn in Nithsdale between 1821 and 1831. In the first decade of the nineteenth century all four recorded increases in excess of the Scottish figure; thereafter they fell behind the national increase one by one: Nithsdale and Kirkcudbrightshire by 1821; Wigtownshire by 1831 (though it had a slightly higher increase again in the 1840s); and Carrick by 1851. Decline set in after 1851. Decreases were registered in 1861 and in every census thereafter, except in 1881 in Carrick, Kirkcudbrightshire and Wigtownshire, and in 1911 in Nithsdale. Though Carrick, Nithsdale and Wigtownshire all recorded declines of around 25 per cent in the second half of the nineteenth century, the declines were still sufficiently limited that each of the four districts had more people living in them than in 1801. Details are in Tables 1 and 5.

Three phases of overall growth in the entire south-west can be distinguished before 1914: an increase of 34.5 per cent between 1755 and 1801, above the Scottish growth of 27.1 per cent between 1755 and 1801; an increase of 71.8 per cent between 1801 and 1851, below the Scottish increase of 79.6 per cent, but well above any assumed rate of natural growth of 10 per cent per annum;[2] and a decrease of 21.9 per cent between 1851 and 1911, a sharp contrast with the increase of 64.8 per cent in Scotland over the same period.

Some indication of the contributions of individual parishes to the overall growth may be derived from the application of various tests of growth to each one. The first, the natural rate of growth, is potentially the more informative but its unreliability in the period before compulsory registration limits its usefulness drastically. If it is assumed to be an increase of 10 per cent per decade, the natural increase from 1755 to 1801 should be 54 per cent and 61 per cent from 1801 to 1851. Since Scotland as a whole, the south-west, and each part of it, failed to achieve growth comparable to the assumed natural rate of growth of 54 per cent in the eighteenth century, it cannot be

1. M. Gray, 'Migration in the Rural Lowlands of Scotland, 1750-1850' in T. M. Devine and David Dickson, *Ireland and Scotland 1600-1850* (Edinburgh, 1983), p. 105.
2. Michael Flinn, *et. al.*, *Scottish Population History* (Cambridge, 1977), pp. 14-16.

used without severe qualification. The rate of 61 per cent for the early nineteenth century may also be excessive, and its use also requires appropriate care. Two other tests, less useful but more reliable in the days before the start of compulsory registration, are the overall rates of growth for Scotland, and for the area of the south-west being examined. The percentage increases of the three tests are:

	Natural increase %	Scottish increase %	South-west increase %
1755-1801	54	27.1	34.5
1801-1851	61	79.6	71.8

Tables 2 and 3 show the increases in each parish and provide a parochial summary.

1755-1801 Number of parishes

	Above south-west increase (34.5%)	Below south-west increase but above Scottish increase (34.5 to 27.1%)	Below Scottish increase (27.1 to 0%)	Negative
Carrick	5	—	—	4
Nithsdale	5	—	6	1
Kirkcudbright	9	5	8	6
Wigtown	10	1	3	3
Total	29	6	17	14

1801-1851 Number of parishes

	Above Scottish increase (79.6%)	Above south-west increase but below Scottish increase (79.6 to 71.8%)	Below south-west increase (71.8 to 0%)	Negative
Carrick	5	—	4	—
Nithsdale	1	1	9	1
Kirkcudbright	3	2	23	—
Wigtown	10	2	5	—
Total	19	5	41	1

Though all parts of the south-west had more substantial increases between 1801 and 1851, and no parish had a smaller population in 1851 than in 1801, the exceptionally rapid growth of population in central Scotland meant that 47 parishes had less than the increase for Scotland between 1801 and 1851 compared with only 31 between 1755 and 1801.

The greatest transformation was in Carrick, with an increase well above the Scottish average in the early nineteenth century, but, as the summary table shows, the increase was concentrated in a few parishes: within Girvan, Kirkmichael and Maybole, noted for the growth of weaving and related Irish immigration. Their population increased steadily throughout the period 1755 to 1801 and then rapidly between 1801 to 1831 — by 32.0, 38.1 and 29.7 per cent in each of the first three decades of the nineteenth century — and came to represent a larger proportion of Carrick's total — 3,961 of 10,812 or 36.6 per cent in 1755, 6,541 of 13,752 or 47.6 per cent in 1801, and 19,465 of 31,302 or 62.2 per cent in 1851. The three were counterbalanced by other parishes with low, even negative, growth. Barr and Straiton, which had losses in the eighteenth century and increases in the nineteenth, were

among the more extensive parishes, with areas of hill land which could not support a large population. The four remaining parishes had contrasting experiences. Ballantrae and Colmonell, also with large stretches of hill land, lost population in the late eighteenth century, but gained substantially in the nineteenth; Dailly's increase of 93.2 per cent in the late eighteenth century, the highest of any parish in Carrick, fell to 48.9 per cent in the early nineteenth; Kirkoswald's increase fell less dramatically from 43.8 to 33.5 per cent. All nine parishes of Carrick shared one feature: though their performance varied, the decade of 1811 to 1821 had the greatest increase of all.

In the second half of the eighteenth century the growth of population in Kirkcudbrightshire and Nithsdale was greater than in Carrick but they fell far behind in the nineteenth. Their growth was also concentrated. In the eighteenth century the increase in half of Kirkcudbrightshire's 28 parishes exceeded the Scottish figure of 27.1 per cent, but was greatest in five of them. In Crossmichael, Girthon, Kelton, Kirkcudbright and Troqueer the increases exceeded the assumed natural rate of growth between 1755 and 1801 and their share of the Stewartry's population increased from 4,695 of 21,205 or 22.1 per cent in 1755, to 9,871 of 29,211 or 33.8 per cent in 1801, to 14,815 of 43,121 or 34.4 per cent in 1851. Of the fourteen parishes in Kirkcudbrightshire which had changes below the Scottish average between 1755 and 1801, the six which registered decreases were in the remote hill country, particularly the three of Carsphairn, Dalry and Kells, while adjoining Balmaclellan recorded an increase of merely 3.7 per cent. Their experience was similar to the hill parishes in Carrick.

The lower overall increase of the first half of the nineteenth century reflected a reversal of parochial experience. The five which had led in the later eighteenth century hardly increased their share of the total population. Unlike the three leading parishes of Carrick, their increase was arrested. Between 1801 and 1851 Crossmichael and Girthon were below the Stewartry's increase; Girthon's growth of 3.5 per cent was the smallest of any parish in Kirkcudbrightshire. Kelton (67.2 per cent), Kirkcudbright (49.3 per cent), and Troqueer (77.5 per cent) were above the Stewartry but not the Scottish figure. By contrast, in the early nineteenth century Balmaclellan (106.7 per cent), Kirkmabreck (87.0 per cent), and Urr (95.6 per cent) alone exceeded the Scottish figure and Carsphairn (72.4 per cent) and Parton (71.6 per cent) were not far behind. No parish recorded a loss, and of those which had losses in the later eighteenth century, the lowest in the nineteenth century was Buittle's 20.7 per cent.

In this inversion of experience Troqueer's continuing importance among the five leading parishes is explained by its proximity to the town of Dumfries, from which it experienced an industrial overspill which helped to ensure that the five parishes, with one-third of the Stewartry's population in 1801, had slightly more in 1851. The failure of the other four to sustain their rate of expansion of the eighteenth century followed lack of consolidation of developments which had been planned and encouraged earlier, notably the decline of the cotton mill at Gatehouse in the parish of Girthon, and the less rapid growth of Castle Douglas in the parish of Kelton. Some of the more rapid expansion in the nineteenth century elsewhere was because of some minor if unexpected industrial growth, as in quarrying at Creetown in the

parish of Kirkmabreck or, even more strikingly in lead-mining at Carsphairn. The temporary nature of much of the incipient industrial development in Kirkcudbrightshire meant that, with the exceptions of Troqueer, gaining from its proximity to Dumfries, and Kirkcudbright, gaining from its status as the county town, there was no permanent basis to maintain a rising population. The Stewartry had nothing to compare with the expansion of weaving in Carrick, often on the basis of Irish immigration.

In Nithsdale the parochial experience varied, largely because, as in the Stewartry, no parish had an economic basis to sustain growth. Between 1755 and 1801, with the exception of Glencairn, which recorded a drop in population of —21.8 per cent, the increase in the others ranged from 188.5 per cent in Morton to 12.7 per cent in nearby Durisdeer. In the nineteenth century Durisdeer, Glencairn and Penpont were all above the Nithsdale average of 40.1 per cent, but, as in Carrick and Kirkcudbrightshire, growth was greater in areas of incipient, or expected, industrial development and less in the hill country. Morton had the planned village of Thornhill. Between 1801 and 1851 its position was further established, and, with an increase of 97.8 per cent, it was the only parish in Nithsdale to exceed the Scottish figure of 79.6 per cent, while Sanquhar's increase of 73.2 per cent was the only other one to exceed the overall increase in the south-west of 71.8 per cent. Together the two parishes had 2,433 of Nithsdale's 11,286 or 21.6 per cent in 1755, 3,605 of 14,529 or 24.8 per cent in 1801, and 6,553 of 20,349 or 32.2 per cent in 1851.

Wigtownshire's experience contrasts with the three parts of the south-west examined so far. Its population grew by 39.2 per cent from 1755 to 1801 and by 89.3 per cent from 1801 to 1851, but, because of Carrick's exceptionally high growth in the early nineteenth century, Wigtownshire's growth of 163.5 per cent over the century from 1755 to 1851 did not reach Carrick's 189.5 per cent. Unlike the other three parts of the south-west, growth in Wigtownshire was spread widely over the county. From 1755 to 1801 eleven of its 17 parishes were above the Scottish growth of 27.1 per cent, ten above the south-west's 34.5 per cent and six were above the assumed natural growth for the period of 54 per cent. Three of the six parishes which failed to achieve the Scottish rate of increase recorded a decrease. The broad basis of Wigtownshire's expansion was even more striking between 1801 and 1851 when Whithorn's 57.6 per cent was the lowest rate of growth recorded between 1801 and 1851, just below an assumed rate of natural growth which is probably too high. Only two of Nithsdale's 12 parishes were higher, seven of 28 in Kirkcudbrightshire, and five of nine in Carrick. Two factors may be used to explain Wigtownshire's experience: new settlements were more widespread and migration was important. As in Carrick, Wigtownshire had a high proportion of Irish migrants in 1851.

