Annual Study Tour

First Day.

THE party assembled outside the Downhill Hotel, Ballina, at 9 a.m. on Tuesday, 31st May, 1960. Shortly afterwards the two buses left on the impressive journey to Glenamoy.

En route a halt was called between Ballycastle and Belderg to view the 400 ft. high carboniferous sandstone cliffs where huge faults, and holes worn by the sea could be seen. Those travelling on the first bus were provided with an excellent running commentary on their surrounding by Mr. T. Hunt.

At Glenamoy Research Station we were met by Mr. O'Hare and his staff. The President, Mr. Swan, then gave a short introductory speech, officially opening the 17th Annual Study Tour. The Convenor, Mr. A

M. S. Hanan, spoke a few words introducing Mr. O'Hare to the party. Mr. O'Hare, before showing us the various aspects of the farm, gave us a brief *resumé* of the history of Glenamoy Research Station.

Founded in 1953, its original function was the cultivation of bog-land for the production of grassmeal. Work started in April 1954 but in August 1955 a joint scheme under the Departments of Agriculture and Lands was introduced. Its objectives were:

(a) The establishment of a 100-acre experimental farm.
(b) The determination of inexpensive ways of increasing stock carrying capacity, and
(c) The production of various industrial crops for small industries.

Mr. O'Hare told us that work is also done at present for the Meteorological Office. The farm consist of 100 acres with 40 acres of shelter belt.

We were told that the first objective entailed sheep and cattle farming on soft swards (e.g. clover). A 40 per cent. loss of lambs was recorded in the sheep flocks to that there has been more emphasis on cattle farming. The all-important product was the animal and a system of bringing feed to the animal instead of vice versa was one of the problems being tackled. Drainage was the only way of dealing with the utilization of the soft land for swards. Mr. O'Hare said that the farm was now at the crossroads of policy as to whether sheep or cattle farming would be the final aim.

Regarding the second objective, seeding was found to be very successful.

The third objective entailed experiments in bamboo growing for the production of fibre. Mr. O'Hare informed us that the British Institute of Research discovered that the total yield of alpha-cellulose from an area of bamboo was greater than from an equivalent forest rotation. Three varieties were being grown. The method of harvesting was the Forage Harvester.

Before proceeding to the field and to the drainage experiments Mr. O'Hare gave us some data on the type of ground being tackled. The pH of Glenamoy ranged from 4.1 at the bog surface to 5.1 at the base. The moisture content was 92%. Led by Mr. Burke of the Institute Staff we then proceeded to the field. First the drainage experiments were seen. The first site consisted of two acres, one underdrained by plough having the run-off tapped by a flow recorder, the other not. The main drains were 100 ft. apart in the first acre with cross underdrains at 12 ft. intervals. The flow recorder was an essentially simple instrument consisting of a float in a water bath which rose and fell according to varying off-flow. The float marked a chart. The graph produced was read weekly and some of the water was analysed every day to determine mineral loss through drainage. Run-off was found to reach substantial

peaks in the area not underdrained with an equivalent loss of nutrients due to the fast run-off. There was no run-off peak in the drained area.

Various underdraining experiments were carried out, one for example of six different crops with different underdrain levels of 3 ins. to 30 ins. Another problem posed was how intensively the area could be under-drained without damage.

We viewed the plough for doing this, a very impressive piece of machinery which was evolved in 1959. The plough ejected the peat onto the surface and therefore could not in fact be called a mole plough. The model we saw had a hand lifting ram, but a hydraulic take-off was in the process of construction. The plough was made of $\frac{1}{2}$-inch metal sheeting but it was suggested that a lighter model would be adequate. The plough was able to go to a depth of 40 ins. and ejected a strip of peat 11 ins. $\times$ 15 ins. Its implications as regards forestry would appear to be great. Mr. Burke told us that experiments were carried out this year testing this new plough with a Cuthbertson and that it outweighed the latter in its advantages regarding labour and efficiency. The oldest drains cut by the plough were eighteen months in existence and showed no sign of closing. There was no limit to the theoretical depth at which the drains could be placed, although draining below 30 ins. was not advisable.

A discussion arose as to the cost of operating this plough and it emerged that, although the rate of travel was the same as that of the Cuthbertson, it could be drawn easily by one platypus tractor as against two required to draw the Cuthbertson. Another point that arose in the discussion was whether, once the area was drained, it would revert to its former "gluey" (gel) peat condition. We were told that experiments to test this were carried out, and it was found that this glueyness would never be regained.

