N.Z. ECOLOGICAL SOCIETY

Report of Fourth Annual Meeting

The fourth Annual Meeting of the New Zealand Ecological Society departed from precedent in two respects; it was the first independent meeting organised by the Society outside Wellington, and it occurred in August instead of May. It was held in Christchurch in the Geography Lecture Room at Canterbury University College, on Thursday and Friday, August 18th and 19th, 1955. Although the Society had many fewer local members than in Wellington, there was a good attendance and a number of new members were recruited. Over 70 members and guests were present at some sessions. The arrangement of the programme was the same as that of the 1953 meeting. The first day and a half were devoted to discussions on selected topics opened by invited speakers. The topics chosen were "The Ecology of Tussock Grasslands" and "Habitat Classification." The final afternoon was kept free for contributed papers on various subjects. The Annual General Meeting and Presidential Address were held on the Thursday evening and were followed by supper and a display of exhibits. There was a successful excursion to places of ecological interest around Christchurch on the Saturday immediately following the meeting.

PRESIDENTIAL ADDRESS

Some Reflections on the Training of an Ecologist

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Ecology as a branch of natural science has expanded so rapidly and been consciously applied, in this country at least, so recently that many of us have been compelled to call ourselves ecologists, or at least to submit to being labelled as such, before we are quite sure what it is all about, or whether we have in fact the necessary qualifications and training. If there are such deficiencies, it is quite understandable, and no great harm will have been done if we recognise the position and take stock of it from time to time. It is some thought along these lines that has led me to select as a topic for a presidential address to the 4th Annual Conference some reflections on the training of an ecologist.

I am going to start by being didactic and categorical, and to state that in my opinion competence in ecology and full understanding of the ecological approach is something that is caught rather than taught. We have undergone a long period in which specialist training for biologists and soil scientists has been considered necessary, and there has been little time to include in the courses of study the general background that was once associated with the old-fashioned naturalist. My contention, in brief, is that the attitude of the naturalist must in some way be restored. Luckily it has not been entirely lost, but I think that most of us would agree that it tends at times to be obscured.

It has been said that the modern science of ecology has grown out of the old natural history. We may accept this if we recognise that the continuous line of growth has sometimes been a very narrow thread represented by an individual or two whose influence has bridged the gap. In New Zealand one thinks of H. Guthrie Smith, and especially of Leonard Cockayne. The first-mentioned was not very consciously an ecologist, and he recorded impressions rather than firm and tested data, but he was keenly

aware of change in nature and alive to much of the related cause and effect. "Tutira" is a monument of documentation of a critical period of which we have no other significant history. In the work of Leonard Cockayne we are confronted with what might almost be called ecological insight. Here was a man essentially an amateur who saw nature whole and thought in terms of associations and relationships at a time when such concepts were new and held by only a few other people working independently in other parts of the world. His letters and field notes, which have been preserved and which one hopes will some day be competently edited, show that he was in active and constructive correspondence with most of the pioneers of his time in this field. I made yesterday a satisfying pilgrimage to the Memorial Garden not far from here, and was reminded what an appropriate memorial are the habitat groupings of sub-alpines and other plants. They are not strictly natural associations of course, but they are at least living symbols of his contribution to science. More satisfying and revealing perhaps is the exercise of reading again his writings of about 1920 onwards on tussock grasslands and related topics, a valid contribution in almost every point to solution of the problems which we are still discussing 35 years later.

I'm not sure that we deserved to have Guthrie Smith and Cockayne. We were just lucky they did not settle in Canada or elsewhere. It is just not safe to count on a sufficiency of naturalist genius to crop up when needed, and we would do well to get what substitute we can by training.

The simplest and most natural way to cultivate the outlook of a naturalist is to start early in the formative years of one's formal education, and because I believe that one cannot start too early, I propose to say something briefly about the nature-study content of school curricula and education systems generally. In basing these references on New Zealand I realise that much of the ground covered will not apply to the schooling of many of those present in a gathering where products of the schools of the United Kingdom, the United States and several other countries are well represented. But our concern is not so much with our own qualifications or lack of them as with the future of ecological research in New Zealand, for which the recruitment will be in part and, we may hope, a large part, from local schools.

