

Scottish Sojourn.

By GERALD SCULLY

MY arrival at Peebles for the opening of the Royal Scottish Forestry Society's 61st Annual Study Tour in May, 1958 was something to which I had keenly looked forward for a long time. Approaching the town one is agreeably impressed by the sight of the young coniferous shelterbelts that straddle the low rolling hills so typical of South Scotland.

In Roman times Scotland was well wooded, but the forests gave way in time to agricultural development. Stock grazing and fire killed out natural regeneration, and by the 12th Century the southern half of Scotland was already well on the way towards being denuded of woods. 17th Century writers were forced to point out that hardly a tree remained in the southern part of the country, though the northern part, by contrast, had some fine isolated stands. Farmers in the south at that time claimed that trees occupied land which could be profitably cultivated, and that woods afforded shelter to the enemies of their flocks. Trees were also generally regarded as detrimental to corn production owing to their root competition and shade, so that trees were quite out of favour with agriculturists.

The authorities as far back as James I had observed this unsatisfactory state of affairs and many Acts were passed protecting woods against damage, and eventually encouraging tree planting. One of the earliest tree planting enthusiasts was Sir Duncan Campbell, who lived about 1580, but it was not until the 18th century that private planting got properly under way in Scotland, and that century might, in fact, be termed The Golden Age of Private Planting, in that country.

One of the first to plant for profit on a large scale was Lord Haddington, who established 800 acres. Another, and probably one of the greatest Scottish foresters ever, was the Duke of Atholl, who planted the first European larch at Dunkeld in 1738, and continued the good work until he had planted four million larch.

Writers of the late 18th and early 19th centuries were extravagantly optimistic regarding the profits from planting, but towards the middle of the latter century a good deal of this zeal and enthusiasm vanished before the growing industrialisation, which made heavy demands on capital for investment. Added to that was the substitution of iron for timber in ships, and building, and the growth in the import of cheap timber from overseas.

Despite this not too rosy picture, we find a few enthusiasts coming together and forming the Scottish Arboricultural Society (in the year 1854), which was to be the first forestry society in the British Isles. From its earliest years the Society displayed a commendable initiative and in 1884 we find them organising a Forestry Exhibition in conjunction with agriculture. By their persistence they eventually

influenced the Government of the day to set up a Committee, whose report resulted in the opening of a School for Foresters at Benmore. In 1909 the Society was represented on the Royal Commission on Coast Erosion, and in two years it sponsored the survey of Glenmore to ascertain the extent of its suitability for afforestation.

Forest of Ae.

The first forest visited was the Forest of Ae where Mr. J. A. B. MacDonald, conservator for South Scotland, welcomed the party and introduced the District Officer, Mr. Neustein, who led the party while in the Forest, and Mr. J. M. Reid the Head Forester.

Considerable public attention has been focussed on this forest as being the first in Scotland to need a completely new village to house its workers. This was opened in 1947. Planting started in 1927 and by 1957 a total of 11,075 acres were planted. Previously the whole of the area was devoted to sheep farming. The forest is interspersed by 3 main valleys and rises from 400' at the southern end, where the village is situated, to 1,750' on the upper slopes of Queensberry which is the highest point in Dumfries-shire. The upper stretches are of peat land and the mineral soil is confined to the steeper slopes and valley bottoms. The soils are derived from glacial till with an underlying rock of shales of Silurian formation. Prior to planting the vegetation generally consisted of rough pasture grasses, *Molinia*, *Eriophorum* with *Culluna* and *Scirpus* on the poorer peats. The rainfall average is 55" per annum. The current annual planting programme is 400 acres but from 1952/55 it ranged from 900 to 1,200 acres. The species distribution is 72% Spruces, 10% Larch and 18% other trees. There is a great danger of fire in spring and early summer, bulldozer lines are kept clean, but little progress has been made in breaking up this vast area of conifers into sizable blocks divided by hardwood belts. The thinning programme for '57/'58 was 771 acres giving an estimated yield of 220,000 cubic feet (hoppus) which is coming from the Spruce woods to be utilized for chipwood and pitwood. In the case of the heavier cuts which amount to 12½%, produce will be sold as milling timber. In 1953 the actual volume removed was 126,000 cubic feet of which 121,000 were pitwood leaving 5,700 cubic feet timber lengths. The estimated removal for 1959 is 260,000 cubic feet out of which 210,000 will be chipwood and 50,000 timber. The 1970 forecast cut is 500,000 cub. with the timber lengths 150,000 cubic feet. The Commissions' staff at the moment is 85 with 20 men employed by private enterprise in the utilisation of thinnings. It is expected that by 1970 there will be about 330 men employed. The new village contains 44 houses, a community hall, shop, post office, school, while T.V. is a standard furnishing in most of the houses. The community now numbers 195 as compared to 30 in pre-Commission days. There are various society organisations such as the Ae Community Association, the Women's Rural Institute as well as Men's and Boys' Clubs, while on the day of the excursion work