The buoyant nature of Wigtownshire's population in the early nineteenth century is confirmed by the transformation of the few parishes which grew least in the late eighteenth century. Six were then below the Scottish average. Three of them were negative: New Luce, —19.2 per cent; Glenluce, —19.1 per cent; Kirkcowan, —1.0 per cent, all similar to the hill country parishes which had low rates of growth in other parts of the south-west. The populations of the three others increased by only small amounts: Glasserton by 6.3 per cent; Inch by 4.2 per cent; Sorbie by 12.7 per cent. The total population of all six fell from 6,053 in 1755 to 5,904 in 1801, a fall of

2.5 per cent; it rose to 11,668, or by 97.6 per cent, between 1801 and 1851. Evidence of settlement and of migration is apparent in all in the early nineteenth century. Two other parishes, Mochrum and Whithorn, were the only others which had been below the average for Wigtownshire between 1755 and 1801. Between 1801 and 1851 Mochrum had the second highest parochial increase in the county and Whithorn's rate of growth increased substantially.

The experience of all four parts of the south-west changed in the later nineteenth century. While the population of Scotland increased from 1851 to 1911 by 64.8 per cent, that of the south-west declined by —21.9 per cent and each of its four parts recorded losses, Carrick of —28.6 per cent; Nithsdale of —25.5 per cent; Kirkcudbrightshire of —9.0 per cent; Wigtownshire of —26.3 per cent. The decline was interrupted only slightly in Carrick, Kirkcudbrightshire and Wigtownshire between 1871 and 1881, and more substantially in the early twentieth century in Nithsdale, because of the increase in the population of Kirkconnel. The most significant change to be explained is the fall in the populations of Carrick and Wigtownshire. Table 4 shows the parochial experience.

The steady increase in the population of Carrick was arrested sharply in the two decades after 1851, when the population of the district fell by 25.6 per cent. The fall between 1851 and 1871 was spread over all nine parishes, but was sharpest in Girvan (—33.8 per cent) and Kirkmichael (—30.9 per cent), which, with Maybole (with a fall of —22.5 per cent) had the greatest concentration of weaving which had helped to sustain the growth of population in the early nineteenth century. The share of the three parishes in Carrick's population fell from 19,465 of 31,302 or 62.2 per cent in 1851 to 13,839 of 23,302 or 59.4 per cent in 1871. Thereafter the population of Carrick fell by only 816 from 1871 to 1901 and was accompanied by a further internal change. In 1901 Girvan, Kirkmichael and Maybole had 14,559 or 64.7 per cent of Carrick's 22,486, but the slightly increased share was largely because of the position of Maybole, which alone registered an increase (of 33.7 per cent) from 1871, taking its own share of Carrick's population from 25.3 per cent in 1871 to 35.1 per cent in 1901. Its population fell sharply (by —12.5 per cent) in the first decade of the twentieth century reflecting migration from the parish, particularly to Canada.

Wigtownshire's population followed the same trend downwards as Carrick's and fell by —24.7 per cent between 1851 and the end of the century. The fall was general. Inch alone recorded an increase of 754, or 24.2 per cent, which merely reflected Stranraer's expansion into it, and did not offset Stranraer's own loss of 1,021 or —26.3 per cent.

The decline in Nithsdale was as widespread as in Wigtownshire. It did not have the weaving towns of Carrick, but Nithsdale had some early industrial development in leadmining at Wanlockhead in the parish of Sanquhar and later in coalmining in both Sanquhar and Kirkconnel. The two parishes, with Morton, dominated the demographic history of Nithsdale in the nineteenth century, as Girvan, Kirkmichael and Maybole did in Carrick. They had 4,701 of Nithsdale's 14,529 or 32.4 per cent in 1801; 7,798 of 20,349 or 38.3 per cent in 1851; 6,053 of 14,684 or 41.2 per cent in 1901; and 7,010 of 15,163 or 46.2 per cent in 1911. The three parishes increased by 65.9 per cent between 1801 and 1851, faster than the assumed rate of natural growth. Their subsequent fall was arrested in the first decade of the twentieth century because of the increase in the population of Kirkconnel from 1,248 to 2,144 in those years on the basis of the expansion of coalmining.

In Kirkcudbrightshire the less rapid increase of the first half of the nineteenth century was followed by a less sharp decline in the second half. The domination by a few parishes which remained a conspicuous feature of Carrick and Nithsdale became less so in the Stewartry. Kelton and Troqueer continued to account for a substantial share of the population and were joined in the later nineteenth century by the parish of Urr, having within its bounds Dalbeattie and Springholm. The three had 1,474 of the Stewartry's population of 43,121 or 26.6 per cent in 1851 and 15,069 of 39,383 or 38.3 per cent in 1901. Four other parishes (Balmaclellan, Carsphairn, Kirkmabreck, Parton), which showed sharp changes between the two halves of the nineteenth century, registering increases of over 70 per cent in the first half and decreases in the second, accounted for only a small part of Kirkcudbrightshire's population: 5.4 per cent in 1801; 11.8 per cent in 18511; 8.8 per cent in 1901.

Migration and probable high rates of natural increase, encouraged by the opportunities for handloom weaving in Carrick, led to the rapid growth of population in Carrick and Wigtownshire in the early nineteenth century. Nithsdale and Kirkcudbrightshire did not experience the same rapid increase and the emergence of some limited industrial developments helped moderate their fall in the later nineteenth century. The overall effect from 1755 to 1911 was less varied than the experiences of the periods between.

TABLE 1

% increase in population

	Scotland %	*Carrick* %	*Nithsdale* %	*Kirkcudbright* %	*Wigtown* %	*South-west* %
1801-11	12.3	18.0	12.4	15.3	17.3	15.8
1811-21	15.8	31.5	8.8	15.5	23.6	19.4
1821-31	13.0	19.7	—0.2	4.3	9.1	8.0
1831-41	10.8	11.5	6.1	1.3	8.1	6.2
1841-51	10.2	10.0	8.2	4.9	10.7	7.7
1851-61	6.0	—15.0	—9.5	—1.0	—4.4	—5.7
1861-71	9.7	—14.4	—7.2	—1.4	—7.9	—7.0
1871-81	11.2	1.2	—2.4	0.1	—	—0.1
1881-91	7.8	—4.0	—7.6	—5.1	—6.6	—5.7
1891-1901	11.1	—0.7	—4.6	—1.5	—9.4	—4.2
1901-11	6.5	—0.6	3.3	—2.6	—2.1	—1.2
1755-1801	27.1	27.2	28.7	37.8	39.2	34.5
1801-1911	196.0	62.6	4.4	31.3	39.6	34.2
1801-51	79.6	127.6	40.1	47.6	89.3	71.8
1851-1901	54.8	—28.2	—27.8	—8.7	—24.7	—20.9
1851-1911	64.8	—28.6	—25.5	—9.0	—26.3	—21.9

TABLE 2

1755-1801 Parishes

Above assumed natural growth rate of 54 per cent

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
Dailly	93.2	Closeburn	68.1	Crossmichael	76.8	Kirkcolm	55.7
Girvan	89.4	Dunscore	80.3	Girthon	370.6	Leswalt	103.8
Kirkmichael	57.6	Keir	55.8	Kelton	134.9	Penninghame	70.2
		Morton	188.5	Kirkcudbright	57.4	Portpatrick	78.4
				Troqueer	99.4	Stoneykirk	60.6
						Stranraer	182.3

Above south-west growth rate of 34.5 per cent but below 54 per cent

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
Kirkoswald	43.8	Holywood	35.7	Balmaghie	39.0	Kirkinner	46.5
Maybole	53.6			Kirkmabreck	41.3	Kirkmaiden	53.5
				Kirkpatrick Durham	44.1	Wigtown	42.9
				Urr	44.1	Whithorn	34.8

Above Scottish growth rate of 27.1 per cent but below 34.5 per cent

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
				Kirkbean	31.6	Mochrum	34.4
				Minnigaff	33.1		
				New Abbey	31.2		
				Terregles	28.5		
				Twynholm	31.6		

Above zero growth but below 27.1 per cent

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
		Durisdeer	12.7	Anwoth	20.0	Glasserton	6.3
		Kirkconnel	21.9	Balmaclellan	3.7	Inch	4.2
		Kirkmahoe	19.8	Borgue	17.6	Sorbie	12.7
		Penpont	15.2	Colvend	23.3		
		Sanquhar	17.6	Kirkgunzeon	11.6		
		Tynron	21.3	Parton	7.6		
				Rerrick	10.9		
				Tongland	18.4		

Negative growth

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
Ballantrae	—20.2	Glencairn	—21.8	Buittle	—4.0	Glenluce	—19.1
Barr	—13.5			Carsphairn	—18.6	Kirkcowan	—1.0
Colmonell	—28.0			Dalry	—6.4	New Luce	—19.2
Straiton	—8.6			Irongray	—18.4		
				Kells	—0.8		
				Lochrutton	—8.9		

TABLE 3

1801-1851 Parishes

Above Scottish growth rate of 79.6 per cent

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
Ballantrae	115.2	Morton	97.8	Balmaclellan	106.7	Glenluce	132.7
Colmonell	124.7			Kirkmabreck	87.0	Inch	98.0
Girvan	280.0			Urr	95.6	Kirkcowan	95.8
Kirkmichael	191.5					Leswalt	117.3
Maybole	140.8					Mochrum	164.7
						New Luce	114.9
						Portpatrick	80.1
						Stoneykirk	79.7
						Stranraer	125.1
						Wigtown	173.6

