but rather a failure to re-assemble the molecule in a specific order by random processes, the measured sedimentation constant of 3·0 S. and intrinsic viscosity of 0·1 (Fig. 1) obtained with a mixture of ribonucleic acid and α-lactalbumin may be used to estimate the probable sub-unit size at 35–75 nucleotides. Considering only the reversible dissociation seen with bovine γ-globulin and bovine plasma albumin, the sedimentation results (Fig. 2) can be employed to estimate an upper limit of 200 nucleotides for the sub-unit size.

The results of Loring *et al.*[5] would suggest that the ribonucleic acid of tobacco mosaic virus is capable of reversible dissociation into sub-units, with retention of potential biological activity. The recovery of infectivity implies a specific re-assemblage of the ribonucleic acid molecules.

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Carbohydrates of *Ecklonia radiata*

In connexion with our work on the chemistry of cellulose and related carbohydrates, it was found desirable to investigate certain properties of algal polysaccharides. In seeking a source of these materials we noted that Australian species of brown algæ appear to have received little chemical study, although the carbohydrates of *Ecklonia maxima*, *Laminaria pallida* and *Bifurcaria brassicaeformis* of South Africa have been investigated[1]. The northern hemisphere species, especially of the genus *Laminaria*, have been studied in considerable detail[2,3]: large seasonal variations occur in the contents of laminarin (0–30 per cent), alginic acid (10–30 per cent) and mannitol (0–30 per cent); the fucoidin content is low and less variable[3,4].

Recently we have made a preliminary study of the carbohydrate components of *Ecklonia radiata* (Ag.) J. Ag., which occurs in the sub-littoral zone of the southern coasts of Australia. Fresh whole seaweed, collected in autumn at Point Lonsdale, Victoria, was milled through breaker plates in a Bauer defibrator and the carbohydrates were extracted from the milled material with 1 per cent hydrochloric acid by a two-stage steeping treatment, essentially as described by Black *et al.*[5]. On allowing the solution to stand for several days, little or no insoluble laminarin was precipitated. One fraction (I) of polysaccharides was precipitated by the addition of ethanol to a concentration of 74 per cent, another (II) by further addition of ethanol to the supernatant to a final concentration of 85 per cent. The polysaccharides (I + II) were obtained in a yield of about 6 per cent by redissolving the precipitates in a small amount of water and triturating with ethanol and ether. Fraction I consisted of laminarin and fucoidin; fraction II almost entirely of laminarin. Fractional precipitation of I with ethanol gave only a partial separation of the soluble laminarin and fucoidin. However, part of the fucoidin could be removed on an anion-exchange resin (a similar method has been used by Unrau, A., and Smith, F.; personal communication), 'Duolite *A*4', after first passing the solution through 'Amberlite *IR*-120(H)' to remove calcium and other cations. A more satisfactory separation was achieved by treatment with cetyl trimethylammonium bromide. The polysaccharides were identified by infra-red spectroscopy and the components of their acid hydrolysates by chromatography, in some cases combined with infra-red examination of sugars eluted from chromatograms and freeze-dried.

Further work was done with samples collected in summer. Mannitol was extracted with butanol[1], and crystallized from butanol and from ethanol; it was characterized by chromatography, physical constants and infra-red spectroscopy. Alginic acid was obtained by alkaline extraction of plant material from which other carbohydrates had been removed. It was isolated as the free acid and sodium salt, which were compared with authentic samples. Analyses were carried out according to the methods developed by Cameron, Ross and Percival[6]. The average contents for December–January were found to be as follows:

	Laminæ	Midrib*
Mannitol (per cent)	16	13
Alginic acid (per cent)	20	26
Laminarin (per cent)	5·4	1·8
Fucoidin (per cent)	1·0	1·2

* The 'midrib' is that portion of the frond, comprising the elongation of the stipe, from which the 'laminæ' have been removed.

The seasonal variation in the content of the four carbohydrates is of interest in connexion with their biochemical function and possible utilization. This aspect of the work and others are receiving attention, and will be reported elsewhere. We wish to thank Miss S. Austin, Mr. K. J. Harrington and Mr. G. Davies for help with this work.

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Fatty Acid Composition of the Lipids of Pasture Grasses

Little information is available on the total fatty acid composition of pasture grass lipids. Shorland[1,2] reported that the fatty acids of the acetone-soluble lipids of cocksfoot grass and of rye grass grown in New Zealand comprised about 3 per cent of the dry matter of the grass; ester-fractionation analysis showed that saturated acids (mostly palmitic) accounted for less than 20 per cent of the total acids and that the remaining unsaturated acids consisted largely of linoleic and linolenic acids. Details were