was proceeding on a site clearance for a secondary school. Within the boundaries of the forest are some 9 forest workers' holdings which consist of a house, garden and several acres of land held on a simple form of tenancy, one condition being that the tenant is guaranteed 150 days work in the forest annually by the Forestry Commission.

A forest lorry took us to the first stop which was at Research Sample Plot No. S.152, Norway spruce planted in 1928. When last measured in 1955 the total height was 57'; basal area per acre after thinning was 143.6 sq. ft. and the standing volume in hop. feet O.B. was 3,350. The plot was first thinned at 20 years and subsequently received four thinnings giving a volume removed of 1,350 cubic feet. The method of thinning was a light crown thinning leaving 200 dominants with lighter small trees performing natural pruning functions. Mr. MacDonald pointed out the disadvantages of such a large number as 200 trees per acre as it is not feasible to develop an uneven canopy with so many dominants.

At Stop No. 2 Mr. MacDonald stated that he was convinced from his research experience that a heavy crown thinning was best in these circumstances as it made conversion to irregular canopy woods more simple. In this plot of 22 year old Norway spruce Crown Thinning in various stages of marking was demonstrated by Mr. Neustein to illustrate the phases in the marking of a crown thinning.

Plot I. Approximately 80-100 well spaced dominants per acre were selected i.e. averaging 7-11 yards apart (good care being taken that trees on drain edges or any other factor which would take from the stability were considered).

Plot II. Dominant trees competing with crop trees were marked for removal.

Plot III. In this Plot:—

- (a) The dominants marked in Plot II as competing with crop trees had been removed
- (b) Trees competing with "Pruners" were marked for removal (Pruners being smaller trees round the final crop tree which by their shade killed off the latter's low side branches).

Plot IV. The trees marked to relieve the pruners had been removed and any light groups not affected by the marking up to this stage are thinned in the normal way.

The next stop was in C.115 where we saw Norway spruce planted in 1939. A thinning competition was arranged here. In this compartment three plots were marked out; Plot 1 contained two final large

trees. All the trees were numbered, the object of the test being to select the correct dominants.

Plot 2. In this plot the two final crop trees were pointed out and the test was to select the competing dominants for removal.

Plot 3. Here two final crop trees as well as their competing dominants were pointed out and the test was to indicate the trees which were competing with the "pruners".

It might be well at this stage to give some of the reasons for the introduction of this type of Crown Thinning which could be associated with Professor Heiberg's Danish Crown Thinning. Crown thinning as locally practised has been in operation for 4 years and the following advantages are claimed :

1. The best trees can be given room for rapid symmetrical crown development by removing only a small number of large trees. By traditional methods this can only be achieved by a very heavy low thinning.
2. An uneven canopy is obtained which may result in a more windfirm crop in a clean forest floor and a finely branched high quality final crop trees.
3. It is ideal for treating mixtures of varying shade tolerance.
4. It is more economic as in the first thinning larger trees are removed.
5. Increment potential of the whole crop is concentrated on the best stems from an early stage, thus producing a greater yield of high quality timber.
6. An uneven crop lends itself to later group felling and regeneration without the risk of windthrow, which may be preferable to clear felling large areas and the resultant loss of forest conditions.

