THE UPLAND PASTURE

On barren upland pastures of Maine's coastal islands worn thin like threadbare carpets with all the nap gone, the bare ground is yet completely concealed from view: every square inch is covered by an assortment of specially adapted plants. By continuous extraction without replenishment stony fields, sterile fields long since abandoned for the pasturing of cows or sheep, pastures which even the thrifty New England farmer relinquished to the careless forces of nature--no longer offer a hope of remuneration for an investment in rejuvenation. But to the non-thrifty, to the casual disinterested visitor, they offer a great deal to see. These rocky slopes are usually edged with prostrate junipers waiting to move in. Prickly to bare ankles, they fill one's sneakers with sharp needles that must for comfort be shaken out after every bush that is waded through because there is no way around. The junipers thrive in these sun-flooded fields and will eventually fill them up, crowding out all the smaller plants, until they in turn are overshaded by the invading forest and die too from lack of light rather than lack of nutriment. Nutriments they find in plenty in this barren soil just as do the lesser things that precede them.

Observed casually, an upland pasture gives the impression of being sparsely inhabited, of supporting a mat of growth containing no tall plants or grasses. But enter the ground early on a dewy morning and one will be surprised how wet ~~the~~ his feet become in the first few steps. Although hardly noticed until the burden of shining droplets each old stalk and spear of grass holds chills and dampens one's feet, they are seen then to be growing quite thickly, so close ~~in fact~~ it is impossible to take a step without brushing against them.

They grow like the first stubble beard of an adolescent boy, but they are the product of old age exhaustion not of youth. As these stalks and spears dry off in the morning sun, they vanish again into the confused background of matted vegetation.

Examine this floor closely and it will be seen that the vegetative cover is dominated by three varieties of plants, one primitive and two flowering ~~types~~. They form a ~~sort of~~ patchwork of colors and shapes that solidly occupy much of the ground, but intermingle at the borders between the colonies of each species. The primitive plant is a bluish, gray-green, branching moss-like organism commonly called reindeer moss--not a true moss, however, but a symbiotic association belonging to that curious group the lichens. A lichen is a working or symbiotic arrangement between a single-celled alga and a fungus in which the concept of discrete individuals, as it is understood to exist between, say, separate trees or flowering plants is quite meaningless. Reindeer moss is often seen covering a considerable area in a continuous growth, but its luxuriance is not in the least inhibited by cutting it up into distinct parcels provided its attachments to the ground are not radically disturbed. The algae and fungi which have entered into partnership in multitudinous combinations to produce the thousands of known lichens do not succeed very well by themselves under the environmental conditions that favor the growth of lichens. Separately they are especially vulnerable to extremes of dryness and temperature. The two varieties of green and blue-green algae that go to compose lichens do exist by themselves in damp places as on wet bark in boggy forests, but not so for the fungi, at least not as recognizable members of the partnership.

Lichens have been separated experimentally into their component organisms which have been independently cultivated, but no one has succeeded conclusively in recombining them into the original or any identifiable lichen. And so, how they ever got together in the first place, what fortuitous circumstances or genetic shuffling could have brought about this intergeneric match, is rather a mystery, but get together they did and the relationship proved to be a strikingly amicable one. Each symbiont performs its self-assigned functions in complete harmony with its own and the needs of the other. The alga contains green photosynthetic granules in which it manufactures carbohydrates from water and carbon dioxide. These carbohydrates are used as a fuel for the production of vitamins and other organic substances needed by both partners. The fungus builds a housing of a dense, resistant gelatinous material which provides physical protection for the algal cells and its own living tissues and conserves moisture. It also extracts mineral and simple organic nutriments from the substrate to which the lichen is attached. Fungi having no chlorophyll do not have access to the energy of the sun and are unable to manufacture all the organic substances they need as green plants do; they are classed as saprophytes which defines them as living only on dead or decaying organic matter. When they join with algae they establish an arrangement whereby the power of the latter to provide what they cannot themselves produce is accepted in exchange for dependence on a source of preformed organic foods. They provide the algae on their part with inorganic nutriments which they extract from the substrate, but they also, and perhaps even more importantly, provide support and protection against desiccation.

Lichens are able to withstand extremes of physical conditions which would