Above south-west growth rate of 71.8 per cent but below 79.6 per cent

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
		Sanquhar	73.2	Carsphairn	72.4	Glasserton	72.9
				Troqueer	77.5	Sorbie	72.9

Above assumed natural growth rate of 61 per cent but below 71.8 per cent

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
				Kelton	67.2	Kirkcolm	69.4
				Parton	71.6	Kirkinner	65.0
						Kirkmaiden	66.2
						Penninghame	61.7

Above zero growth but below 61 per cent

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
Barr	22.2	Closeburn	3.2	Anwoth	41.3	Whithorn	57.6
Dailly	48.9	Dunscore	34.4	Balmaghie	25.6		
Kirkoswald	33.5	Durisdeer	56.4	Borgue	27.2		
Straiton	50.1	Glencairn	41.4	Buittle	20.7		
		Holywood	31.0	Colvend	26.4		
		Keir	24.5	Crossmichael	25.6		
		Kirkconnel	13.6	Dalry	48.8		
		Kirkmahoe	18.1	Girthon	3.5		
		Penpont	46.1	Irongray	25.8		
				Kells	40.2		
				Kirkbean	41.1		
				Kirkcudbright	49.3		
				Kirkgunzeon	34.7		
				Kirkpatrick Durham	49.8		
				Lochrutton	41.2		
				Minnigaff	27.7		
				New Abbey	32.0		
				Rerrick	47.9		
				Terregles	11.0		
				Tongland	45.3		
				Twynholm	14.5		

Negative growth

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
		Tynron	—14.4				

TABLE 4

1851-1901 Parishes

Above Scottish growth rate of 54.8 per cent

None

Above south-west growth rate of —21.7 per cent but below 54.8 per cent

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
Maybole	+3.6	Holywood	—11.5	Borgue	0	Inch	+24.2
		Kirkconnel	+8.5	Buittle	—15.6	Penninghame	—19.2
		Morton	+12.7	Colvend	—16.2		
		Sanquhar	+20.0	Crossmichael	—9.6		
				Kells	—19.5		
				Kelton	+17.2		
				Kirkcudbright	—6.9		
				Kirkmabreck	—18.0		
				New Abbey	—12.8		
				Parton	—16.1		
				Rerrick	—21.4		
				Rerrick	—21.4		
				Terregles	—19.8		
				Troqueer	+34.0		
				Twynholm	—8.1		
				Urr	+40.8		

Below —21.7 per cent

Carrick	%	*Nithsdale*	%	*Kirkcudbright*	%	*Wigtown*	%
Ballantrae	—37.6	Closeburn	—26.4	Anwoth	—27.7	Glasserton	—40.3
Barr	—35.9	Dunscore	—33.1	Balmaclellan	—46.6	Glenluce	—24.1
Colmonell	—33.4	Durisdeer	—46.0	Balmaghie	—34.1	Kirkcolm	—25.4
Dailly	—30.7	Glencairn	—24.7	Carsphairn	—58.5	Kirkcowan	—25.2
Girvan	—43.3	Keir	—43.7	Dalry	—33.3	Kirkinner	—34.4
Kirkmichael	—44.9	Kirkmahoe	—28.8	Girthon	—32.3	Kirkmaiden	—27.5
Kirkoswald	—29.6	Penpont	—34.6	Irongray	—23.6	Leswalt	—24.9
Straiton	—34.0	Tynron	—40.7	Kirkbean	—30.2	Mochrum	—33.5
				Kirkgunzeon	—28.2	New Luce	—29.6
				Kirkpatrick Durham	—36.4	Portpatrick	—42.1
				Lochrutton	—31.9	Sorbie	—27.8
				Minnigaff	—36.3	Stoneykirk	—27.1
				Tongland	—25.0	Stranraer	—26.3
						Whithorn	—25.5
						Wigtown	—38.1

TABLE 5

Population in selected years

	1755	*1801*	*1851*	*1901*
Carrick				
Ballantrae	1,049	837	1,801	1,124
Barr	858	742	907	581
Colmonell	1,814	1,306	2,934	1,954
Dailly	839	1,621	2,413	1,673
Girvan	1,193	2,260	8,588	4,872
Kirkmichael	710	1,119	3,262	1,798
Kirkoswald	1,168	1,679	2,242	1,579
Maybole	2,058	3,162	7,615	7,889
Straiton	1,123	1,026	1,540	1,016
Total	10,812	13,752	31,302	22,486
Kirkcudbrightshire				
Anwoth	531	637	900	651
Balmaclellan	534	554	1,145	634
Balmaghie	697	969	1,217	802
Borgue	697	820	1,043	1,045
Buittle	899	863	1,042	879
Carsphairn	609	496	855	351
Colvend	898	1,106	1,398	1,171
Crossmichael	613	1,084	1,362	1,231
Dalry	891	832	1,238	826
Girthon	367	1,727	1,787	1,209
Irongray	895	730	918	701
Kells	784	778	1,091	878
Kelton	811	1,905	3,186	3,734
Kirkbean	529	696	982	685
Kirkcudbright	1,513	2,381	3,555	3,309
Kirkgunzeon	489	545	734	527
Kirkmabreck	858	1,212	2,266	1,859
Kirkpatrick Durham	699	1,007	1,508	959
Lochrutton	564	514	726	497
Minnigaff	1,209	1,609	2,054	1,309
New Abbey	634	832	1,098	957
Parton	396	426	731	613
Rerrick	1,051	1,166	1,725	1,356
Terregles	397	510	566	454
Tongland	537	636	924	693
Troqueer	1,391	2,774	4,925	6,599
Twynholm	519	683	782	718
Urr	1,193	1,719	3,363	4,736
Total	21,205	29,211	43,121	39,383

Table 5 *Population in selected years* (contd.)

	1755	*1801*	*1851*	*1901*
Nithsdale				
Closeburn	999	1,679	1,732	1,275
Dunscore	651	1,174	1,578	1,055
Durisdeer	1,019	1,148	1,795	970
Glencairn	1,794	1,403	1,980	1,490
Holywood	596	809	1,060	938
Keir	495	771	960	540
Kirkconnel	899	1,096	1,245	1,248
Kirkmahoe	1,098	1,315	1,553	1,106
Morton	435	1,255	2,482	1,872
Penpont	838	966	1,411	923
Sanquhar	1,998	2,350	4,071	2,933
Tynron	464	563	482	334
Total	11,286	14,529	20,349	14,684
Wigtownshire				
Glasserton	809	860	1,487	887
Glenluce	1,509	1,221	2,841	2,157
Inch	1,513	1,577	3,122	3,876
Kirkcolm	765	1,191	2,018	1,506
Kirkcowan	795	787	1,541	1,153
Kirkinner	792	1,160	1,914	1,255
Kirkmaiden	1,051	1,613	2,681	1,943
Leswalt	652	1,329	3,021	2,270
Mochrum	828	1,113	2,946	1,958
New Luce	459	368	791	557
Penninghame	1,509	2,569	4,155	3,356
Portpatrick	611	1,090	1,963	1,136
Sorbie	968	1,091	1,886	1,373
Stoneykirk	1,151	1,848	3,321	2,420
Stranraer	610	1,722	3,877	2,856
Wigtown	1,032	1,475	2,824	1,747
Whithorn	1,412	1,904	3,001	2,235
Total	16,466	22,918	43,389	32,685

GARROCH WATERPOWER SCHEME
Part II

by
Richard J. Clarke

Ashwood, Closeburn, Dumfriesshire

Introduction

Volume LIX (1984) of *Transactions*, under the title of "Survey of Garroch Waterpower System, Closeburn", gave an outline of the water scheme and its connection with the lime workings at Park Village, Closeburn, near Thornhill. This article deals in more detail with the central components of the Park Limeworks.

The earlier article described the development, about 1800, of an extensive lime quarry, with underground workings. The trucks of quarried stone were hauled up from the workings to the lime kilns by a large waterwheel. The water was brought about 10 km. from neighbouring hills, and powered other plants on the way.

There are two quarry sites in Closeburn and some writers do not always make a distinction between them. One quarry is at Limebank, National Grid Reference NX911915. With five or perhaps six kilns, the whole scheme was apparently worked on the level, no doubt with horses. There is no record or modern evidence of equipment or power for haulage or pumping on the site. The other quarry, which is the subject of this paper, is at Park, at NX908912. Here is the site of the waterwheel and remains of the haulage up from the deep mine.

Figure 1 is drawn from the 1899 25 inch to the mile Ordnance map and shows the two sites.

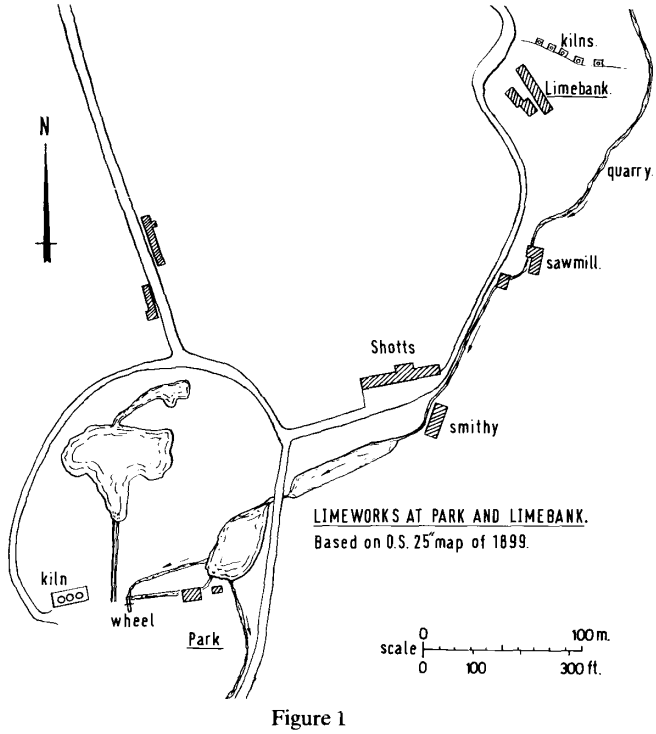


Figure 1

Local Geology

The Closeburn lime quarry is one of the very few limestone exposures in the district. Barjarg is another, about 5 km. away across the River Nith, after which the nearest quarries are at places such as Canonbie and Sanquhar. Accordingly the owners made every effort to extract the limestone that lay under their property.