Historically the approach to nature study in New Zealand schools has passed through definite phases, all of which have left some mark on current practice. In the beginning before the establishment of a national education system in 1870, the bias might be described as academic. Between the mathematics and humanities that formed the basis of curricula, there was not much place for science and nature study as we know it today, although a certain amount of nature lore in literary form was sometimes usefully injected into the standard courses. This tradition also set the pattern for the early curricula of the first State schools, in which the first impact of science teaching was a compound of physics and chemistry distilled rather painlessly into a general science course for primary schools. There was astonishingly little provision for biological concepts until it was first thought appropriate to introduce a little human physiology with some attention to elementary anatomy. When the need to catch up with advances in biological knowledge was first recognised as a duty, even at school level, the New Zealand reaction was to introduce what was called agriculture, and here again in the necessary distilling process there emerged elementary nature study with some recognition of the importance of practical work. Thus began the sequence in which junior classes were introduced to the bean seed, and thereafter watched its reaction to warmth and moisture, making formal notes on its development. From this, as many of you may recall from your own experience, the transition was to techniques of planting and simple cultivation followed by exercises in grafting, pruning and other forms of applied plant surgery. Teachers' courses in this work were reasonably thorough, and the itinerant instructor in agriculture became an integral part of the education system in primary schools. For many years this system tended to terminate sharply with entry to secondary schools, where the tradition of physics, chemistry, heat and light filled up all the available science time and left little for developing biology. When the breakdown did come, it consisted at first of extension of agriculture courses, in which specialised direction a great deal of very good work was done and has continued in some schools. Although it was not inevitable that under such a system

the element of nature study should be lost, in practice that did tend to occur. The feeling was, no doubt, that agriculture was something with a practical end of peculiar importance to this country, and that the aesthetic approach and a broad interest in every aspect of nature might well be kept in its place as an inspiration to poets or a diversion for a few cranks.

I recall an example of timely direction and stimulus during a period of my own junior school-days in Southland, the days of the formal agricultural nature-study. A local naturalist who conducted voluntary field excursions for teachers had found so little response that pupils of the then Standard Six were invited to participate. A few boys who expected at least to have a day's fun and fishing found instead the excitement of getting to understand the countryside by collecting and interpreting specimens of rocks, plants and animals.

I doubt whether we have yet made up all the leeway, but it must be said that the present provision for biology and nature study is in theory much more adequate and in practice much better realised. The official attitude is embodied in a nature study syllabus, in the preparation of which the responsible officers of the Education Department have made full use of the advice of learned Societies and of those groups like the New Zealand Association of Scientists that for years have been actively aware of an urgent need. It still remains true that the attitude of teachers is an essential element in the proper carrying out of theory embodied in the syllabus, and in this respect it is gratifying to know that some provision is made in the teachers' colleges to prepare teachers for this particular responsibility.

There is one peculiar difficulty in which interested individuals and organisations can help, and that arises from the fact that in spite of the most elaborate of systems of teacher training, it is still possible for the growing child to miss the necessary encouragement at the appropriate stage in his development. There are so many competing claims on attention and interest at the impressionable periods of child growth that opportunity can too easily be lost. Children certainly do more for themselves than formerly, but the desirable element of spontaneity and independent observation and thought is neutralised to some extent by a tendency to accept a lot of ready-made concepts from books, newspapers, films and radio. Original projects which could be constructive are often nearly as second-hand as they used to be when dictated by a teacher. Fortunately, many teachers recognise that there is a period in the life of a child when collecting things or hunting something are impulses almost spontaneous and that these can form a natural basis on which essential field training can be built.

No one expects all intelligent children to become naturalists, but it makes for a better balanced community if they at least have the opportunity of becoming acquainted with an attitude and having it established as a part of their adult outlook. It should be recognised with appreciation that a great deal is being done to encourage junior membership of outdoor clubs such as the Botanical Societies, field clubs, Ornithological Society, and so on, and it is a matter for satisfaction that the junior membership of such groups are so vigorous. Organised visits of school children to metropolitan museums, and less frequently, guided tours of research departments and institutes, should be encouraged and continued as a contribution to this end. Quite apart from this, the more intelligent amateurs we have, the easier it will be for professional biologists to explain themselves and to secure co-operation in field work.

In concluding this short summary of the place of primary schools in establishing basic attitudes, I would suggest that it is something in which the Ecological Society as such might interest itself. Teachers, like any other professional group, like to be left alone to do their own job, and they are peculiarly the critical target of faddists, but the ecological approach is something in which many of them would welcome co-operative help. Nothing could be more explicit than the theory embodied in the official syllabus for Nature Study.