The next stop was in C. 131, a 28 year old stand of Norway spruce where felling, hand and horse extraction, work study costings and conversion of poles to chipwood lengths were in progress. It was noted that the horse held his own in the hauls up to 130 yards. The felling of spruce of poles up to $7\frac{1}{2}$ " Q.G. was done by one man as work study research revealed that this resulted in maximum output. Most of the conversion work was done by one man with a bow saw which had a hard toothed blade. This blade was not sharpened as the time spent in doing so was equal to the cost of a new one. The "life expectancy", in statistical parlance, ranged from 3-5 weeks. The ideal axe has been found to be a 4 lb. one with a 27" to 30" handle. Peeling is done by

a Scandinavian-designed peeler with a detachable blade. A measuring stick with a scribe in the end is used before snagging to measure the desired log lengths so that only the usable portion of the log is snagged. Extraction between the



Forest of Ae. Horse extraction.

lines is done by horse and rubber-tyred dray as illustrated in the photograph. When the poles are hauled to the roadside they are slipped on to a $4\frac{1}{2}'$ long flat topped, tubular steel, triangle-shaped horse which is most convenient for subsequent handling. Poles are then cut to the required lengths at the roadside by a rubber-tyred portable mill which is doing a cheap and satisfactory job. Power saws in the wood were found uneconomic as only 40% of the operator's time was productive.



Illustrating the crown thinning in *Sitka spruce* stand in Forest of Ae.

The next and last stop was at a Research Sample plot where Mr. MacDonald pointed out the shade bearing qualities of the Sitka spruce and demonstrated that crown thinning is practical with this species as illustrated by photograph. Mr. Gribson thought that the danger of

windthrow without some system such as crown thinning would be considerable especially when trees got up into the wind zone. He also stated that there was evidence of considerable peat shrinkage in the forest where spruce was growing and that there was a danger that this shallow rooter would remain on the peat layer and not enter the compacted sub-soil, thus giving rise to the danger of large scale windthrow.

The excursionists were entertained to tea in the village of Ae where Dr. Gorrie thanked the conservator and his staff for such a highly informative tour.

That night there was a discussion on the Scottish Woodland Owners' Association in the Picture Gallery of the Chambers Institute in Peebles. Mr. J. Maxwell MacDonald of Largie delivered the opening paper and a lively discussion followed.

There was much emphasis on the desirability of a Marketing Board of the same type as that which serves agriculture, but nothing definite on this point emerged. It was pointed out forcibly that the production of quality timber did not pay the grower as he got nothing extra from it and a case was made for a system of sampling and grading. Without some common denominator or measure of timber values it was stated that private estates would not be able to judge the value of their produce. It is expected that a definite timber marketing policy will emerge in the near future in Scotland. It was also mentioned that the price of pitwood was depressed as the Coal Board were trying to recoup some of their five million pound losses; and timber growers generally were having anxious times especially those with light thinnings ready for the market.

Dawyck Estate.

The visit to the Dawyck Estate attracted a large crowd and this beautiful demesne of cultivated fields and woods of some 1,000 acres was seen on a perfect summer's day. The well laid out walks bordered by daffodils in bloom with a background of Azaleas and Rhododendrons and many oriental shrubs and herbaceous plants made what one might term a riot of colour. The woods on the outer periphery of the estate framed the picture!

The party was welcomed by the proprietor, Colonel A. Balfour, who traced the history of the planting in Dawyck since the days of its ownership by the Veitches who were an old border family. Fortunately for forestry, the Veitches as well as the Balfours who came after them were devoted to silviculture and the woods at Dawyck have been famed for their beauty since 1650. Continuity of management of woodlands is essential, and it is fortunate that this well-wooded estate has been managed with care for 300 years. The woods are planted within the elevation range of 600' to 1,500' with an average annual rainfall of 35" and severe frost is experienced in winter. The soil is mostly light loam, with good natural drainage. This is a most interesting woodland as many new species introduced to Scotland were grown from seed at

Dawyck and it was particularly pleasing to have an opportunity of visiting this magnificent and historic estate. It is noted that the largest Douglas fir measures 142 ft. in height with a Q.G.B.H. of 49" giving a total volume of over 700 cubic feet, while the larger Sitka spruce measures 117 ft. with a Q.G.B.H. of 50 $\frac{3}{4}$ " and a volume of 500 cubic feet. There are about 1,000 acres of woods enclosed with 750 acres dedicated. During the last 40 years the species mostly planted were Sitka spruce, Douglas fir and Japanese larch. Experience with European larch is that it suffers from canker and die-back while the performance of hybrid larch is most encouraging and it is a very popular choice at the moment. This species thrives on the dry hillocks and is fairly frost resistant there. As most of the plantable land is already fully stocked, and it has been found uneconomic to plant above the 1,200 ft. contour line, the major operations are thinning and felling of small patches of mature trees, so that the planting programme is about 10 acres a year. Group fellings are pursued as opposed to clear fellings and every effort is made to encourage natural regeneration while the general policy is the establishment of uneven-aged woods.

