Council appointed a sub-committee (with Dr. Hindle as chairman) to proceed with its formation.

This sub-committee issued invitations to a number of eminent biologists to join a provisional council, which held its first meeting on October 28, 1949. Prof. J. F. Danielli and Dr. R. J. C. Harris were appointed respectively to the office of honorary secretary and assistant secretary for the period ending October 1, 1950. The Provisional Council also arranged the general meeting, and agenda and forms of application for admission were sent in December to all those who had indicated their support for an Institute.

After his opening remarks the chairman declared the meeting open to discussion and various proposals were put forward for consideration.

With reference to the composition of the Council, Dr. T. Goodey felt that applied biologists were not as fully represented as they should be. Dr. G. Pontecorvo proposed that a geneticist should be included, and other speakers wanted a Scottish regional representative. The chairman agreed that the present Council was not fully representative (for example, no palaeontologist was a member) and the meeting unanimously accepted the proposal of Dr. H. R. Hewer that the Council should be given the power to co-opt.

The meeting agreed that the Provisional Council should be confirmed as the first Council of the Institute, that it should be empowered to further the aims and objects of the Institute as determined by the meeting, and that it should hold office until the close of the annual general meeting in 1951. Dr. Hindle was unanimously elected president of the Institute and chairman of the Council, which is constituted as follows: Dr. Edward Hindle (*chairman*), Prof. J. F. Danielli (*honorary secretary*), Prof. T. A. Bennet-Clark, Prof. G. E. Blackman, L. J. F. Brimble, Dr. D. G. Davey, Captain Cyril Diver, Dr. J. W. Evans, Prof. A. Graham, Prof. J. Gray, Prof. A. Haddow, Dr. J. Hammond, Dr. C. Horton Smith, Prof. W. H. Pearsall, N. W. Pirie, and F. S. Russell.

The general aims and objects of the Institute were next discussed. The meeting agreed that these should be: (a) the provision of a representative body of biologists; (b) the elevation of the profession of biologist and the advancement and diffusion of a knowledge of biology, pure and applied, and especially (i) to promote the efficiency and usefulness of its members by setting up a high standard of professional and general education and integrity; (ii) to establish and maintain a benevolent fund; (iii) to keep an appointments register; (iv) to form local and overseas branches; (v) to provide a central office and meeting-place.

In view of the considerable interest in the Institute already shown by biologists in many parts of the Commonwealth, Dr. J. W. Evans devoted special attention to (b) (iv). The Council, he stated, was anxious to make definite provision for the differing requirements of home and overseas biologists, and if, as was hoped, large numbers of the latter joined the Institute, overseas branches would be desirable. Obviously, the first job was to complete the establishment of the parent body; but the Council hoped that both overseas and local branches would develop in the future and, by their activities, make worthwhile contributions to the progress of the parent Institute.

Prof. J. F. Danielli then opened a discussion on conditions of membership. The memorandum out-

lining a proposed Institute had had a wide circulation among biologists, and the suggested recommendations concerning grading of membership (into ordinary members and fellows) had been much criticized. The Council now proposed that, at least until the next general meeting, qualified professional biologists should be admitted into one category only. This proposition and a further suggestion, requesting the Council to examine the feasibility of a student membership for prospective full members, were accepted unanimously. It was further agreed that all applications for membership (and every professional biologist, whether a university graduate or not, is invited to apply) should be dealt with by the Council.

Prof. Bennet-Clark stressed the fact that a professional Institute was not, and could not act as, a trade union; but it was not debarred from taking an interest in the financial, as well as the professional, interests of all its members. The sister Institutes of Chemistry and of Physics had already obtained data concerning the salary structure of their membership in relation to age and type of employment. It would be desirable to make an early and similar assessment of this structure for the profession of biology, in order that comparison might be made with the sister professions, and that data should be available for the use of the envisaged appointments register. The meeting agreed that the Council should be empowered to conduct a suitably safeguarded salary census in conformity with the practice of other Institutes.

It was further agreed that the Council should consider the desirability and practicability of compiling a register of biological consultants similar in function to that already in existence in chemistry. Such a register might also define the scope of such consulting work, lay down standards and formulate a code of practice, with regard to advertising and standardization of fees.