We then proceeded to an experiment in water-table measurement with vertical pipes placed at 3 ft., 6 ft., 12 ft. and 25 ft. intervals from a main drain. It was noted that beyond 6 ft. there was no substantial drop in water level.

Finally in this series we observed an evapotranspiration experiment in which a 10 gallon drum with peat saturated with a known volume of water was used. Allowing for rainfall, syphoning off, and additions to maintain saturation in dry periods the difference in the amount of water at the end of the experiment gives a measure of the evapotranspiration from a saturated peat surface. It was pointed out by Mr. Burke that total evapotranspiration from a given surface was limited by the

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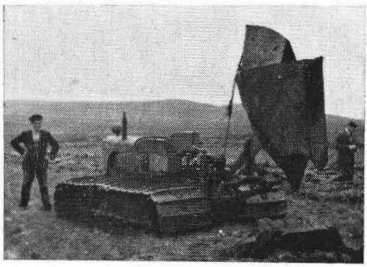
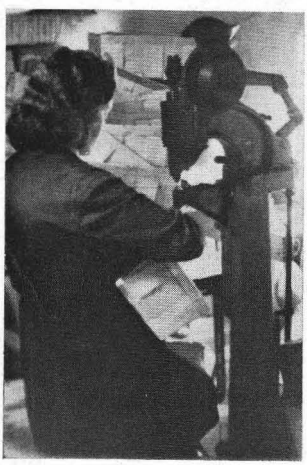
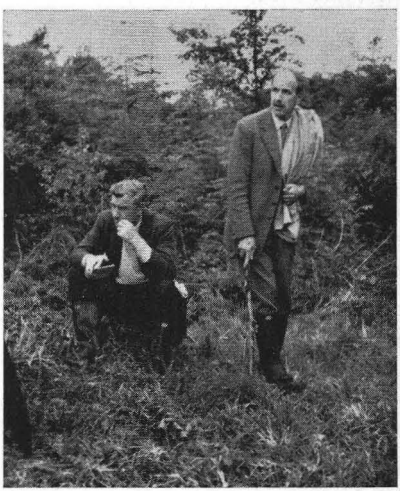
PHOTOGRAPHS. *Top left:* Experimental mole plough at Glenamoy. *Top right:* Examining contorta pine of Lulu Island origin in the shelter belt at Glenamoy. In the background can be seen the contorta of presumed Washington coast origin. *Centre:* The party discussing forestry experiments at Glenamoy. *Bottom left:* "Stitching" chip baskets in the Sligo factory. *Bottom right:* Convenor A. M. S. Hanan addressing the party in Lough Gill forest. Seated is Mr. M. MacNamara, Vice-President.







amount of energy falling on or received by the surface and that theoretically any complete vegetation cover was capable of yielding the maximum evapotranspiration. Therefore grass crops might get rid of as much moisture as a tree crop. Surface root crops die out so therefore do not maintain an evapotranspiration surface as does a tree crop.

This finished our tour of drainage and related experiments and we proceeded to another area where we looked at shelter belts and fertilizer experiments. The 40 acres of shelter belts comprised an outer belt on the exposed edge of 4 rows of contorta pine, a middle belt of 3 rows of Sitka spruce and an inner belt of 3 rows of Sitka spruce, contorta pine and hybrid larch. The area was plough drained with drains 10 ft. apart and ribbons at 5 ft. 1½ oz. of ground mineral phosphate had been applied at time of planting in 1956. The original intention was that the outer (exposed) edge of the belt should consist of mountain pine, but contorta pine had been supplied in error and it was now apparent that these were more vigorous than the contorta in the inner part of the belt. This difference was discussed and was generally ascribed to provenance; the outer rows, supplied instead of mountain pine, being probably the progeny of old stands of contorta pine grown from seed originally imported from the coastal districts of Washington, U.S.A., as compared with the inner belt which was known to have been raised from seed supplied from Lulu Island, British Columbia.

We adjourned from the shelter belts to experiments conducted by Mr. D. Collins on seeding of grass mixtures and fertilizing. The first experiment we were shown demonstrated the necessity of liming. We were also informed of experiments carried out on clover crops with the addition of lime and various types of phosphate. It was found that ground mineral phosphate, although more effective than no treatment, was not satisfactory, and that superphosphate was a better form in which to apply phosphate fertilizer in conjunction with lime. In another experiment a response in clover to ½ lb. of molybdenum per acre was seen.

In the following discussion one of the reasons given for the poor response to G.M.P. was that the lime neutralises the soil and inhibits the liberation of available phosphorous, so that G.M.P. should only be applied under acid conditions. To end the fertilizer and seeding experiments we saw an experiment in large-scale surface seeding.

