to the previous report of anti-IFA reactivity with Allium root tip proteins (Dawson et al., 1985), we have found that anti-IFA labels certain additional high molecular weight proteins (Fig. 1). These were also labelled by C31, C26 and C3 (Fig. 1). Whilst our initial Western blots closely resemble those of Dawson et al. (1985), Coomassie Blue staining of the corresponding SDS gels revealed no protein bands above $M_r 100,000$. SDS/polyacrylamide-gel electrophoresis of plant tissue is known to give rise to difficulties and many of these problems have been attributed to proteolytic activity (Wu & Wang, 1984). Using a revised protocol for sample preparation, we routinely obtain much higher molecular weight proteins. The high molecular weight proteins recognized by anti-IFA, C3, C26 and C31 were only observed following our improved protocols. Since monoclonal antibodies can react with biologically unrelated molecules possessing a region of common sequence (Dulbecco et al., 1981), we are cautious in assigning these additional proteins as putative plant intermediate filament proteins although they do of course remain candidates.

These results demonstrate the presence of four more intermediate filament epitopes in plant cells and provide further evidence for the presence of intermediate filament proteins in these organisms. It may be of significance that all of the plant reactive intermediate filament antibodies recognize cross-reactive epitopes present on more than one class of animal intermediate filament protein, and thus the epitopes probably represent regions of evolutionary conserved sequence.

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Myosin has been described in a taxonomically diverse number of species including slime moulds (Tangiguchi et al., 1980), yeast (Watts et al., 1985) and the algae Nitella flexilis (Kato & Tomomura, 1977). The myosin molecule from all species studied comprises a hexamer containing two heavy chains (Harrington & Rodgers, 1984). Myosin heavy-chain generally has an $M_r$ of approximately 175 000–220 000 (Pollard, 1984). Whilst actin has been described in a variety of plant taxa (see review by Jackson, 1982) and its distribution mapped throughout the cell cycle of Allium cepa root tip cells (Clayton & Lloyd, 1985), higher plant myosin remains poorly characterized. A myosin-like protein of 100 000 $M_r$ has been described in endocarps of tomato fruit (Vahey et al., 1982), although the distribution of this protein throughout the cell cycle has not been reported.

We have utilized a monoclonal antibody to animal myosin heavy-chain to identify putative plant myosin in Allium cepa root tip cells. On Western blots of total Allium root tip proteins, the antibody labelled a high molecular weight polypeptide of approximately 200 000 $M_r$ which co-migrated with purified rabbit myosin heavy-chain (Fig. 1a).

Monoclonal antibody to myosin heavy-chain recognizes putative higher plant myosin

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myosin showed only a partial co-distribution with actin. In interphase cells, the labelling occurred as cytoplasmic dotty patterns, which were distinct from the actin cables described by Clayton & Lloyd (1985). Likewise myosin does not appear to co-localize with actin in S1 phase of the yeast Saccharomyces cerevisiae (Watts et al., 1985; Kilmartin & Adams, 1984) and there is emerging evidence that myosin forms thick filaments distinct from actin in Dicyostelium (Yumara & Fukin, 1985). In dividing cells however, similar patterns were observed with both the anti-myosin heavy-chain antibody and rhodamine-conjugated phalloidin for actin, with the cytokinetic phragmoplast being strongly labelled. Myosin is present in the cleavage furrows of animal cells (Fujiwara & Pollard, 1976) and in the neck region of mother and bud cells in yeast (Watts et al., 1985). The presence of putative myosin in the phragmoplast of higher plant cells thus suggests a common role for myosin in cytokinesis in a wide variety of taxonomically distinct species.

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Fig. 1. Immunochemical identification for higher plant myosin (a) Western blots of (i) purified rabbit myosin heavy-chain and (ii) total Allium root tip proteins labelled with the anti-myosin heavy-chain antibody. (b) Immunofluorescence microscopy of the same telophase Allium root tip cell labelled with (i) anti-myosin heavy-chain antibody and (ii) rhodamine-conjugated phalloidin for actin. The cytokinetic phragmoplast is labelled with both reagents (magnification × 860).