The meeting concluded with a unanimous expression of thanks to the Biological Council, the Society for Experimental Biology and the Biochemical Society for their financial assistance, and to those biologists, especially Prof. J. F. Danielli, who had devoted so much effort to the founding of the Institute.

Further information concerning the Institute can be obtained from the Assistant Secretary, Institute of Biology (at the temporary office), Chester Beatty Research Institute, The Royal Cancer Hospital, Fulham Road, London, S.W.3.

SNOW FLORA OF THE SCOTTISH HILLS

By SETON GORDON, C.B.E.

LITTLE has been written of the so-called perpetual snow-beds of the Scottish mountains and of the vegetation which grows—exists rather than flourishes—near them. There are two well-known snow-fields which almost always remain unmelted throughout the year. One of them is on Braeriach, one of the Cairngorm hills, and the other is on Ben Nevis, which, standing near the west coast, is the highest mountain in Great Britain. Larger than either of these two at the beginning of summer is the field of snow which lies north-east of the summit of Ben MacDhui, 4,296 ft. in height; but this great snow-

field, being exposed to the disintegrating effects of the wind, usually disappears by the autumn. Unlike the two other snow-fields, it is visible from afar, and I believe in favourable conditions can be seen from vessels on the North Sea.

The snow-bed on Braeriach and that on Ben Nevis lie at, or near, the 3,600-ft. level; both face north-east, and both are almost entirely screened from every wind that blows. It is to their sheltered position that they owe their long life, for a strong, mild wind in summer melts snow faster than the hottest sun; these snow-beds are screened from sun as well as from wind. The plants which grow at the margins of the snow-fields are usually beneath the snow from November until July. Nearer the heart of the snow-fields their emergence is progressively for a shorter period, until, at the extreme margin of the zone which supports plant life, they may be covered with snow from late in one October until early in the October of the following year.

The climber who approaches the great snow-field at the head of Garbh Choire Mòr of Braeriach on a day of mid-summer sunshine cannot but be impressed by the cold snow-field, brilliantly illuminated by the sun for a short time around mid-day, and the warm sun-bathed slopes near it, where already *Silene acaulis* and *Saxifraga stellaris*, with other plants, are in full bloom. He passes, in effect, in a few hundred yards from mid-summer conditions to those of mid-winter or earliest spring. At mid-summer the snow-bed is still so extensive as to exercise a considerable influence on the climate near it. I have been on the plateau of Braeriach in June when a local gale, with wind-speed exceeding sixty miles per hour, has swept the plateau, its origin being the great snow-field in the depths of the Garbh Choire 500 ft. beneath. As I have fought my way to the edge of the plateau I have felt the temperature fall, as though a cloud had obscured the sun, and have been stung by small stones lifted from the ground by the force of the gale. The sensation under such conditions which one experiences standing perhaps a quarter of a mile (in a straight line) from that great snow-field is similar, or at least calls to mind, that experienced when approaching the ice on the Greenland Ocean off the South Cape of Spitsbergen.

Let me describe first the vegetation which appears, and almost at once begins to grow, as the Braeriach snow-field gradually melts, and, later, that of the Ben Nevis snow-field, cradled high above the brackish water of Atlantic sea lochs in Lochaber. As one approaches the Braeriach snow-bed—the usual approach is by the Garbh Choire from Glen Dee, but it may be reached by climbing Braeriach from Aviemore and descending into the corrie just to the westward of where the Dee drops in a series of waterfalls from the Braeriach plateau—one walks upon a carpet of ling (*Calluna vulgaris*) with, here and there, a few small juniper bushes with highly aromatic wood and, on dry granite ridges, that small hardy plant with pink china-like flowers, *Azalea procumbens*. This small plant in summer beautifies the high hills of Norway, Switzerland and other European countries.

As the climber approaches the snow, he notices that ling, juniper and the creeping azalea are left behind—the growing season is too short for them. He reaches the snow, let us say, in early August. At its margin plants are being daily released from the snowy covering. Various species of hill grass and *Carex* lie brown and flattened by the weight of snow

which for months has held them prisoners. The grasses seem devoid of life. Among the plants *Alchemilla alpina*, the alpine lady's mantle, is seen to be sending out small green leaves, as yet rolled up; when released from the snow, this plant is swifter in growth than any grass. Here and there among the screes, the parsley fern (*Allosurus crispus*) is unrolling its green fronds, and that plant of ancient lineage, the club moss (*Lycopodium selago*), badge of the wild MacRaes and of the proud MacKenzies, seems to have lost none of its freshness after its nine-month imprisonment.