We were told that by these experiments it was hoped to show that the lot of the residents of the western bogs could be improved by draining and seeding ¼ million acres of bog. The cost of the whole operation, including establishment of sward and drainage, would be about £10 per acre.

Having seen the agricultural side of Glenamoy we returned to the personnel buildings where we enjoyed a wholesome pack lunch provided by the hotel, ably added to and very kindly served by the Glenamoy staff.

We took the field again after lunch and proceeded to Glenamoy

research forest where we were shown a number of experiments by Mr. O. V. Mooney, Research Officer. Mr. L. Condon, District Inspector, opened the proceedings by welcoming us to the forest. He told us that the running of this forest was a joint responsibility between Research and Management Staff. In treating Glenamoy as a working forest the management staff were aiming to produce a crop of timber, possibly of pulpwood type.

The plantation lay on an area of blanket bog with a natural vegetation consisting mainly of *Eriophorum* spp. and *Schoenus vigricans.* The bog, ranging in depth from 4 ft. to 24 ft. overlay gneiss and mica-schist. The climatic factor was critical. Mean annual rainfall (48?) ins.; relative humidity (80%?); mean wind velocity 17.5 m.p.h.

Mr. Mooney told us that the area was originally acquired in 1955, and since 1956 an annual planting programme has been carried out. Up to the present 500 acres has been planted. He told us that the whole of Glenamoy was planted as an experimental plot and as yet there was no real knowledge as to its success. This forest was to be a pilot plot as to what the possibilities will be on similar ground, e.g. at Bangor Erris, Crossmolina, Nephin and Blacksod. The Forestry Division needed a preview of what would happen in these areas.

We saw first an experiment in which acre plots of different species had been sub-divided for different applications of G.M.P. These were at the rates of 3 oz., 2 oz. and 1 oz. per plant with unmanured controls. The species involved were Sitka spruce, contorta pine, maritime pine, Japanese larch, *Abies procera,* and *Picea omorica* with two further plots of mixed contorta pine and Sitka spruce, one of these being undrained and the other having been planted with 1-year seedlings. The most promising species were contorta pine, Sitka spruce and *Abies procera.* Data for survival and growth were given and it appeared that an application of phosphate was necessary though the amount applied did not, as yet, seem to be of importance. Mr. O'Hare mentioned the comparison of applying phosphate eevery year and alternate years. He said that 2 cwt. per annum was more effective than 4 or 8 cwt. in alternate years.

We visited a demonstration where year old Sitka spruce muched with the spoil from drain deepening in July 1958 had responded to the extent of a 73% increase in growth compared with unmulched controls the following year.

The last experiment visited was one planted in 1958 to compare 12 coniferous species. An interesting point here was the continuing mortality among the *Pinus radiata,* due, it was assumed, to severe climatic conditions.

Having finished our tour of Glenamoy forest we again boarded our buses and travelled through miles of bogland stopping off to look at a small plantation on the Bord na Móna property at Bellacorick. The plantation consisted of mixed *Pinus radiata* and *P. contorta* and of these

almost all of the *P. radiata* and 4½% of the contorta had died recently although they had been growing well since 1950. Suggestions put forward to account for this included frost and wind damage, salt winds, or a combination of atmospheric conditions and salt.

We completed the final stage of our day's tour and returned to dinner at Ballina before moving on to Sligo for the night.

G.J.G.

Second Day, 1st June.

The second day of the tour was devoted entirely to the recently acquired Rockingham estate woodlands, near Boyle in Co. Roscommon. The estate, which has been joined for management purposes to Ballyfarnon Forest Centre, comprises 857 acres in two blocks, and consists mainly of old broad-leaved high forest with some conifers on peat areas.

At the first stop we viewed some poplars in the rain. Here Mr. Johnston began by giving us a short account of the soils of the area. The mineral soils are derived from limestone giving a structureless red clay, through which drainage was almost nil. This was emphasised by the occurrence of swamp vegetation even on top of knolls in open fields. The best tree crops on the estate were to be found on the mild peats which occurred here and there.

We returned our attention to the poplars—3 year old black Italian and not growing well. We looked into a soil pit and saw the gley characteristics. Some confusion arose at this point over the soil reaction which was determined on the spot by means of an indicator, and reported variously as pH 4-5 and pH 7-8. Mr. McEvoy pointed out that the vegetation supported the latter value. A discussion followed on methods of establishing poplars and their site requirements.

