

At the conclusion of this talk - it was too conversational to be called a lecture - we were shown colour slides taken by Mr Uhe in the South Pacific, of Tahiti, New Caledonia, Norfolk Island, Lord Howe Island and Samoa, and we appreciated very much his descriptions both humorous and descriptive during the screening. A vote of thanks was proposed by Mr Warren, who said that in his opinion "it was one of the best lectures we had had." This was carried by hearty acclamation.

L.W. Butler

CHAROPHYTES

"The New Zealand Stoneworts"

For the September lecture I had the pleasure of introducing a group of water plants quite new to the vast majority of members - and indeed to many professional botanists. They have been passed over by both algologists and botanists dealing with the higher plants, and they fall in between somewhere, owned by few and usually quite neglected, so here's your chance to make some new discoveries! They are quite distinctive and need not be confused.

They are a very ancient group of plants with a fossil record stretching way back into the Lower Devonian at least, when the "spores," looking very like those we see today, were preserved. Most botanists include them now with the Green algae, of which they are among the largest freshwater examples. They have been regarded as a separate division of the plant kingdom by some devotees - hence the oft-used term "Charophyta." The male reproductive organ (the "antheridium"), is particularly complex.

The plant body is relatively simple, with a thread-like axis (though sometimes to $\frac{1}{2}$ " thick), and regular whorls of lateral branchlets arising at "nodes" along the "stem." They can be likened to the "horsetails," and were in fact called Equisetum in pre-Linnean times. The common name "stonewort" arises from the limey covering adhering to certain species of the large genus Chara, and have in fact been used for scouring - the "chara" was used by the people of Lyons, who found them locally and used them to scour their plates clean some centuries ago (Wood). It was suggested by the audience that perhaps the household "char" got her name from the same root!

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I cannot go into great detail here on structure, which requires the use of a microscope, but this need not deter you, as much can be seen with the ordinary x 10 lens - which you should all have. The cells are so large, as plant cells go, that they make ideal demonstration material of cell activity, and particularly the streaming of protoplasm - which is all most botanists know about them. They are not to be blamed unduly for their ignorance however, as the taxonomy of the group has been much confused, and it is only now with the appearance of a World Monograph* on the group that some order has come out of chaos. "Splitters" have in the past erected numerous species, without studying enough material from other lands, as most species of this ancient group are very widely distributed through the World. Wood has largely rectified this together with an excellent series of "icones" in the second volume by Imahori, of Osaka.

These plants first attracted my attention as a boy, when I fished them out of water while looking for other aquatic plants. Some of the local botanists had earlier taken the trouble to collect some, and they were included in the County Flora, in some of which they are tagged on to the higher plants, being the only plants "lower" than ferns mentioned. Hooker included five species in his N.Z. Flora, and Ruth Mason listed fifteen species (Trans.R.S.N.Z. Vol.84,1956, pp.269-271), which are now reduced to thirteen by Wood through the relegation of two "species" to forms of others. Wood visited New Zealand and Australia, and Professor Chapman holds duplicates of his collections here. The present monograph reduces the World species to eighty one, of which numerous forms are detailed.

As with all botanical material one should aim to collect as complete a specimen as possible - preferably "fruiting." The reproductive bodies of stoneworts are about the size of a pin head, but their colour makes them obvious. The male is frequently a bright orange colour - the female rather dull. Once fertilised, the egg cell develops a hard dark coating and these bodies, or oospores, can be blown around by the wind - and on from the temporary waters they often occupy; live in the mud till favourable conditions return; or be carried on the feet of waterfowl. They are often among the first plants to colonise fresh bodies of water, and some prefer brackish water by the coast. They are rather particular in that they like a clean habitat - murky or fast flowing water won't do. When the Rotorua lakes were sprayed to kill the "Lakeweed" (Lagarosiphon) the stoneworts soon colonised the bare lake floor, and I have dragged them up from quite deep water. They have been recorded to a depth of 90 feet in the Konigsee (Germany), where the water must be particularly clear to allow enough light for these green plants to photosynthesise.