If the observer should return to the snow-bed at the beginning of September, he may find summer conditions still prevailing, or he may see fresh snow lying on the Arctic plateau of Braeriach, where, at 4,000 ft. above sea-level, the climate resembles that of Spitsbergen rather than of Scotland, and where an early September snowstorm is not so infrequent as might be imagined. He will notice that the old snow-field has considerably receded during the month of August and that, where the snow has recently melted, small plants of cudweed (*Gnaphalium supinum*) and of *Saxifraga stellaris* are beginning to grow. At a little distance from the snow the grasses are beginning to flower. In mid-October he will see that *Saxifraga stellaris* has small flower-buds, and that a few plants of *Gnaphalium supinum* have flowered and may even have formed seeds. Yet in an average season, at mid-October these plants have but ten days more of activity before the new snow covers them afresh.

If the autumn be mild and snowless, the climber may return to the snow at the beginning of November (yet even in 1949, after the exceptional summer and autumn, new snow had fallen before the close of October) and will then find the snow-field at its lowest ebb. He will see that *Saxifraga stellaris* has been unable to flower, for its growth has been checked by the severe frosts which prevail there on clear nights in October. Yet even in November he is likely to see moss covering the ground and the rocks to the very edge of the snow. From my observations of this snow-bed during most autumns since 1908, I have found there are cycles when this moss may remain hard-frozen beneath the snow for the space of some half-a-dozen years, without loss of vitality. At the close of this prolonged imprisonment the plants have perhaps no more than a fortnight when it is possible for them to grow before they are again covered, and during that fortnight the weather may be cold, with long nights of frost. It is remarkable that the mosses are able to remain alive under these unfavourable conditions.

There are years when a warm summer following a mild winter causes the snow-bed to shrink to small dimensions, yet I have never seen it disappear. It was, for example, confidently predicted that the snow would be found to have gone by mid-October 1949; but the place was visited only three days before the snow of autumn again covered this high corrie, and a small snow-field, a sheet of ice rather than of snow, with a depth of approximately 2½ ft., still remained. During these exceptional years—and I have known three of them since 1908—the rocks and boulders at the edge of the snow give the impression that they have recently fallen from the cliff above, for they lack the normal growth of moss and lichen.

If we except the mosses, the plant found nearest to the snow at its lowest ebb is *Saxifraga stellaris*. This plant is evidently able to maintain life if it has

even a short growing period; it would be interesting to know whether under these conditions it lives for a greater number of years than those of its race which grow freely, and perhaps exhaust themselves producing seed. The water trickling from the snow-bed provides the damp environment favourable to it. One may unexpectedly find a small colony of harebells (*Campanula*) beneath the rocks perhaps two hundred yards from the snow-bed, but outside its normal influence. Snow-buntings are often seen near the snow; and for some years a blue hare had its home there, and my collie dog habitually put the animal up from boulder-strewn ground at almost always the same place. The animal may have found *Gnaphalium supinum* (a favourite plant with sheep) to its liking.

Fifty miles by air westward from Braeriach lies Ben Nevis, where a snow-field lies almost always unmelted beneath a high precipice which falls from the hill-top to the north-east. The surroundings of the snow-bed are sunless, dark and gloomy, and the rainfall there greatly exceeds that on Braeriach. The rocks which rise almost sheer above this snow-bed are higher than those which shelter the Braeriach snow-bed from the winds. I have mentioned that on Braeriach the sun in summer does shine for a time upon the snow, but I doubt if the Ben Nevis snow-field is lit up by sunshine at any time. The steep screes, which are unstable and easily provoked into a slide, are unfavourable to plant life, and with the exception of mosses and lichens on the stones there is no plant near the edges of the snow-bed except *Saxifraga stellaris*, which grows luxuriantly, although it has no time to form flowers. Its presence here is not without interest, as its seeds are almost certainly carried by the wind, perhaps also on the drifting snow during winter blizzards, from the edge of the plateau far above, where it is to be found, at an elevation of 4,300 ft., the highest colony of this saxifrage in Britain. Indeed, the colony may be the highest of any phanerogam in the British Isles.