The geological map in Figure 2 shows the surface outcrop of the limestone as it is now. The limestone in the 1840s lay in two distinct bands, about 14 feet and 18 feet thick, separated by 18 feet vertically. The upper band was magnesian limestone, which at first was not quarried because users considered it did not weather and help the ground, and was too caustic for agriculture. The two strata dipped at an angle of about 20 degrees to the horizontal towards the North West; this is a gradient rather steeper than 1 in 3. The big bend in the strata showing on the map is right in the centre of the area which was quarried.

We can assume that initially both sandstone and limestone were extracted by straightforward opencast working. This would explain the large waterlogged pit which dominates the site. But later the limestone was removed by a mining technique, following the dip of the strata in tunnels, with galleries off at right angles.

It appears that initially the miners took out only the lower, non-magnesian stratum, but that later they mined both strata.

James Stuart Menteath's 1845 (Highland Society) paper gives a very precise description of the components of the limestone beds.

There was a bed of about three feet of fireclay, from which fireproof bricks were made for the kilns.

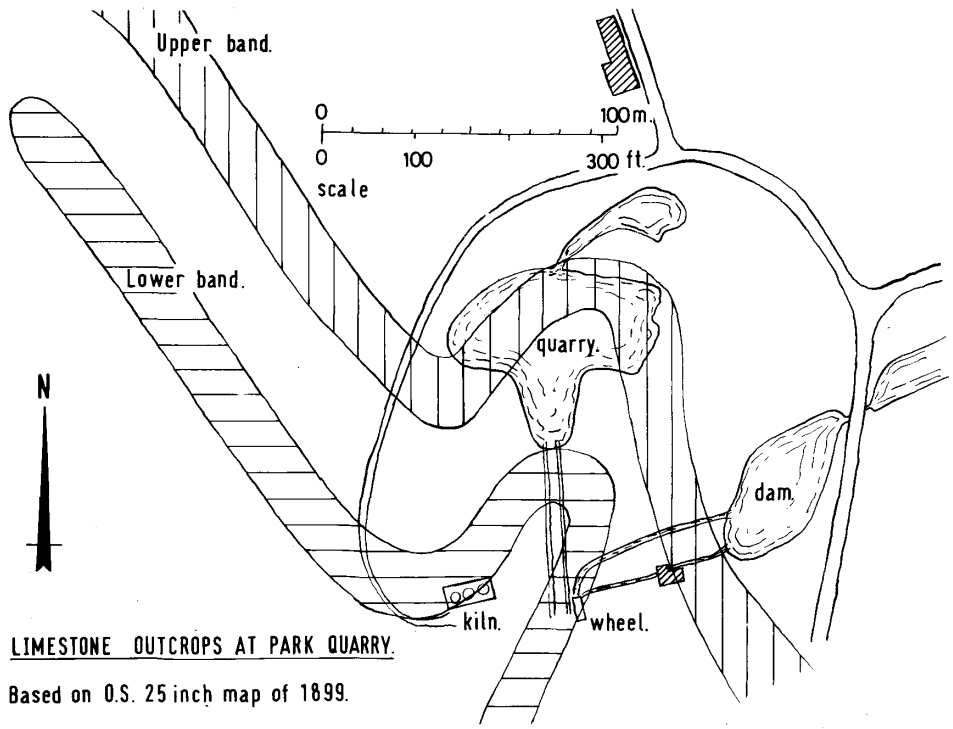


Figure 2

The Site

Figure 3 is a sketch of the main works, with the waterwheel in position. Despite tree growth, these features can be seen by today's visitor to the Park site, who is mainly struck by the fine block of the lime kilns, AA, and the large water-filled hole, BB, which is the site of the opencast workings. Nearby is the impressive stonework structure of the waterwheel pit, CC. At a higher level on the site, at the viewpoint of this sketch, is the Lower Limeworks Dam, which provided water to the wheel. It appears that the water level in the opencast site is about 30 metres below the original ground surface level and that digging probably continued at least another 20 metres deeper. At the start of developing the site, sandstone rock would probably have been quarried, as well as limestone, and used for building and roofing stone locally. After the workings went underground, it is probable that only limestone rock was brought out.

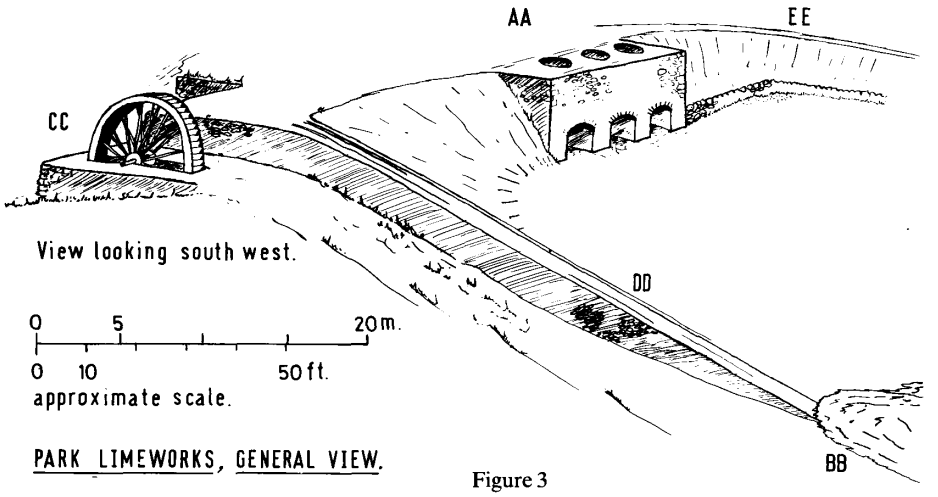


Figure 3

Figure 4 gives a plan of the site, showing the position of the dam and the lade bringing water to the wheel. The workings are flooded to an unknown depth, forming the lake, BB, about 50 to 100 metres across, with a lot of material tipped into it. Down into the lake dips the ramp, DD, which carried the haulage railway up to the kiln tops. Near the top of the ramp is located the waterwheel pit, CC, all that remains of the waterwheel haulage. There was probably other machinery, since one author states that the wheel drove pumps for drainage and provided draught for the kilns, and the stonework shows many marks of machinery.

When the trucks reached the top of the ramp, they were moved about 40 metres on the level to the kiln, AA, where the rock was mixed with coal, which had been brought by horse-and-cart up the more gentle slope, EE, to the West of the kilns, and fed into the kilns.

The burnt lime emerged from the hearth at the bottom of the kiln, where it was loaded into horse-carts for transport to the farms.

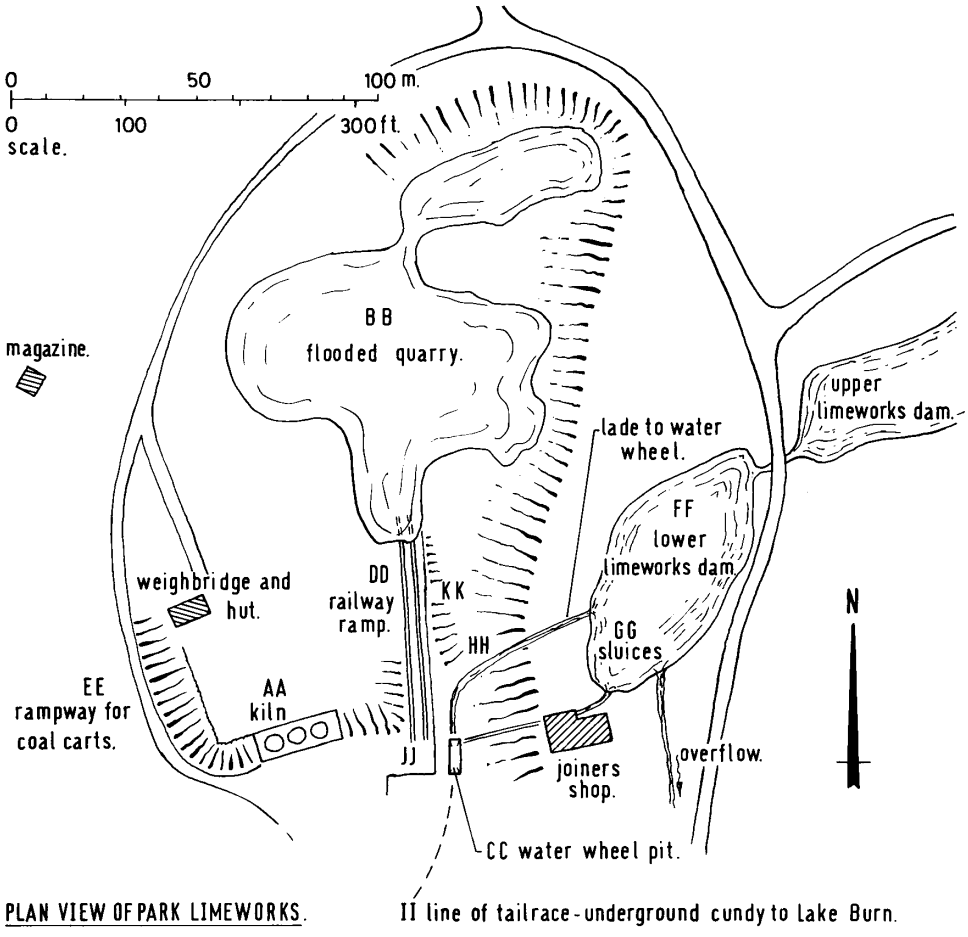


Figure 4

The water to work the wheel was held in the Lower Limeworks Dam, FF, and controlled by the sluice GG. The lade consisted of wooden troughs, or 'trows', HH, on high trestle supports. After passing over the wheel the water dropped into a 'cundy' or conduit, II, which carried the spent water underground 250 metres to the outlet to the Lake Burn.