The first wood visited was Bellspool which is divided into two sections one stocked with hardwoods and the other with softwoods. Group regeneration is being pursued on both areas. In 1953 the filling up of groups and planting of hybrid larch, Norway spruce with further extensions since then to the groups of *Tsuga heterophylla* and some hardwoods. There was a lively discussion on the size of the groups, natural versus artificial regeneration and clear felling as opposed to group methods. The next stop was a plot of Scots pine/Douglas fir with a mixture of hardwoods. Here replanting on clear felled groups with *Tsuga* and Norway spruce has been carried out. In February 1957 a plague of field mice attacked the *Tsuga* destroying 50% of the trees in some groups. It was rather strange that *Tsuga* was singled out for the attack.

The next wood visited was an unusual mixture of Douglas fir, Norway spruce and Sitka spruce. There was general agreement that the thinnings here in early years were too light as the B.H.Q.G. for a crop 50 years old was not satisfactory. The timber trade group pressed for complete felling and a stem with butt rot obligingly justified one of their advocate's claims. It was unusual to see Douglas fir and Sitka spruce growing so satisfactorily in association and strangely enough the volume advantage was with Sitka spruce. A view of one of the more senior members was that Douglas fir was not at home on this type of site as it contained too much moisture, and Sitka spruce was suggested as a more suitable alternative.

The Policies in the glen were next visited and some 50 year old *Chamaecyparis lawsoniana* was inspected from which it was evident that this species grows very slowly with a tendency towards forking. Some 30 year old *Tsuga heterophylla* and Sitka spruce in mixture were noticed as well as some fine specimens of Sitka spruce planted in 1856,

and Douglas fir planted in 1835. The hill behind the house was then climbed and plots of *Picea rubra*, *Picea asperata*, *Picea orientalis* and *Pinus monticola* planted under forest conditions were visited. *Pinus monticola* was affected by rust as usual, but the shape and form of the trees were excellent. Here a competition on volume estimation of growing timber was held with Mr. D. Ramsay winning the prize. On the way to Dawyck House some of the oldest specimen trees, many of which were grown from seed when first introduced into Scotland were inspected. The oldest tree was an *Abies alba* planted in 1680, next was a European larch planted 1735 followed by *Abies nobilis* planted in 1831, while at the end of the walk was a mere youngster of *Tsuga heterophylla* introduced in 1860. The latter is a tree of exceptionally good form with light branching and regenerating freely. An exhibition of forestry machinery was later held in which some of the leading firms in the U.K. and Sweden demonstrated.

On the way back to Peebles Mr. Dalgleish pointed out a larch site on which he had seen three crops of timber grow. In 1916 while apprenticed to a local merchant he saw the first crop felled. The site was replanted and another crop was harvested in 1942 while to-day still another crop is growing vigorously on the same site.

Glentress Forest.

The visit to Glentress where the Department of Forestry of Edinburgh University are carrying out experiments under the direction of Professor Anderson and Doctor Taylor his assistant fully justified our expectations.

Dr. Taylor pointed out that for 6 years this forest has been under the management of the University, the local Forestry Commission's staff performing the actual operations. The forest is situated quite close to the town of Peebles and lies on the upper slopes of two spurs with an elevation range of 800' to 1,830', most of the plantation lying above 1,250'. The rainfall average for the area is $37\frac{1}{2}$ " with 206 rainy days and the incidence of ground frost is estimated at 100 nights annually. The average relative humidity is 77.5% and mean annual temperature is 45° F. There is exposure in the southern and western aspects. Soil is mostly of brown earth slightly leached on the higher ground while on the lower slopes there is a heavy glacial till. Before planting which was started by the Forestry Commission in 1920 the vegetation was pasture grasses and mosses. Dr. Taylor stated that the present objects of management were to create and maintain in perpetuity a forest of irregular structure with treatment based on the accumulated experience with a view to the ultimate establishment of a maincrop of climax species of irregular structure and composition, especially Norway spruce, silver fir and beech. The main crop species will be introduced by groups retaining existing species as pioneers, while the margins on the exposed high ground are to be thickened with relatively slow growing trees such as sessile oak, ash and sycamore. Dr. Taylor pointed out that the area