"Nature study may be defined as 'the study of living things and their way of life.' This definition covers all the science activities of the primary school, and includes garden work and relevant parts of general science and agriculture. Nature study thus conceived builds naturally on the child's preschool nature experiences, and also leads easily into the biology of the post-primary general science course. . . . The study of na-

ture lays a foundation for the building up of the fundamental concept that there is unity of organism and environment. Thus the dominant method is observation, out-of-doors whenever possible, supplemented by the use of such equipment as nature tables, aquaria, and terraria."

Here is immediate ground for agreement in principle. It is in hammering out methods that real progress is more in doubt. At the levels of training represented in the membership of this Conference, there is still a degree of groping and room for improvement, and responsible teachers feel the same way. They hold frequent conferences at which the problem is discussed, and I would think it mutually desirable that field ecologists who are not teachers should occasionally make a contribution to such discussions and at the same time become acquainted with what teachers are doing to train the ecologists of the future. The idea might be taken up by our council for negotiation with both Nature Study Specialists of Primary Schools, and the Secondary Schools Science Teachers' Association.

At the University level I think it may be claimed that there has been more freedom and in some ways more progress in the provision of scope for ecology, and what limitations there are can often be traced to deficiencies in the earlier training of the students. Sometimes these are very real, and there is a problem confronting University teachers as to how they can be overcome. I am not proposing this evening to provide a solution, but will discuss some of the points in the course of a general consideration of training.

There is at least one feature of method which every group in training, whether in a school, a college (Universities in the New Zealand usage here included) or in field service employment, must sooner or later develop, and that is the properly integrated team project. One can think of team projects which are so in name only and lack any real integration in their planning and execution. University teachers in this country will probably agree that even more should be done than they are at present able to attempt. I know that the standard of team training has been high in the past experience of some of you here. With others it has been fortuitous, and some may feel that they have missed it. My own experience comes into the fortuitous category—at University level for the most part formal and stereotyped, followed by nearly ten years as a one-eyed specialist (here used as a term of reproach) and then participation in a field project which was essentially a habitat study. Luckily it was a simplified habitat—the polar zone—with clear-cut factors to be evaluated and enough specialists in the team to cope with most of them. For integration we had the guidance of a senior scientist who was a University teacher in the ecological tradition. The result was a growing awareness of inter-relations on the part of even the dullest of us. That an ornithologist, who never grasped the elements of school physics, can now look at sea-ice and classify it reasonably well, I regard not as a matter of pride, but of humble satisfaction that in some circumstances the ecological outlook can be caught, and that it is never too late.

It will be agreed that the training of an ecologist can well be very wide. Indeed, his work impinges on so many special sciences that full knowledge of and experience in each of them is manifestly impossible. One method of approach to this difficulty is to assume or provide a general course in which the student becomes acquainted with the main outlines of several disciplines, and then to concentrate on specialist training, with a view to mastering appropriate techniques, using appropriate tools and becoming acquainted with the scope of the literature. There seems to be no escape from this trend, but it is as well to recognise that it does carry some dangers which can be obviated if they are recognised. For example, in a useful outline of his views on the teaching of ecology, Pearse (1939) remarks that systematic biology should be kept separate from ecology. "It is not desirable for students to spend much time classifying the animals and plants encountered. A teacher should know and give them the names, and thus allow them to devote their time to ecological work." This may be all very well at the level Pearse is describing, but it would be restrictive if made more universal. An ecologist should have enough first-hand experience of systematic biology to challenge any taxonomist colleague on his own ground. Surely this is one of the rights implicit in the scientific approach. We may consult a lawyer and have to accept his dictum because we are not trained in the intricacies of the law, but

to submit in the same way to every sub-specialist in our own field is to risk being led up the garden path sooner or later.

In the practical task of presenting a picture of some biological situation, the work of any one specialist will ultimately be co-ordinated with results produced by others. Those of you who have participated in team project activity will recognise that situations arise in which one contributor may be asked to accept uncritically the contribution of another on the grounds that A, who is a botanist, will presumably have no informed opinion on the accuracy or otherwise of the work of B, who is an entomologist. Under some circumstances this can bring about an undesirable situation. Theoretically there might be a super co-ordinator who could deal critically with the whole series of contributions, but in fact such supermen are rare, if they exist at all. I suggest that a sound co-ordination of team contributions can only be achieved if there is a full awareness by each contributor of the significance of the work of the others and a confidence also in the soundness of their techniques. This surely could be attained by more provision for critical discussion by all participants in each contribution. That would imply in the first place an ability on the part of each contributor to explain his work, and a willingness to be cricitised by people who may not have done quite as much in that particular field. Is it possible that we have become too sensitive about hurting people's feelings, or too lazy to bother to understand the aims and methods of disciplines slightly different from our own? I am quite sure that there is a danger of so-called ecological team projects becoming unrelated contributions when they could in fact be co-ordinated within the team before their results are passed into the pigeonholes or become political footballs. A short-term alternative to this rather ideal approach is the formulation of sampling techniques which can be understood by and agreed to by all participants, professional or technician.

