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MISCELLANEOUS

A Device for the Transfer of Suspended Tissue Cultures

In the development of growing plant cell suspensions from callus cultures, there is considerable cell agglomeration for the first 15-20 generations; under our growth conditions¹ this represents 4-5 sub-cultures. The diameter of the cell agglomerates may be as high as 0.5 cm, thus transfer by pipette is difficult.

An apparatus (Fig. 1) was designed for the rapid, sterile transfer of measured amounts of suspension cultures containing large cell agglomerates.

Fig. 1. Culture flask for the transfer of suspended plant cells. A, Main growth vessel; B, inoculum chamber

The graduated inoculum chamber was derived from a test-tube, 11 cm × 17 mm. A 250-ml. wide-necked conical flask served as the main growth vessel. The two vessels were connected, 8 cm from the base of the main vessel and 7 cm from the end of the inoculum chamber, by 13 mm (internal diameter) tubing (4.5 cm long), bent to set the inoculum chamber at 45° and to enter the chamber on its top side. 'Pyrex' glass was used throughout.

Cell suspension is poured from the main vessel into the inoculum chamber and the apparatus tipped to deliver the inoculum. With the long axis of the inoculum chamber

at approximately 45° to the vertical, the plug of the main vessel is not touched by culture during the second transfer.

Since 13 mm is the smallest internal diameter in the system, the largest cell agglomerates may be dispensed satisfactorily. The single transfer action also reduces the possibility of contamination.

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Dating of Old Mortars by the Carbon-14 Method

THE carbon-14 method may be applied to the dating of old mortars, in the same way as if these mortars were remains of organic substances.

Old mortars are ordinarily composed of about 80 per cent by weight of coarse sand particles embedded in a matrix of calcium carbonate needles. Therefore, 1 kg of mortar contains about 90 g of carbon dioxide, which has been incorporated through diffusion process from the ambient atmosphere when the mortar has been prepared. The carbon dioxide capture process lasts about one week after the moment when lime and sand have been mixed with water. From this moment the proportion of carbon-14 in the carbon of the calcium carbonate needles must decrease in the same way as it does after death in plants or animals, and therefore buildings constructed with these mortars can possibly be dated by the usual carbon-14 method.

In order to test this hypothesis we have measured the ages of four samples extracted from four buildings of which ages are historically known.

Dating is performed by ordinary methods, the carbon dioxide being extracted by heating, at 900° C, about 100 g of mortar after a preliminary coarse crushing. The carbon dioxide is carried away from the heated sample by a stream of pure oxygen gas and precipitated in a solution of barium oxide. Results are given in Table 1. The hypothesis appears to be verified.

Table 1

	Composition	Historical age	Age found
1. Château de la Madeleine, Vallée de Chevreuse, Seine-et-Oise, France. Mortar from the north side of the northern wall, 1 m above the present ground-level	0.3 CaCO ₃ 0.68 sand	600 ± 50	660 ± 120
2. Roman aqueduct of Barbegal, near Arles, Bouches-du-Rhône, France. Mortar from pillars	0.13 CaCO ₃ 0.87 brick wastes and sand	1,620 ± 60	1,620 ± 150
3. Vannes, Morbihan, France. Mortar from concrete terrace with fragments of <i>Tegula</i> , covered with 20 cm of sand and 80 cm of black garden soil	„	1,500-1,860	1,650 ± 150
4. Western wall of the C.N.R.S. Park, Gif-sur-Yvette, Seine-et-Oise, France	0.11 CaCO ₃ 0.89 sand and sand stone wastes	50-150	0-100

Calcareous sands are sometimes used for preparing mortars and must be discarded, because this sand introduces in the sample a large and unknown proportion of very ancient carbonate. Therefore a previous microscopic examination of an eventual presence of Foraminifera tests is needed.

Mrs. Marie-Thérèse Guillier carried out the carbon-14 dating of the carbon dioxide extracted from the samples.

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