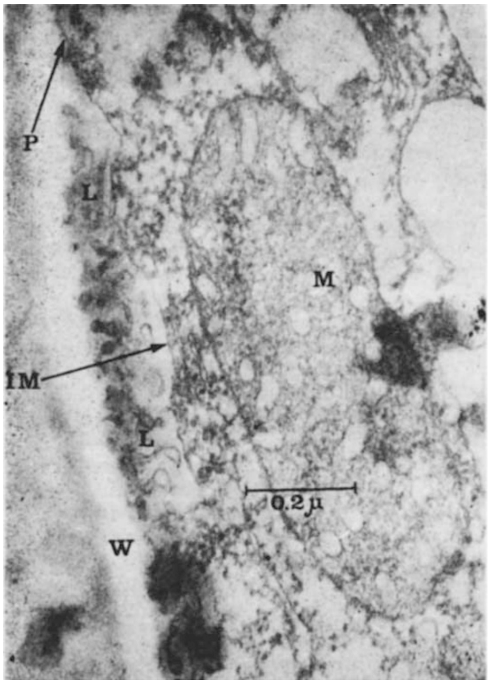

Fig. 1. Part of transverse section of young hypha of *Pythium debaryanum*, fixed glutaraldehyde, post-fixed osmium tetroxide. *L*, Lomasome, note interconnected tubules; *IM*, membrane on inner side of lomasome, continuous with plasmalemma (*P*); *W*, cell wall; *M*, mitochondrion

contact with the cell wall. It was suggested that they might play a part in the synthesis of cell wall material.

Similar structures were earlier demonstrated in potassium permanganate or osmium tetroxide-fixed material of a number of fungi by Moore and McAlear[3], who termed them 'lomasomes' and considered them to be unique to the fungi. Lomasomes were also detected by Hawker and Abbott[4] in young hyphae of *Pythium debaryanum*, grown on 3 per cent malt agar and fixed in permanganate.

Further sections were cut from Hawker and Abbott's block and from material of the same fungus, grown on Ashour's synthetic medium[5], fixed in glutaraldehyde and post-fixed in osmium tetroxide. Definition of the lomasomes was much better in the latter fixative (Fig. 1). They consist of interconnected tubules, similar to those of *Chara* and *Nitella*.

It was pointed out by Hawker[6] that *Pythium* shows many similarities to green algae and some other green plants. Lomasome structure is an additional similarity. It is of interest that a similar organelle was described by Manocha and Shaw for *Triticum*[7]. It may well be that these organelles are of more general occurrence in green plants than has been realized and that the use of glutaraldehyde as a fixative may reveal them in many more species.

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Biological Indicator of Manganese-54 Contamination in Terrestrial Environments

The value of *Unio* molluscs as indicators of manganese-54 contamination in freshwater environments has been discussed in an earlier communication[1]. We have attempted to find a similar indicator for terrestrial environments, and have concluded that the red slug *Arion rufus*, L. (Gasteropoda, Stylommatophora), may fulfil this role.

Samples of terrestrial animals of widely different taxonomic groups[2] were collected, dried at 105° C and ashed at 450° C. Manganese-54 was measured by gamma spectrometry, using a 3 in. × 3 in. sodium iodide well crystal and an *RCL* 256 channel analyser. The error of the measurements was about 8 per cent. Total manganese was determined by radioactivation[3], with an error of about 3 per cent.

Of the various animals investigated, *Arion rufus* proved to be the greatest accumulator of manganese-54. Large samples of this mollusc, which can be collected in huge quantities because of its size and weight (about 7·5 g per individual), were taken in September 1963 and May 1964 in meadows at Cocquio (Varese) near Lake Maggiore. Plants making up its diet were collected at the same time.

Table 1. Concentration (dry weight) of Radionuclides in Some Animal Species, September 1963

Nuclides	^{54}Mn (μμc./g)	^{95}Zr–^{95}Nb (μμc./g)	^{137}Cs (μμc./g)	^{106}Ru–^{106}Rh (μμc./g)	^{144}Ce (μμc./g)	K (%)
Arion rufus, L.	45·8	14·5	4·9	10·4	19·5	0·2
Sympetrum striolatum, Charp.	3·2	15·8	2·1	5·1	13·7	0·9
Rana esculenta, L.	0·8	1·4	0·6	6·3	2·1	1·2

Table 1 shows the relatively high concentration of manganese-54 in *Arion* as compared with other animals (adult dragon-fly and frog) and as compared with other nuclides in the same animal. Even though stable manganese was four times more abundant in *Arion* than in its diet (Table 2), the specific activity of manganese-54 was about seventy times higher in the animal. Thus, most of the radionuclides entered the mollusc through routes other than diet, possibly through the epithelium, which is known to be permeable to solutes and particulate material[4].

Table 2. Concentration (dry weight) of Manganese-54, Stable Manganese and Specific Activity, in *Arion* and in Some Plants, May 1964

Element	^{54}Mn (μμc./g)	Stable Mn (p.p.m.)	μμc. ^{54}Mn/mg Mn
Arion rufus, L.	34·66	167	207·5
Holcus lanatus, L.	0·14	48	2·9
Trifolium repens, L.	0·10	31	3·2

Table. 3. Concentration (wet weight) of Manganese-54, Stable Manganese and Specific Activity, in *Arion* and *Unio* (Shell plus Soft Tissues), September 1963

Element	^{54}Mn (μμc./g)	Stable Mn (p.p.m.)	μμc. ^{54}Mn/mg Mn
Arion rufus, L.	7·00	23	304·3
Unio mancus var. *elongatulus*, Pf.	13·33	340	39·2

A comparison was made between *Arion rufus* and *Unio mancus* from Lake Maggiore. As shown in Table 3, *Arion* had one-fourteenth of the stable manganese in *Unio*, but the specific activity of its manganese-54 was more than seven times higher. Thus, while *Unio* may be used as an indicator of manganese-54 contamination in fresh water because it strongly accumulates stable manganese, *Arion* is able to take up manganese-54 directly to a great extent and may be valuable as an indicator for this radionuclide in terrestrial environments.

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