Quarrying and Mining

Much of the information which follows is obtained from two papers:— *An Account of the Principal Limestone Quarries of Scotland* by Carmichael (1838) and *Geology of Dumfriesshire* by James Stuart Menteath (Highland Society 1845).

In the early life of the quarries the rock would have been dug at the surface. It is likely that both limestone and sandstone were extracted in the early years, and outcrops of the sandstone are still visible. As the limestone seam was worked, removing the overburden became too costly and the quarrymen followed the lime underground. It is possible that this quarry was in action for nearly 100 years.

The considerable thickness of the limestone seams enabled the miners to excavate big 'rooms', the ceiling held up by pillars of limestone at intervals. The rock was blasted by gunpowder, further broken if necessary by hammer, and loaded into trucks. Carmichael (1838) describes the main workings:— ". . . the main passage extends nearly 500 yards in a line, with numerous branches all crossing it at right angles, like so many streets, while the spacious galleries on every side afford ample room for stowing the rubbish. Rails are laid about 200 yards into the mine and the stones are brought along the diverging alleys in single wagons, containing about one ton, and pushed by a man going behind each till it reaches the main railway, where they are attached to a chain connected with a waterwheel of ten horsepower, placed near the entrance of the mine, which drags the team of wagons up an inclined plane to the top of the kilns". Empty trucks came down at the same time on the other line.

The limestone strata dipped at an angle of 20 degrees, according to Carmichael. The angle of the ramp is around 15 degrees, so it does appear that the railway was broadly following the limestone band into the ground. Carmichael says that the strata dipped to the NE, but Menteath says NW; as he was the proprietor, it is probable that he was right.

Singer's *Agriculture in Dumfriesshire* (1812) describes the workings: "At Closeburn the lime quarry (which has 18 feet thick of calcareous rock, five feet of which are solid limestone). . . The cover is deep and the stone is taken out by mining, strong pillars to support the roof being left, at ten or twelve yards distance, and the roof and floor worked into regular form, the latter accessible to horse and carts, and the kilns close at hand." The text does not make it clear whether Singer is describing Limebank or Park quarry, but Park seems probable.

Carmichael's paper describes the Closeburn operation, here unmistakably referring to Park: "The mode of working is first to remove the blase from the lime beds, and then by boring, blasting and breaking with hammers, to reduce the whole to pieces of movable size. The clear height of the excavated space is about 24 feet, and the columns are left at regular distances, 5 feet in the side, and 30 feet apart. Formerly the columns were upward of 7 feet in the side; but increasing trade, as well as improved taste, suggested the idea of reducing them to fairer proportions. The upper bed of lime, nearly 7 feet thick, was also left, but is now removed with profit and perfect safety, there being still 2 feet of solid sandstone for roof."

James Stuart Menteath (1845) describes how the lower band of 18 feet is pure carbonate of lime, and states: "For some years the operations of this mining have been extensively carried on, and these excavations now exceed many hundred square yards. In proceeding with these excavations, strong pillars, of nearly six square yards in thickness, are left standing, as supports for the roof of the mine which is high enough to admit the miner to stand erect at his work, and between the pillars the space of thirty feet is excavated. This limestone . . . requires the aid of gunpowder in working it."

While these writers are all telling roughly the same story, there are some conflicting points. We should note that the writings span about 35 years, so there may have been changes in method. In 1812 the horse-and-cart is mentioned, implying a big tunnel, and the kiln is said to be 'close at hand', while in 1845 Menteath says that the miner can stand, which might imply rather a small tunnel; and that the kiln is at

the top of the powered haulage ramp. Carmichael talks about the passages 24 feet high, while agreeing with Menteath about the haulage. But he does not make it clear how the miners man-handled one-ton trucks up the 15 degree sloping parts of the workings beyond the reach of the railway and its powered haulage, since he mentions 500 yards of passage but only 200 yards of rail.

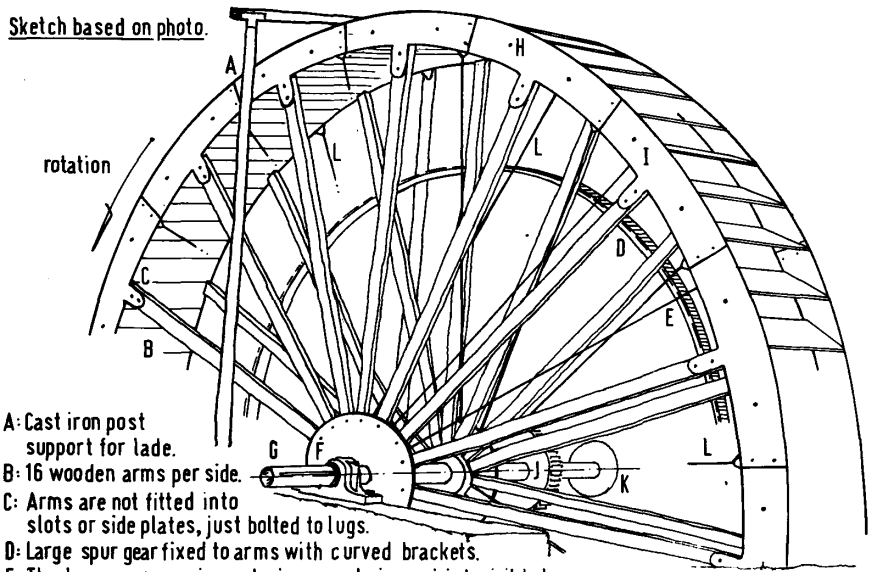
If Carmichael meant 500 yards in a direct line, descending at 20 degrees, the furthest workings would have been about 500 feet below the surface. This is an almost unbelievable depth, with implications of many problems of drainage and movement. We should question the interpretation of the 500 yard passage. Perhaps it was the total length of underground passage.

Waterwheel

When the quarry closed in the 1880s, the waterwheel was that shown in Figure 3 of the 'Survey' paper, page 86 of Vol. LIX. This was taken around 20 years later. The main structure is complete but the wooden 'trows' that fed it have gone. These came from the upper right of the photograph, over the top of the wheel.

Figure 5 sketches a number of the details of the wheel, which can be seen in the photograph. Some points of construction were easily recognised by our draughtsman, who has experience with wheels, but others were unfamiliar.

The wheel is about 9 metres diameter, the buckets about 1.5 metres wide. There are 64 buckets, and Carmichael (1835) mentioned it as 10 horsepower. We cannot be certain that Carmichael was describing this particular wheel, but the construction technique looks like that of the early 1800s.



A: Cast iron post support for lade.
B: 16 wooden arms per side.
C: Arms are not fitted into slots or side plates, just bolted to lugs.
D: Large spur gear fixed to arms with curved brackets.
E: The large spur gear is made in several pieces; joint visible here.
F: Key way in circular shaft. G: Note the length of the shaft beyond the bearing H: Through bolts, 2 between each arm. I: Cast iron side plates, 16 per side. J: Slow speed pinion. K: Flange ?.
L: Diagonal tie bolts.

WATERWHEEL DETAILS.

Figure 5

It will be seen that there are two gear rings, at large and small radius, which would have driven relatively fast and slow gear trains respectively. There also appears to be a large flange on the distant end of the main axle, which may have been the drive to some equipment.

As already stated, the water feed or leet to the wheel would have been in a wooden 'trow', the position of which is obtained from the map of 1899, and shown in Figure 4. The trow would have ended just beyond the support member which stands to the left of the centre of the wheel. It was normal to design the trow to feed water smoothly and easily in to the buckets, so as to minimise splashing and hence ensure they were full. The power of a wheel is in direct proportion to the weight of water which is held in buckets at any time, the diameter of the wheel and the speed of rotation. Rushing the water, producing turbulence and not properly filling the buckets adds nothing to the power; steady and complete filling of the buckets is the important point.

It seems likely that the small-radius, slow but powerful pinion was connected to the haulage gear, which pulled the trucks up the ramp by rope — or chain as Carmichael states above. At present we cannot be sure how the rope was driven, except that the layout indicates that the winding gear was located on the top of the stone bank lying behind the wheel, since this is in line with the ramp. This is shown as point JJ in Figure 4. The likely site of the winding gear is at least 5 metres horizontally and 3 metres vertically from the wheel's main shaft and there is no clear indication how the mechanisms were linked. It would probably have been by belts, with fast-and-loose pulleys.

