

Countercurrent Distribution Once Again

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An earlier installment of *Museum Notes* described the donation in 2010 by Dr. Robley Williams of a double row, 30-cell, countercurrent glass distribution train designed by Lyman C. Craig of the Rockefeller Institute for Medical Research in 1951 (1). We are now pleased to announce the donation of an even earlier alternative version of this apparatus by Dr. Edward Bennett of Berkeley California (figure 1).

First described by Craig in 1944 (2), and in its final form in 1949 (3), this earlier alternative was based on the relative rotation of two cylindrical arrays of 20 numbered extraction cells. These cells were made of stainless steel rather than glass, as in the later linear train version. In the initial 1944 design the cells were

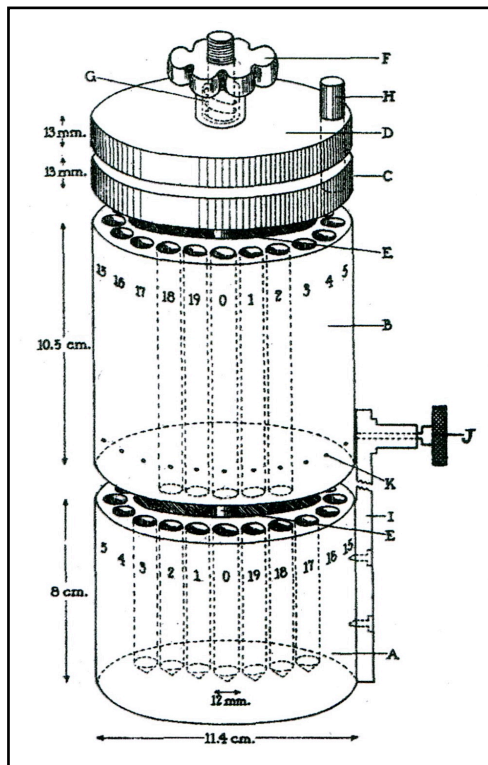


Figure 2. A drawing of the double cylindrical array of extraction cells in Craig's original prototype of 1944 (2).

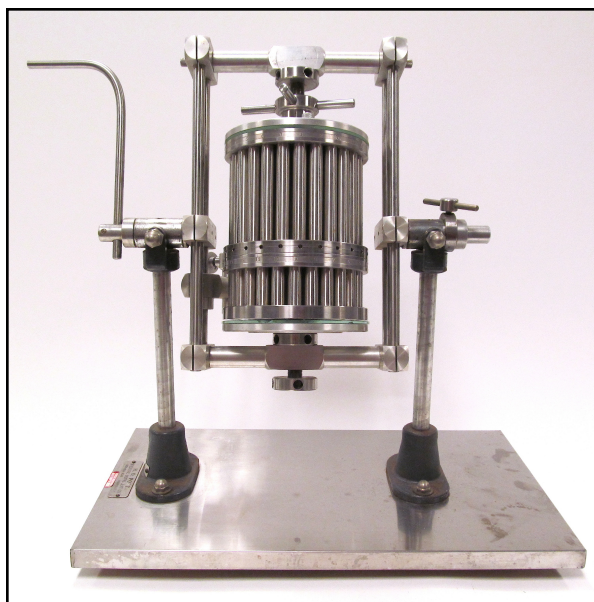


Figure 1. The circa 1949 Craig cylindrical countercurrent distribution apparatus recently donated to the Oesper Collections by Dr. Edward Bennett (Jensen-Thomas Apparatus Collection).

drilled directly into a solid piece of stainless steel (figure 2), whereas in the final 1949 version donated to the museum they are made from sections of stainless steel pipe.

The cells in the lower cylinder were completely filled with the denser of the two immiscible solvents used in the extraction and the cells in the upper cylinder half filled with the less dense solvent such that the liquid-liquid interface coincided with the self-sealing rotatable joint between the upper and lower cylinders. The sample to be extracted was placed in cell 0 and the entire apparatus shaken back and forth using a crank and mounting frame. After giving the solvents time to separate once again, the upper cylinder was advanced counter-clockwise by one cell and the process repeated until all 20 extraction steps were completed.

Like the linear glass train donated by Dr. Wil-

liams, the cylindrical train donated by Dr. Bennett was custom-made by Otto Post, the machinist and glass-blower at the Rockefeller Institute. It was salvaged by Dr. Bennett many years ago after being discarded from the laboratory of Dr. Melvin Calvin at Berkeley.

The importance of these countercurrent extractions trains in bridging the gap between the conventional 19th-century laboratory separatory funnel and the rise of liquid chromatography – especially in the field of biochemistry – has been commented upon in the earlier installment of *Museum Notes*.

References and Notes

1. W. B. Jensen, "The Craig Countercurrent Distribution Train," *Museum Notes*, December 2010.
2. L. C. Craig, "Identification of Small Amounts of Organic Compounds by Distribution Studies. II. Separation by Counter-Current Distribution," *J. Biol. Chem.*, **1944**, 155, 519-534.
3. L. C. Craig, O. Post, "Apparatus for Countercurrent Distribution," *Anal. Chem.*, **1949**, 21, 500-504.