was divided into six blocks of equal size which are treated in turn one each year. The block of the year is enumerated, fellings marked and groups selected for planting the following year. The conversion period is fixed as 60 years so that 1/10 of an annual block will be planted each year. It was stressed by the Director of Studies that groups are sited with the long axis north to south with light demanders in the northern half and shade bearers in the southern half. It was noted that some of the broad leaved species were not doing well and the vigorous thick mat of grass could be attributed to their poor height growth, as competition for available moisture must be considerable during times of dry weather. It was suggested by some of the members that the hardwood groups should only be introduced into stands which had already closed canopy and that the opening up should be just sufficient to minimise the grass competition at least during the early years of the young trees. Various views were put forward about the future of silver fir and its susceptibility to Chermes but Dr. Taylor maintained that a great deal of the trouble with that species arose from the fact that trees were planted on marginal and unsuitable sites and that the problem was one of selection of species to avoid planting on unsuitable sites. Discussion also centred on planting Sitka spruce on dry sites and a case was made for having humidity tests for the upper and fog bound summit as well as on the lower slopes. Dr. Taylor went on to explain that the Glentress experiments were closely associated with similar ones of the Swiss/French/German/Danish pattern where the Check system of management was in operation. He claimed that climatically in many respects Glentress conditions resemble those of some of the forests in western Europe where the Check method of management has been practised for over 50 years. Dr. Taylor pointed out on plots already measured that the system of measurement is 100% calipering by compartments and blocks of all stems over $3\frac{3}{4}$ " B.H.Q.G. The trees are arranged in a stand-table by $1\frac{1}{2}$ " Q.G. Groups, ranging upwards from mid group of $4\frac{1}{2}$ ", 6", $7\frac{1}{2}$ ", 9" up to 21". Standing volumes are calculated by means of a Conventional Volume Table in hopsils. When fellings take place they are measured on the ground according to B.H.Q.G. classes, timber height and Q.G. at half timber height, thereby obtaining actual volumes. Such volumes for each species are related to the management volumes (hopsils) and a conversion factor calculated. It is hoped that the conversion factor for a particular species with approach unity as improvements take place in growing stock. The selection of a Q.G. as low as $3\frac{3}{4}$ " affords detailed managerial information on the development of the smaller stems. It was pointed out that the Check method recommends itself for the management of uneven aged stands, because it records the development of the stand by compartments with a high degree of accuracy and is highly adaptable to any abnormalities which may develop. It has also the advantage of uniformity in recording, experiments with the composition and density of the stand over a long period of time are possible.

In Glentress, stem/number curves are prepared for each compartment and production calculated whenever the necessary information is available. No prescribed cut will be fixed until adequate increment data are available. This aims at the development of irregular stands of good health. Discussion centred on the close planting of the trees in the groups. One of the private planters advocated the Hiley approach and drew attention to the high establishment costs per acre of 3' planting and the difficulty of finding adequate capital to finance planting projects. It was pointed out that in large scale planting the health of the growing stock, and therefore the quality of the timber produced, was of the utmost importance, as a high volume per acre of trees suffering from butt-rot made poor comparison with a lower volume of healthy stems. Confidence in the Anderson silvicultural gospel was affirmed as tree farming and silviculture are diametrically opposed.

The advantages of growing trees in close formation when young was stressed as diameters of narrow annual rings are produced giving a higher proportion of summer wood to spring wood. It was also learned that Dr. Anderson is of the opinion that summer wood ought to be more resistant to fungal and bacterial attacks as it has long narrow cells and a higher proportion of resin, aromatic oils and other chemical substances than the spring wood, hence the need for dense stocking.

Major Paterson expressed the party's appreciation of Dr. Taylor's stimulating leadership of this tour and said that all present would follow the fortunes of the silvicultural experiments with lively interest. Personally I was highly pleased to have seen Glentress and was fascinated with the grace, ease and modesty with which Dr. Taylor replied to the continuous barrage of questions from the party. The Forestry Commission are to be congratulated on their wisdom and generosity in allocating this splendid forest to silvicultural research.

Cardrona Forest.