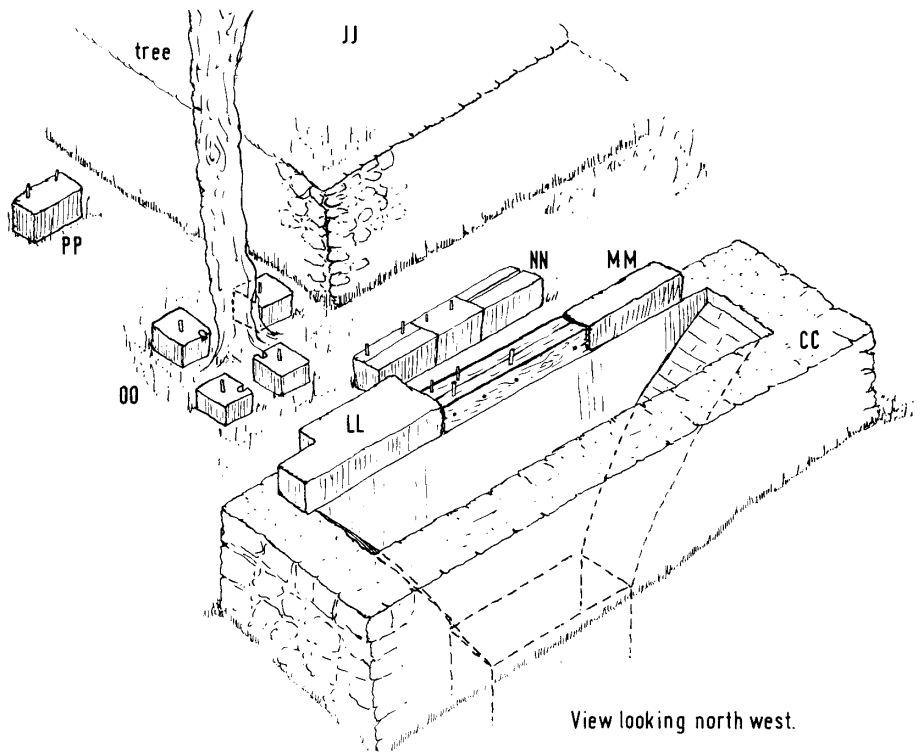


Figure 6. Wheel pit and machine foundations

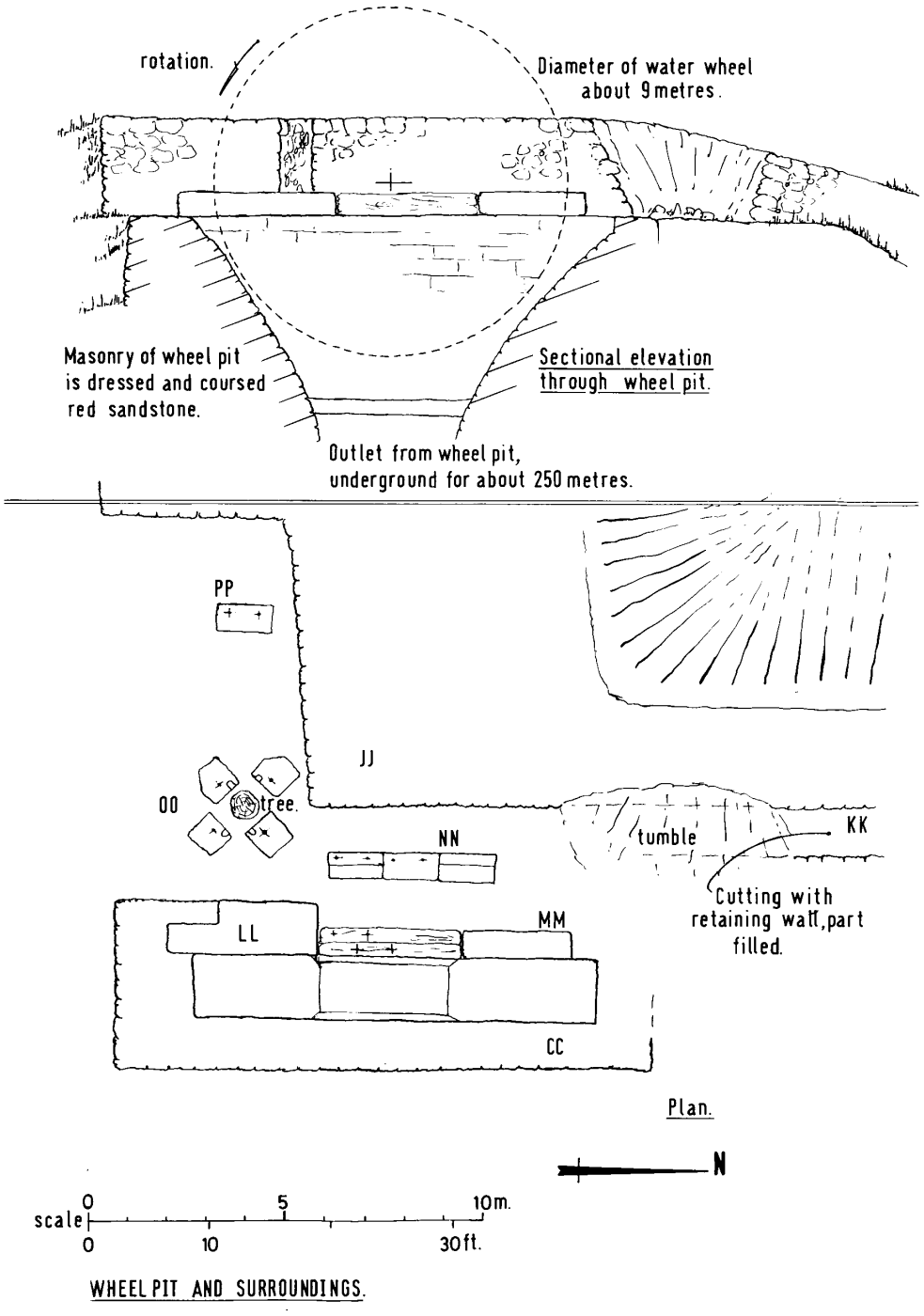


Figure 7. Wheel pit and surroundings

A strange construction feature is that the bank at JJ, on which the winding gear was probably sited, is built with a drystane rubble wall, like a field dyke. This seems rather incompatible with the fine quality of the inside stonework of the wheel pit, especially in the light of the heavy duty required of the winding gear which it supported.

It is of course possible that the flange on the waterwheel shaft somehow drove the haulage, and the slow gear drove the pumping machinery. There is a 5 metre space between the wheel and the stone bank (which is the likely site of the winding gear) and there is a trench running down the site, parallel to the ramp, at point KK in Figure 4. This might have carried drive ropes down to pumps at the working level of the mine; or sliding rods which were sometimes used at that time for reciprocating power transmission; even rotating shafts. But there is at present nothing positive to support these ideas. It appears to us that it would have been better to use the flange to operate sliding rods for pumps and the slow gearing to drive the winding gear.

The wheel pit is a fine piece of stone construction. The inside — the water side — has finely-made stone work, with good pointing, which is almost wholly intact after some 80 years use and 100 years disuse. The outside is rubble stonework, which was pointed and restored by Manpower Services Commission people in 1985. The outlet has not yet been cleared, but it is hoped that in time MSC will extract the remaining stones at the bottom of the pit, to expose the form of the outlet. Some local people think that the drainage of the drowned quarry passes through the cundy which carried the waterwheel tail race, and back this with a story of a farmer pouring waste milk into the quarry, and finding it emerging along the cundy. However the bottom of the wheel pit stands about 5 metres above the level of the quarry flooding, which is very steady, so there may be another channel draining the quarry away to the NW, on the line of the old workings. There could well be drainage along a natural channel in the limestone.

An interesting feature of the wheel pit is the curved profile of the two converging sides of the pit. This is not widely found in waterwheels. We assume the builder intended the shape to improve the water flows.

There are a number of features around the wheel pit which require explanation, on which there is little evidence. In the large stone slabs surrounding the pit there are signs of the siting of machinery, and a number of bolts and dowels remain. These are shown in Figures 6 and 7 as LL and MM. They may be the locations of machinery which engaged the two gear rings, and the flange if it is one, and which were the drives to the haulage, pumps and air blowers.

Another set of machinery marks is cut in stones about 2 metres nearer the kilns, at point NN. These are in line with the trench mentioned above, and might have been for operating a pump in the workings.

A group of four stones nearby, towards the lime kilns, at point OO — each shaped with identical small indentations — is puzzling. It now has a tree growing through the group, but this has happened subsequent to the closure of the site. It looks like the footings of a derrick, and might have served a purpose in building or maintenance. We note that the 1858 map shows a crane about this point. Just beyond this set, towards the kilns at point PP, is a single stone, cut as for machinery, which might have been sited on the line of the haulage ropeway, and could have been for tensioning the rope or chain.

The Second Wheel

Up to this point all the quoted comments on water power refer to the railway haulage of wagons from the underground workings to the lime kilns, which both Carmichael and Menteath — qualified and technical men — write about. The published source which gives rise to some difficulties is in the *New Statistical Account* (1841). The text deals with freestone and limestone quarries in Closeburn, and records techniques for use of the freestone for roofing. It continues: "Advantage has been taken of a rivulet in the immediate vicinity of one of these quarries to put in motion pumps, by a waterwheel, to drain it." This sounds like Park, but the statement is not specific. The text then describes the underground working, as already described here by Carmichael and Menteath, and clearly is describing Park. It continues: "The method of raising the limestone from the quarry is rather ingenious. From the centre of the excavations an iron railway on an inclined plane, 200 yards long, extends to the top of the kiln, up which loaded waggons ascend with the utmost facility, by means of a waterwheel put in motion by a stream of water brought six miles for the purpose. This stream is appropriated to other purposes. Descending to a lower level, it falls on another wheel, which puts in motion fanners to throw air into the bottom of the lime kilns, to facilitate the burning of the limestone and diminish the fuel necessary for driving off the carbonic acid; to move pumps to drain the lime quarry, and also machinery for sawing timber."

The Statistical Accounts were written by the Parish Ministers, who are unlikely to have had much knowledge of quarries and waterwheels, so it is not surprising if some of this statement is hard to accept. The main problem is the idea of a second wheel taking the water after the 'railway' wheel, which clearly was powering the major activity of the site. The spent water from the main wheel is at a level that required the digging of the tail-race cundy some 5 to 8 metres below surface level, to drain to the Lake Burn. It is inconceivable that a second wheel could have worked and then been drained at this lower level. There is no sign of a pit for such a wheel. Possibly in an earlier design, of which there is no record, the 'railway' wheel was higher than the present wheel pit, thus giving room for a second use of the water. But inspection of the site makes it appear unlikely that there was a quite different waterwheel layout before the present one.

Another point which clouds the evidence is the mention in the Statistical Account of 'sawing timber' as a function of the second wheel. If nothing else, the site levels and layout are totally unsuitable for large-scale sawing. Possibly there was a small water-powered saw, which might have been of use around the quarry. But a more probable explanation is that the sawing referred to is at the big sawmill, near Limebank, which was obviously built to use the water coming to the limeworks. Perhaps the minister who wrote the Account had been informed about this second wheel and thought it was in the lime quarry. This is particularly likely as the Limebank — not Park — works are nearer the sawmill.