The next stop was in a mixed stand of Norway spruce, European larch, ash and sycamore where 7,800 H. ft. per acre was carried on 253 stems. We were shown a felled larch 103 ft. high with a volume of 58 H. ft. Its age was 75 years and its ring pattern showed that it had grown at a very fast rate in its early years. The proposed action here was first to remove the trees suitable for transmission poles and to sell the remainder standing.

Mr. Condon here gave an indication of the proposed treatment for the different types of crop on the estate. Broad-leaved high forest with some conifers would be accepted and an attempt made to improve them by cutting and introductions. Mature conifers would be clear felled and the areas re-stocked. Scrub hardwoods where the stand elements could not be accepted as a basis for improvement would be removed and replanted except where their retention was necessary for amenity purposes, e.g. on the lake shores.

Butt rot, we were told, was universal in stands on mineral soils; less so on peats.

Mr. Johnston gave an account of the position of the estate as a bird

sanctuary. It had carried a heavy stock of game, and intensive management had eliminated vermin. The grey squirrel had been absent until recently. He imaged for us the sight of a black-backed gull flying in across the lake, and shortly afterwards a squad of game-keepers emerging with rifles to stalk and destroy it.

We next visited the remnants of an 81 year old stand of *Thuja plicata* whose utilization was discussed. We were urged to take advantage of the new fashion for timber cladding on buildings and it was suggested that we might be more successful in our attempts to compete with the imported material if we stopped calling it Thuja and referred to it instead as western red cedar, its common name in America. The problem of butt-rot was raised and Mr. Johnston pointed out that the high quality timber was on the outside of the tree, and put forward for consideration the hypothesis that the rot was confined to the juvenile timber laid down before the tree reached the age of about 20 years, and that in fact as the tree grew older the proportion of decayed timber it contained was reducing. If this could be established there might be a case for growing *Thuja* on long rotations.

We passed on then to view two single specimen trees: a Sitka spruce 110 ft. high with a quarter-girth at breast height of 28½ ins. and an assumed volume of 220 H. ft., and a grand fir (*Abies grandis*) 127 ft. high with a quarter-girth of 40¾ ins. and an assumed volume of 440 H. ft. The ages of the trees were not known but it was quite possible that they were the same.

The next discussion concerned the treatment of a young crop of natural ash. Many thought that selection of the crop trees should be deferred until they reached a quarter-girth of 3 to 4 ins., but Mr. Mooney thought it should be done now.

Having passed through a pleasant pale pink to deep red display of *Primula japonica* now growing wild in the woods we were presented with a problem. In an old conifer stand groups of trees bore old lesions, all on the side of the tree facing towards the centre of the group. The bark on the affected sides was loose and the cambium dead. The only cause which seemed to fit all the effects was fire. Indeed after a diligent search pieces of charcoal were found near the centre of one group. It was assumed that large piles of branchwood had been burned in the stand at some time during its history and as a result the commercial value of many of the remaining trees had been greatly reduced.

After lunch, which was taken in the Royal Hotel, Boyle, we assembled before an area carrying only a sparse crop of young alder. The question for consideration was whether this alder should be retained in restocking the ground with conifers. This led to a discussion of the whole question of the rôle of hardwood admixtures in coniferous plantations. The view was put that there was little advantage to be gained by such admixtures that could not be obtained by the application of lime and artificial fertilizers, and that the silvicultural difficulties and

the economic loss following the use of hardwoods were strong arguments in favour of the latter course. This might not, however, be the case with alder which gave a continuous supply of nitrogen, often the limiting factor, provided that the amount made available was sufficient for the needs of the coniferous crop. The commercial uses of alder timber were also discussed.

Mr. Johnston called our attention to an outcrop of limestone carrying a tree crop, the roots of which had explored the fissures in the rock for a considerable depth. Only the thinnest covering of soil was present —a mixture of clay and organic matter with no gritty material.

Our last stop was at a stand of Scots pine with an impassable understorey of *Rhododendron* the eradication of which we were asked to discuss. It was agreed that it must be removed, and that a mechanical approach would probably be more economical (a figure of £30 per acre was mentioned for hand cutting) and the stumps and young growth treated with a weedicide.

After alfresco tea we re-embussed and to view the scenic attractions of Lough Key and Lough Arrow we returned by a circuitous route to Sligo and the Society's Annual Dinner.

N. O'C.

Third Day, 2nd June.