The next forest visited was Cardrona where some European larch plantations were inspected. Here crown thinning was also employed with the usual number of 80-100 final crop trees isolated from the others. A long stimulating discussion took place and Mr. Whyman, who has had considerable experience in the growing of larch and Scots pine thought the stand over-stocked and the crowns rather short. In fact with considerable reserve I would say that Crown Thinning is not altogether suitable to light demanders particularly larch.

The party then moved back to another property of Glentress Forest where we saw a mature 90 year old stand of European larch in which there is some evidence of the presence of *Fomes annosus*. Back in 1942 some of the stand was underplanted with *Abies grandis* while since 1950 Norway spruce has been introduced as well as some beech. The planting of Norway spruce which is so susceptible to *Fomes annosus* was not considered to be a good choice and there was agreement in the suggestion for its removal for Christmas trees and its replacement by Douglas fir and silver firs.

Dalkeith Woods.

The study tour terminated with a visit to Dalkeith Woods which are owned by the Duke of Buccleuch.

The Head Forester, Mr. W. Mowet, led the party through the estate. He explained that the woods have been under regular and somewhat intensive management for 50 years. The aim is to keep the woods fully stocked and in recent years selection felling and under-planting has been practised as much as possible. Broad-leaved trees have been used mainly with conifer nurses especially larch. The woods lie between the elevation range of 500'-700' and are fairly scattered and irregular in outline. One portion of the wood has been allowed to



At Dalkeith Woods.

Some beautiful boles of Ash, Beech and Sycamore.

remain in its natural state to accord with the wish of the Nature Conservancy and this course has also received the approval of the Forestry Commission.

After inspecting the Estate's small efficiently kept nursery, which supplies transplants for the home estate as well as for the Roxburgh and Selkirk estates, the party moved on to the various small plantations within Dalkeith Woods.

The first stop was at a plot planted in 1938 with oak groups, the balance being European larch with a small percentage of beech. After four thinnings the larch has been practically removed leaving some nice quality hardwoods. At the next stop it was noticed that a 45 year old crop of sycamore and beech was doing satisfactorily while in the plantation immediately after this we saw a 28 year old mixture planted originally in alternating lines of European larch, beech, Spanish chestnut and ash. Some really fine hardwood poles particularly ash were admired in the well-thinned stand shown in the photograph. (p. 16).

It was noticed in the Dalkeith estate that where soil and sites were unsuitable for agriculture because of marginal fertility on the one hand or of too steep a gradient on the other, the ground was used for planting with the dual purpose of providing shelter for stock and dairy cows as well as producing timber. Without the benefits of shelter afforded by the plantation the higher ground of this area might be marginal for stock rearing whereas at the moment it is supporting milch cows. This estate was high lighted by the costings section under the Chairmanship of Professor Zuckerman, as being a model of forestry and agricultural integration.

The last stop was at a beech/sycamore/oak plantation, where the Head Forester pointed out that the nearby housing estate together with the mines proved a lucrative outlet for light thinnings. This concluded the Study Tour.

General.

In the Edinburgh district Dr. Caborn collected much of his material for his thesis entitled "Shelter Belts and Microclimate." I was fortunate, during the Study Tour, in making the acquaintance of Mr. Edwards, silviculturist to the Forestry Commission Research Branch, on whom I called by arrangement at his home in Edinburgh. After showing me the relevant maps of the district, Mr. Edwards very kindly offered to conduct me over the locality where his research had been carried out. I am glad of this opportunity to express once again my gratitude to Mr. Edwards for his great helpfulness to me on this occasion.

The district which we visited is at the foot of the Pentland Hills, a range running from S.W. to N.E., with many shelter belts on its slopes. One of the belts visited was situated in Dregghorn, and has a width of 21 yards comprising mainly Scots pine, with a small proportion of sycamore, oak, elm, ash, rowan, birch and beech. The belt runs from north to south. The local topography causes wind deflection so that the prevailing wind is westerly, as demonstrated by the tree growth. To the windward side of the belt there is a whitethorn hedge, which is part of the belt, with a top height of some 10 ft. Moving lee-

wards there is a gradual increase of height growth until, on the opposite or leeward side of the belt the height is about 40 ft. The Scots pine runs through the centre of the belt and is flanked on either side by hardwoods. On the leeward side the land has been recently cultivated and reseeded, and it carried a dense stocking of grasses and clovers. Sheep were grazing placidly here, even though it was raining heavily and there was a high wind. This area is part of a progressive pattern of farming in South Scotland, and might be regarded as a model in agricultural management. The fences and ditches have been levelled and drained, and the space which they formerly occupied has been devoted to the planting of shelter belts at fairly frequent intervals.