If this explanation takes care of the timber sawing, we have to consider the fanning and pumping:

1). With regard to blowing the kilns, Carmichael (1838) states that forced air for the kilns has "just been added . . . supplied with air by a movement from the waterwheel." At present we cannot see any sign of the large air ducts which were

built into certain types of kiln in that period — as recorded in Skinner's *The Lime Industry in the Lothians* (1969). But there may have been air blast only at the fire box at the bottom of the kiln, to which air was led by external air ducts made of perishable material, of which no trace remains. It is possible that the marks in the stonework in the area of the wheel pit, NN, show the site of the 'fanners'. Bellows operated by cranks are the most likely blower for that date. People have been misled by wooden rails hanging down the front of the kiln, but these are probably remains of the protective railing for the operators, which was fitted round the top of the kilns.

2). Pumps are normal on an underground site, so their inclusion and operation by the wheel is to be expected. Their driving method is unknown, but rope drive or sliding rods have been mentioned above. Apart from the Statistical Account quoted above and a mention by Carmichael, the only word of pumping we have noted is in a quotation from Ramage in *Drumlanrig Castle and the Douglases* (1876). He writes: "Loch Ettrick . . . enlarged by means of a dam to form a collection for water for the machine to draw off the water from the limestone mines. This dam broke during the month of January in 1827. . .". This quotation implies that the water power was for pumping rather than haulage; but then Ramage was not an engineer and writing in 1876 may have not fully understood the scheme. Whatever the facts are, the rather small amount of reference to pumping is surprising, especially as mine drainage was generally a major problem in this era, and there were obviously such large underground workings. It is of course possible that the limestone was largely self-draining.

So, in summarising on fanning and pumping, we should assume that both may have been in use, almost certainly driven by water power. Because of the difficulty of visualising a second wheel, we take the view that all three motions — railway, blowing and pumping — were driven by the one wheel, using the two gear rings and the flange.

Lower Limeworks Dam

The operation of the main waterwheel was regulated from the Lower Limeworks Dam, shown as FF on the map of Figure 4. The Upper Dam lies upstream, connected by a culvert under the road, and starts at the Smithy. The dam's outlet was controlled by a sluice with a screw adjustment. The major components of the sluice valve have survived and been reconditioned, and the sluice has been reconstructed with new timbers. Figure 8 is a sketch of the sluice. It can now control the water level of the dam, which has been dredged by Manpower Services Commission personnel. The dam will soon look much as it would have done when the plant was working. At that time there was an overflow running South, parallel to the village street, then dropping away to the West, towards the cundy. This watercourse is now out of use.

The outlet runs through the bank which forms the East wall of the quarry, and the water runs down the slope into the flooded quarry. This is the point at which the trows would have started, to carry the water across to the waterwheel.

A second outlet has also been excavated, which controlled the flow to the water turbine which drove the Joiners Shop, installed around the 1900s. The sluice valve in this case is a heavy wooden plug, which dropped into a metal-lined hole, of about 25 cm diameter. This was operated by a long lever, with gudgeons to assist the straight-line movement of the plug. Figure 9 is a sketch of this sluice.

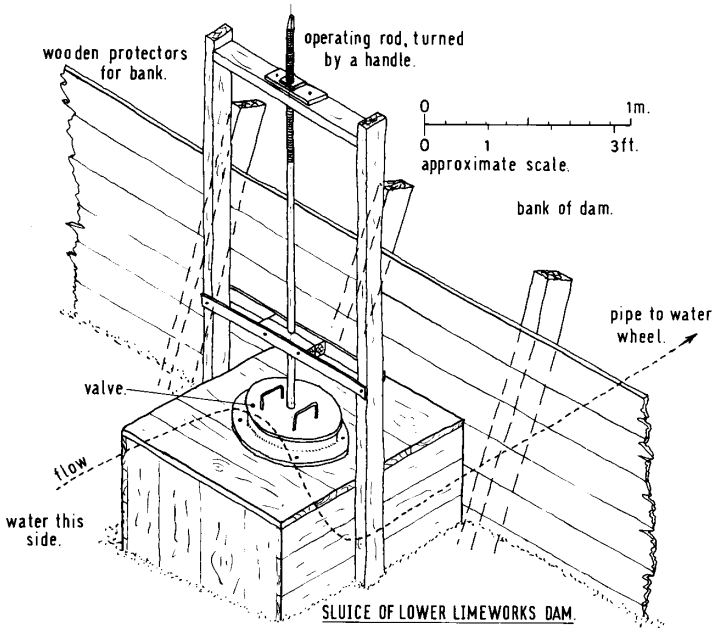


Figure 8

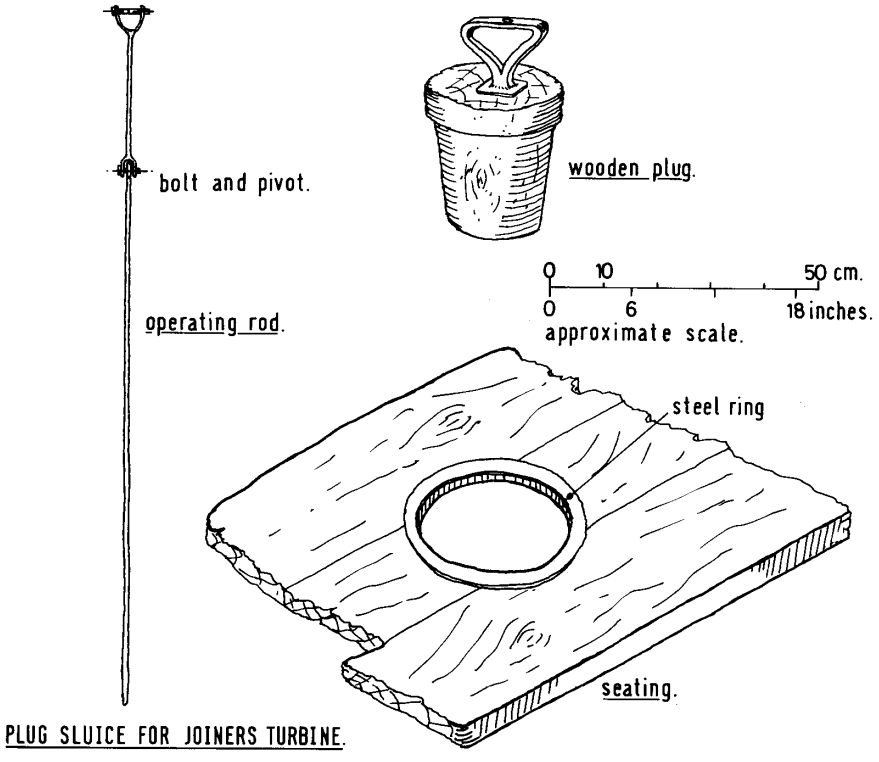


Figure 9

Dating the Works

The earliest mention of the railway in the quarry is in Singer (1812), quoting a letter of 1811 from Stuart Menteath in which he says: "I am employed at present in laying down a few hundred yards of iron rail-road, to bring limestone to my kilns." He does not mention the motive power for the railway, which had the heavy haul up the 15 degree slope, and the earliest mention of power is in the Carmichael (1838) quotation given above. But in 1811 it is unlikely that anything but a waterwheel would have been used.

The 1841 Statistical Account describes the railway and an extract was quoted above in the chapter 'Waterwheel' under 'The Second Wheel'. This makes it quite clear that the haulage railway and the water scheme from Garroch made a unified project.

Another pointer in dating the workings is the letter dated 1810 from Menteath given in Singer (1812), in which he says: "For some years past we have been under the necessity of mining the limestone . . .". Mining would almost certainly require haulage up the dip of the limestone stratum, which would imply use of power some time before 1810. These pointers and the lack of any other evidence lead us to think the water power scheme was built around 1790-1810.

Support for this dating comes from the figures of Closeburn population, obtained from the 1841 Statistical Account, page 83. These rise in the late 1700s and drop steadily after 1811, the changes being considered as due to the completion of the scheme.

A further, less-precise date is provided by the quotation from Ramage (1875), given in the preceding chapter, concerning the failure of the Loch Ettrick dam in 1827. Loch Ettrick's water was joined with the Garroch input to feed the Park scheme, so there is a clear indication that the scheme was well established by 1827.

Information from Maps

A review was made of the two earliest Ordnance Survey maps, of 1858 at 25 inch to the mile and 1861 at 6 inch to the mile. The Park Quarry section of the 25 inch map is given as Figure 10. This is surprising, as it seems to omit most of the significant points of the workings, which have been documented in the various writings quoted all through this paper, from 1812 to 1845. Neither Upper nor Lower Limeworks dam is shown, and there is no evidence of the waterwheel or the leet to it. The kilns are further to the West than at present and have only two pots, not three as now. Perhaps the kilns were rebuilt after 1860. The parallel lines running North from 'Crane' may be the railway, but they are in a different position from the present ramp; here again, reconstruction may have taken place. The extent of excavation is not clear, but we consider that by 1858 a much larger part of the quarry would have been excavated to have achieved today's appearance, remembering that work stopped around the 1880s. In that context, it seems unlikely that the owners would have rebuilt kilns, ramps &c. as late as 1860, when the quarry's future was obviously being affected by railborne competition. And the idea that the dam, wheel and wheel pit were not in existence somewhere in 1858 is unbelievable.

The note of 'Crane' is interesting, in connection with the four blocks at OO in Figure 6, which are not readily identified, except as mountings for a derrick. The position of 'Crane' on the 1858 map, in relation to the kilns, is different from that of the OO blocks today.