On the third day of the annual Study Tour our Society visited Hazelbrook Property of Lough Gill Forest where we were welcomed by Mr. Campbell, the Forester in Charge. Mr. Condon gave a brief outline of the history of the Property since its acquisition in 1939-40. The Property which contains 1,750 acres is situated on the slopes overlooking Lough Gill in a district which is sometimes described as the Killarney of the North West has been managed since acquisition with a view to combining the preservation of the scenic amenities of the area with good forestry. A wide variety of species were used including Norway spruce, Sitka spruce, Scots pine, beech, Japanese larch, *Abies nobilis, Abies alba, Tsuga* and *Chamaecyparis Lawsoniana.*

During our tour of the woods we got some excellent views of Lough Gill and its beautiful Islands which Mr. Campbell named and gave us points of local and legendary interest concerning them.

Mr. Mooney remarked on the satisfactory growth of Scots pine in the Property and pointed out remnants of old Scots pine stands which contained timber of good quality. Mr. Condon referred to the difficulty of establishing Sitka spruce on old hardwood areas where *Calluna* had grown so vigorously that it deprived the spruce of sufficient water and soil nutrients and caused it to go into severe check. Mr. McEvoy said that the *Vaccinium-Luzula* vegetation of old woodlands was sometimes mistakenly accepted as indicating a good spruce site but after the removal of overhead shade an invasion of *Calluna* was liable to occur before the spruce crop was established and lead to considerable trouble. Mr. P. Kelleher advocated the more intensive use of *Abies nobilis* on

such sites. Messrs. Mangan and Mulloy spoke in favour of Japanese larch and supported their arguments by quoting examples of excellent crops of that species growing under similar conditions. Mr. Condon invited suggestions as to the best way of treating the spruce which had gone into check and Professor Clear suggested that the most economical way of helping the spruce might be the planting of Lawson cypress at 20 ft. spacing. Lively discussions were still in progress when the Convenor had to draw our attention to the time and the party returned to Sligo where we visited the premises of the North West Chipboard Company.

The establishment of a Chipboard industry in Sligo is mainly due to the initiative of Mr. Higgins, the Managing Director of the Company. This is the only industry of its kind in Ireland and before establishing the factory Mr. Higgins studied the technique of chipbasket making overseas. The factory is now in full production and provides employment for 15 men and 35 girls and has a weekly output of 200 gross of 12 lb. chips and 200 gross of punnets. They are purchased by fruit and vegetable growers in Ireland who formerly had to import their requirements. Until recently the timber used in the factory was imported, but as a result of tests made with home grown timbers Mr. Higgins is satisfied that he can make baskets of high quality from clean butt lengths of Sitka spruce and poplars grown at home and he is changing over to that material. Four cubic feet of round timber is used in the production of one gross of 12 lb. chips and one cubic foot of round timber produces six gross of punnets. Our President, Mr. Swan congratulated Mr. Higgins on his enterprise and thanked him for showing us over his factory.

On Thursday afternoon we visited Ben Bulben a property of 206 acres acquired over the past 5 years.

Mr. Condon conveyed the apologies of Mr. Delaney, the District Inspector, who was unable to be present due to pressure of business elsewhere. Mr. Condon said that the area was typical of North Leitrim —its distinctive soil, known locally as Leitrim daub, is a grey hydromorphic soil of carboniferous origin which presents its own peculiar problems as a soil with which Irish foresters have had little previous experience. The site presented little difficulty at the establishment stage, and the real problem which confronted the Forester concerned the wind firmness of the crop. Due to the retentive nature of the soil drainage was extremely difficult. Sitka spruce tended to be very shallow rooting and the danger of wind throw was very great. He believed if the rooting depth could be increased this type would offer the best Sitka spruce sites in the country.

Mr. Johnston estimated that there was 22,000 acres of Leitrim daub in the district. He agreed with Mr. Condon about the danger of wind throw and said that trees in established forests were shallow rooting and he feared that as well as the wind throw risk there was a danger of severe damage being caused to the tree roots during thinning operations,

particularly if thinnings were removed by skidding. He would like to see a wider variety of species used and suggested *Tsuga* and *Thuya* as species which might do well.

Mr. P. Kelleher suggested that a closer network and shallower drains, say 1 foot deep, might be more efficient than the more widely spaced deeper system.

Professor Clear drew attention to the wide cracks which occurred at the drain edges and suggested that with a closer drainage system the cracks might be helpful in improving root penetration. He thought that alder in intimate mixture with the spruce might have a beneficial effect. He added that the site type would justify a really intensive study as it was potentially a first class spruce site.

Dr. Murray said that at the Kells Ingram Farm on a Carboniferous site where the profile showed the same mottling as was apparent here, oak failed to find sufficient rooting depth and blew over.

The day concluded with a scenic drive ending with a short stop in Glencar overlooking the waterfall and wooded slopes of this beautiful valley. Here our President formally concluded our study tour and thanked all those responsible for its success.

M. McN.