What, then, are the main elements of a sound training for an ecologist? The first, I would suggest, is a simple ability to observe accurately, to check such observations by doubt and self-criticism, and then to record clearly and fully. Behind all this there should be an awareness that the problem may be much larger than, and of a different nature from, what it orginally appeared to be, so that there must be an alertness and readiness to be confronted with totally new aspects. The second requirement is a grounding in the elements of biology.

For many of us frequent refresher courses would be a very good thing, and at least we should be prepared to make up some of the deficiencies in our own training. No matter what school or University provides the academic training, there is bound to be something which the student does not have an opportunity to come fully to grips with. It may be recent advances in physiology, it may be a discipline in taxonomy, but whatever it is, the lack of it will be ultimately a handicap in our approach to an interpretation of problems in the field. The third requirement is perhaps ability to select and use appropriate tools. These vary in different branches of the work, and some that may be mentioned are libraries and the literature generally, reference collections in museums, indexing, recording and statistical systems for the collation and analysis of field records. There are, of course, other requirements, but it would seem that any training system should at least make provision for these three as a minimum.

I have left to the last the difficult question of how an ethic and a philosophy can be developed. It will be implicit and not explicit in any system of training, but the ecologist must have some firm attitude to prepare him for the shock of being involved, as he inevitably will, in the conflicting interests of his fellows in the human community. We are in danger first of all of being influenced by climate of opinion or influenced by prejudice. We get into the careless habit of using emotive terms that should be barred. I jotted down today from three successive speakers the term "ravages," "menace of' and the "destruction of" in contexts which did not require them. We all do it. My fellow ornithologists and I speak of the depredations of the skua gull as it makes savage attacks on defenceless penguins. Three of these words are suspect and we could strengthen the integrity of our approach by avoiding them.

Much more difficult to resolve is the problem of reconciling scientific freedom with direction. There are claims of both to be recognised. It is the age-old problem of God or Caesar, and happy is the ecologist who

can clear his mind about the respective claims of both. We have ultimately to think hard too about the social attitudes involved in concepts that seem self-evident, but prove to be complex. What do we mean, for example, by Conservation? To some it is preservation of habitat, to others something else. In the clear thinking necessary to guide policy and action, the ecologist should be able to make some contribution, without becoming invo'ved at the expense of his own peculiar discipline.

Conclusion

It will be clear to you by now that in this rather informal fireside chat I have been mainly concerned to sort out my own problems and air some tentative views. They are not intended to be critical of aims and methods in fields in which I have no competence, but I hope that they may have impinged here and there on enough common fundamental problems to be acceptable as a presidential address.

THE EXHIBITS

The following is a list of the exhibits:

1. Disappearing plants of the Chatham Islands—Miss L. B. Moore and others.
2. Germinating study in a Mediterranean plant association, *Barbuletum gracilis* —Dr. M. Mayer.
3. "Science Record" — Otago University Science Students' Association.
4. Intertidal algal ecology—C. B. Trevarthen.
5. Techniques for isolating soil micro-organisms—Dr. R. H. Thornton.
6. Methods of age determination in rabbits —Animal Ecology Section, D.S.I.R.
7. Behaviour of grass seedlings in four microhabitats within *Festuca novae-zelandiae* tussock grassland at Molesworth—Miss M. Simpson.
8. Vegetation of Auckland Islands—N. T. Moar.
9. Variations in a population of *Pimelea*— Botany Dept., Canterbury University College.

THE EXCURSION

During the excursion stops were made at the following places of interest:

1. Selwyn River: Trout stock and electric fishing machine, Prof. E. Percival and A. M. Burnet.
2. Lake Ellesmere: Fauna, Prof. Percival: Saltmarsh vegetation, Miss R. Mason.
3. Prizes Valley: Residual forest of Banks Peninsula, M. J. T. Holloway.
4. Port Hills: Geological History, Prof. R. S. Allan.
5. Mount Pleasant: Flora of "wet" and "dry" faces, Mr. Brownlie.
6. Summer: Exotic vegetation of cliff faces, A. J. Hardy.
7. Sumner estuary: Biological features, Prof. Percival.