From Dr. Caborn's findings it is clear that the benefit of shelter to pasture and animals is considerable, but I venture to suggest we must await his more conclusive findings before determining the orientation, silviculture and quality of shelter necessary for the establishment of an economic forestry partnership.

Scotland's foresters are well to the fore with the introduction of new ideas, as well as with experimentation in the adaption to home conditions of systems that have been tried out satisfactorily elsewhere. One such scheme is the school for private forestry workers, where young men take part in a six-weeks' training course on the many aspects of forest work. Tuition by demonstration lectures ranges from the correct method of seed sowing to loading timber for the mill yards. Simple costings are taught, and elementary botany also finds a place in the curriculum. The Forestry Commission is to be congratulated on this imaginative step towards the provision of a nucleus of highly efficient private forest labour similar to that found at Zwingenberg.

Another item discussed with the Scottish Foresters was the difficulty being experienced by the Forestry Commission in maintaining its intake of land to meet new planting requirements. A variety of reasons are apparently responsible for the fall-off in land acquisition, the major causes being the legal difficulties in acquiring land free of encumbrances, for example, commonages, competition for the land with agricultural and other interests, the low price payable for forest land and hostility to the Forestry Commission. As regards the last mentioned, it was felt that in the early years lack of experience resulted in the acquisition of land without adequate account being always taken of the farmers' point of view. These grievances have since been remedied, however, and the goodwill of land owners near the plantations is now properly regarded as vital to the success of afforestation.

The Commission are reluctant to increase the price of land as it would affect agricultural land values generally. Economists do not encourage forestry on to the better quality uplands, as they argue that if the 3½ million acres of reasonably good quality uplands in the U.K. were improved so that 39 instead of 25 mature bullocks could be supplied per 100 acres, the national output in stores would be increased by 0.4 million, and with the fattening of these cattle in the lowland

yards, the 120,000 tons of beef, or one-third of the 1955 beef imports would be produced. It would appear that forestry in Scotland will be confined to the areas of marginal quality as far as agriculture is concerned.

There is, however, a fairly large block of unproductive forest land in the cut over woodlands; still left from World War II.

I was fortunate, before leaving for Scotland, in having obtained statistics of conversion of woodlands to agriculture, costed and prepared under the London School of Economics. This directed attention to the fact that almost 0.4 million acres of derelict woodland were unproductive. Some Scottish foresters, especially those in private planting, were glad that attention was focussed in this way on the fact that such a large acreage of land, capable of producing the finest tree crops, was lying idle. The private owners also claimed that during the War, when they had hoped to reap the benefit of greater profit after years of depressed timber prices, the Government stepped in with price controls on timber on the grounds of its importance as a commodity. This, they believe, is responsible for the fact that, to-day, due to death duties and lack of capital, this large acreage of the best timber producing potential is lying idle.

Private planters can lay claim to a major contribution in Scottish forestry, with the 1949 census showing as much as 1.1 million acres of woods in their hands.

Another item of interest revealed by the same census is that of the total stocking of both private estates and Forestry Commission plantations, 46% is of Scots pine, while the total of the high yielding species, such as Douglas fir and the spruces amounts to some 37%.

The Scottish Tour was most successful, and, apart from the forestry experience gained, I enjoyed my stay immensely. The kindness and generosity of the Scottish people is something that has to be experienced to be properly appreciated.

In conclusion, I would like to join in the tribute paid by the members of the Society to their able and energetic Secretary, Mr. Gallaway, and his Assistant, Mrs. Page.

The briefings which we received on the forests to be visited were, in particular, most helpful and imaginative and added greatly to the interest and enjoyment of a memorable scientific experience.

CORRECTION

Irish Forestry XV, 1958, page 42.

The sentence beginning on the line 36 should read :

Germany, however, was not troubled with the wholesale trade of state-property owing to the theory of free-trade as established by Adam Smith. In Austria, on the contrary, two and a half million acres of woodland was sold to private owners.