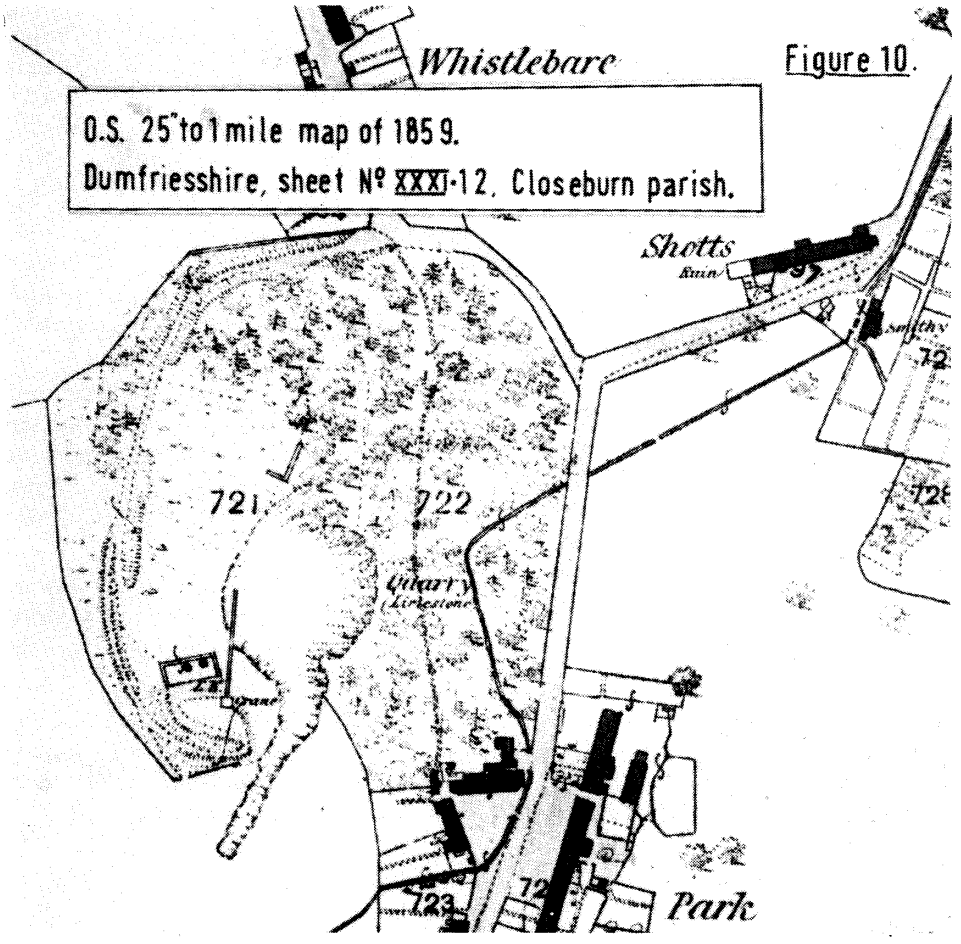


Figure 10

The 6 inch to the mile map of 1861 has very similar information, apart from an unexplained line, similar to the railway, running to the NE from near the site of the kilns. It also shows 'Old Kiln', but the site is not clear.

The next survey, of 1899, shows all the details of the site, as given in Figure 1, and these accord with what is there today.

These two maps of 1858-61 are disturbing to the researcher. From all the writings of Singer, Carmichael, Menteath and the Statistical Accounts a picture has been building up of a waterpower scheme of underground quarrying and the associated haulage, pumping and blowing. The limited facts seem to add up to building around 1790-1810, probably with improvements through time, but substantially created by the time the authors wrote in the 1830s and 1840s. Yet the Ordnance Survey, doing a survey which is often stated to be the best ever done, appears to record little or nothing of the waterpower features of the scheme at 1858-61. We are led to suspect that the surveyors did not look closely at the site, or failed to understand its significance; or that they regarded the machinery as temporary surface structures which were not appropriate to a map; or that in some way they did not obtain access to the site, and worked on outdated information.

1845 Map. For the benefit of any researchers, it is worth mentioning a Closeburn Estate map dated 1845, which will be offered if one consults the National Library. This shows nothing of the quarries, sawmill, watercourses, etc., which obviously must have existed at that date. It is our view that this is a 1783 map, drawn when the Stuart Menteaths bought the estate from the Kirkpatricks, mainly defining the farm properties. When the Menteaths sold in 1845, the map was used again with a new date, as nothing much had changed; the water scheme, etc., was not drawn in. If this hypothesis is correct, it is an interesting example of the risk of false history being created, if documents are not checked with the ground.

Conclusion

This article has described a number of points which do not have clear conclusions. The written authorities are somewhat contradictory, or else do not agree with the visible evidence. Also it is not easy to see in places how the old workings operated.

The current phase of work by Manpower Services Commission personnel may bring to light such things as air ducts in the kilns and the line of a drive to the pumps in the quarry. Each piece of digging in the kilns and the wheel pit area will be closely watched to seek clues.

Another field which requires investigation is old literary sources, such as Closeburn Estate papers, and those held by the descendants of the Stuart Menteaths. A similar area of research is to seek the original mapping of the scheme, to explain the anomalies that have been noted.

An important investigation to be completed is the clearance of the outlet from the wheel pit, to establish how this links with the cundy and show whether the quarry drains along this route.

Meanwhile the main present task is restoration of the lime kilns, which is going forward steadily.

Acknowledgements

The Author is extremely grateful for the preparation of all the drawings, undertaken by Mr Graham Douglas of the Royal Commission on the Ancient and Historical Monuments of Scotland.

He would like to record the work of the Manpower Services Commission on the dam and the wheel pit, and Mr James Kirkpatrick and Mr Edward Martin on the sluice, using timber donated by the Buccleuch Estates.

Discovering Galloway by Innes Macleod (John Donald, Edinburgh), 1985 — £6.50.

Now here at last is an authentic and up-to-date guide to Galloway (with a little of Dumfriesshire thrown in for full measure) — the lack of which has been a sad miss either for the native, the tourist, or the incomer who is anxious to learn more about the region in which he has settled. Hitherto, reliable information has been difficult to obtain and much in print has been based on long out-dated material — a notable exception being Brian Blake's *Solway Firth*, now in its umpteenth printing. Mr Macleod, who is well known for his knowledge of and research into the history of Galloway has been able to cram several thousand facts into some 275 pages. Of particular value is the reproduction of over 40 old photographs and drawings, plus several more illustrations.

The book commences with chapters on the topography and natural history, followed by archaeology and history — these are followed in turn by a parish-by-parish tour with all the places and objects of interest noted — old railways, mines, harbours, castles, witches, stately homes, gardens, antiquities — whatever your interests are, they're there and well indexed too.

The specialist too will find much of value but may come across an occasional error — some serious, like the implication (p.96) that the stonebuilt castle at Lochmaben is the Bruces', whereas in fact theirs was probably of timber and situated at Castle Hill on the present golf course (as the author makes clear on p.116) — others the usual minor inaccuracies which plague every author and editor — e.g. The Wigtown cross (p.210) standing upside down with its fixing tenon in the air, and the Monreith Arms Hotel at Portwilliam being referred to as formerly the Noble *Seiner* Inn (p.232) instead of the Noble *Science* Inn. However the author or editor may be forgiven when the vast scope of the book is taken into consideration.

This book is thoroughly recommended not only to the categories of reader mentioned but every guest house and hotel in the Region should certainly have one.

W.F.C.

The Shape of the Past I — Essays in Scottish Ethnology by Alexander Fenton (John Donald, Edinburgh), 1985. U.K. price £12.

The writer has known Sandy Fenton over many years, since he was a young newly-graduated staff member of the School of Scottish Studies: his passion for Scottish rural studies — he was brought up on an Aberdeenshire croft before taking his Cambridge degree — and his soft north-east accent have remained unchanged over the years. He is already well known to this Society through his paper on Plough and Spade in Dumfries and Galloway in Volume 45 of our *Transactions*.

The essays in this volume extend over the past 20 years: the chapter-heads speak for themselves: "Material Culture in Local History Studies", "Historical Ethnology", "An Approach to Folk Life Studies", "Regional Ethnology and Environmental Awareness", "The Scope of Regional Ethnology" — these forming Part I — Theory and Background.

Part II — Region, Community and Home — covers "Aspects of the North-East Personality", "Change and Conservation in the Farm Village of Lewis", "The Longhouse in Northern Scotland", "A Fuel of Necessity — Animal Manure": and Part III, "Sickle, Scythe and Flail", "Sickle, Scythe and Reaping Machine: A Study in Innovation Patterns", and "Hand Threshing".

There is a full list of references, a good index and many illustrations — the latter, due to the printing techniques used, perhaps not quite as sharp as they might be, but still giving their information clearly enough.

To anyone sharing in the rapidly-growing enthusiasm for the study of rural life in the past this is a very valuable document: Galloway of course figures in it, though the emphasis is inevitably on the Highlands, the North-East, and the Northern Isles, where study has concentrated and where the old has not been so heavily overlaid by the developments of the past 200 years.

Nevertheless, for example in the section on the use of dung for fuel, in that on thrashing grain, and in the section on flails, our area figures, though in his paragraph in treading out grain he fails to refer to the Rev. Andrew Symson's *Lomeing Floors* and *Lomeing,* practised by the men of Wigtownshire in 1684 *(Large Description of Galloway)*. However, that is a minor point and, all in all, the book can be heartily recommended: the price of £12 is not excessive for a modern specialist paperback: but the non-specialist will probably borrow from his library.

A.E.T.

26 October 1984
Annual General Meeting.
Mr A. E. Truckell was elected as an Honorary Member.
Speaker: Dr I. Morrison — Crannogs.

9 November 1984
Speaker: Mr A. B. Fergusson — Bees.

23 November 1984
Speaker: Mr W. McCulloch — Rare Breeds Survival Trust.

7 December 1984
Speaker: Mrs E. Whitley — Covenanters' Monuments.

11 January 1985
Members' Night.
Speakers: Mr D. Lockwood — Proposed Burns Centre, Old Mill Building.
Mr D. Perry — Trade Tokens.
Mrs J. Muir — Lesotho.

25 January 1985
Speaker: Mr G. Haggarty — Excavations at Rispain Camp, Whithorn.

8 February 1985
Speaker: Monsieur Vainker — Burrell Collection.

22 February 1985
Speaker: Mr G. Maxwell — Aerial Arachaeology of Roman Scotland.

8 March 1985
Speaker: General Sir William Turner — King's Own Scottish Borderers.

22 March 1985
Special General Meeting — A proposal to raise the subscriptions for the following session was approved by the meeting.
Speaker: Rev. G. Savage — Railways in South-West Scotland.

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