The plant is anchored in the ground by small "rhizoids," but plants will survive quite happily in the aquarium just lying free in the water, and are attractive in the fine tracery of their branches. Under good conditions they may grow inches in a week, and single cells have been found up to 6" long and $\frac{1}{8}$ " wide, though more generally an inch or two long in the case of the "internodal" cell. The latter is

*A Revision of the Characeae"
by R.D. Wood and K. Imahori.
J. Cramer, Weinheim, 1963.

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often enveloped in numerous small cells in the genus Chara, which can invariably be used to distinguish Chara from the other major genus Nitella in Europe. Here we must look at the "crown" on top of the egg-cell, which is made up of one tier of cells in Chara, and two tiers in Nitella. The branching pattern is usually quite distinctive however. Nitella is usually a more delicate soft plant with the branchlets forked, and of course no envelope of cells round the stem or branches, just the bare cells.

Further details and drawings might best be kept for a future booklet, as it is difficult to reproduce cell structure on the inferior grades of paper available to us for stencilling. I will endeavour to get a drawing to illustrate their general appearance however, so that you can spot these plants. (see Plate at the end)

I would be very pleased to receive material at any time, and hope you will keep a sharp eye open in all waters you visit.

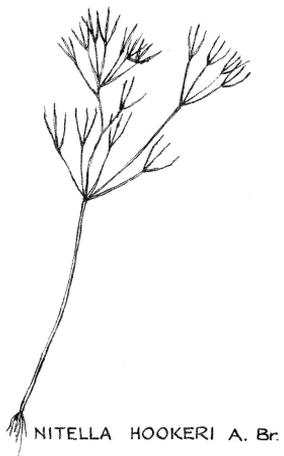
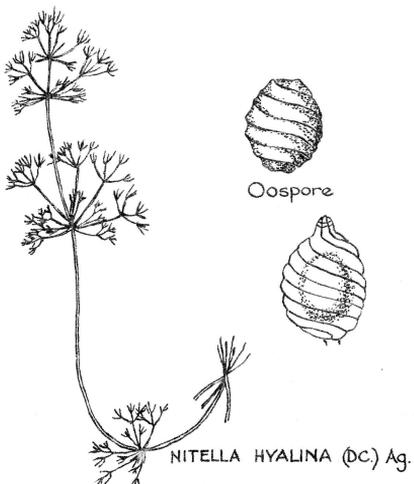
Hints on Collection, etc.

You may expect to find them in any bodies of clean water not choked by other plants. They may be gathered by hand where they occur at the edge of shallow waters, or pulled out with a simple wire grab from deeper water. Those of you with some sort of craft could pull up all sorts if you throw a grab over when you're on some lake. Specimens are best put straight into plastic bags, in which they will keep for a few days- those of you with access to preserving fluid (spirit or formalin) would be advised to put some representative material (preferably "fruiting") into tubes or small leak-proof bottles suitable for postage. Label clearly as you collect,

Very attractive herbarium sheets can be made with a little patience in floating the plant out on to stiff paper. Cover the mount with some non-stick material to dry out such as muslin or wax-paper, otherwise you will damage the specimen on removing the top sheet. The plant stays on the sheet on which you floated it out (use the sink to do the floating). Done properly a finely branched Nitella is a most beautiful object, and I consider surpasses the finest Pinus, without my being biased.

Should you have access to a microscope, then these plants make an ideal subject for the study of cell structure, where quite a low power reveals plenty of detail. I hope to produce a key to the known New Zealand species using a lens only, though any identifications should of course be confirmed by comparison with reliable named material. One should be aware of the fact that the general form of a species can vary greatly, mostly in size depending on suitability of the habitat to growth. Plants are often stunted in intense light, and elongated in reduced light; lax in stagnant water (clean) and compact in fast-flowing water. Low water levels and temporary heat can give excessive spore formation.

I look forward to seeing your finds.



CHARA GLOBULARIS
Thuill., em.