This account may fittingly be ended with a brief note on the possibility of perpetual snow existing in Britain. There are, as I have stated earlier, only two snow-beds which might be thought to be relics of the snow of the Ice Age. One of them is on Ben Nevis, the other on Braeriach. There have been rumours that in two years recently, when a mild winter was followed by a warm summer and autumn, the Ben Nevis snow-bed had disappeared. On Braeriach, it was reported to me that, about the year 1935, the snow had gone also. Yet when the Braeriach bed shrinks to its lowest ebb, it may well escape notice, as it recedes into a 'pocket' and becomes discoloured and ice-like in character. Indeed, on one occasion I reached a neighbouring 'pocket' and found it free of snow for the first time in my experience; and even then I was unable to see the bottom of the main 'pocket', although I was only a few yards from it. To my surprise, I found that the second 'pocket' still contained snow. There is, therefore, a possibility that this snow-bed is permanent; if so, it is the only perpetual snow in the British Isles.

Certain Highland families traditionally hold their land on the condition that they are able to supply the King with a bucket of snow whenever he should pass that way. The Camerons of Glen Nevis, the Grants of Rothiemurchus, and the Munros of Foulis are all supposed to hold their lands on this condition.

CHEMICAL ASPECTS OF ATOMIC ENERGY

ON November 9 a symposium on "Chemical Aspects of Atomic Energy" was held in the University of Manchester. The meetings were arranged by the Manchester local section of the Chemical Society, in conjunction with the Society of Chemical Industry and the Royal Institute of Chemistry, and papers were presented by members of the staff of the Atomic Energy Research Establishment.

In an introductory lecture, Dr. R. Spence (head of the Chemistry Division, Atomic Energy Research Establishment, Harwell) gave a broad survey of the role of the chemist in the atomic energy programme, and of the facilities for chemical research that have been set up at Harwell. After reviewing the development of the chemical effort from the time of the Tube Alloys Project, through the international co-operation at Montreal and later at the National Research Council laboratories at Chalk River, Ontario, he outlined the present organisation. In addition to the short-term problems that arise from the technological side of the work, there is need for a wide variety of fundamental research. Shorter-term work at Harwell includes technological investigations, the development of methods for extracting radio-isotopes of high specific activity and very high purity from materials irradiated in the British piles, and an extensive range of unusual analytical problems. For longer-term work, research groups are working in the fields of physical chemistry, with particular reference to ion exchange and the properties of concentrated solutions of electrolytes; radiochemistry, especially on problems related to the fission products; radiation chemistry (equipped with a 2-MeV. Van der Graaf generator, for producing monochromatic γ - and β -radiation) and inorganic chemistry. The interests of these groups were reflected in the other papers of the symposium. As the chairman, Dr. F. Fairbrother, stated in his opening remarks, the work of the chemist enters in at every stage of pure and applied nuclear studies.

The place of the trans-uranic elements in the Periodic Table was discussed by Dr. J. S. Anderson. It has been unambiguously established that neptunium and plutonium have no similarity to rhenium and the platinum metals; we may infer that they belong to a transition series in which 5f, rather than 6d, electron-levels are being filled. We have to weigh the physical and chemical evidence to decide at what atomic number the 5f-levels first become tenanted, and to assign configurations to the known elements up to curium ($Z = 96$). Spectra of the heavy elements are complex; but Kiess and Meggers have assigned to uranium the ground-state $5f^3 6d 7s^2$. Americium is said to have a simpler spectrum resembling europium; this would point to the ground-state $5f^7 7s^2$. The absorption spectra (for example, of U^{IV} , Pu^{VI} , Pu^{IV}) rather resemble those of the rare earths and are suggestive of 'forbidden' transitions between 5f-levels. The magnetic moments of ions with effective atomic number ranging from 86 to 92 (Ac^{3+} , Th^{4+} , U^{6+} , Am^{3+}) show a regular trend resembling that in the rare-earth series, but quantitative evaluation is not yet possible. Chemically, the most stable valence state changes regularly from uranium (U^{6+}), through neptunium (Np^{5+}), plutonium (Pu^{4+}) and americium (Am^{3+}) to the apparently constant trivalency of