CC/NUMBER 33
AUGUST 13, 1979

This Week's Citation Classic

James A T & Martin A J P. Gas-liquid partition chromatography: the separation and microestimation of volatile fatty acids from formic acid to dodecanoic acid. *Biochem. J.* **50**:679-90, 1952.
[National Institute for Medical Research, Mill Hill, London, England]

Gas-liquid chromatography was suggested by Martin and Synge in their classical paper on the liquid-liquid chromatogram in 1941. Our development of the new chromatogram in 1951[1] gave birth to a new, very powerful analytical and purification technique that is now found in almost every laboratory in the world. The first paper outlined the general principles, a specific application, and the general theory and produced an explosive development of a new subject. [The *SCI*® indicates that this paper has been cited over 525 times since 1961.]

AT. James
Division of Biosciences
Unilever Research Laboratory
Colworth House
Sharnbrook, Bedfordshire, England

June 26, 1978

"The development of the technique was due to a series of fortunate accidents. In 1950, I was working at the Lister Institute of Preventive Medicine in London on the structure of Gramicidin S, initially with R.L.M. Synge. I was therefore acquainted with the new liquid chromatographic method of amino acid analysis developed by Martin and Synge.[2] W.T.J. Morgan was having problems with the paper chromatographic analysis of amino sugars and asked for my help. As a sideline, I therefore developed a liquid-liquid column chromatographic system for the separation of the 2:4 dinitrophenyl derivatives of the amino sugars. For this I needed an automatic fraction collector but none was available. Fortunately, A.J.P. Martin had just temporarily arrived at Lister before moving on to permanent facilities at the National Institute for Medical Research Already interested in such devices, he was delighted to collaborate in the design of automatic mechanical fraction collectors.

"As we got on so well together, he invited me to join him as co-worker at the National Institute in order to attempt to develop a technique of continuous counter current crystallation. I spent some months at this, but we got very poor results. Seeing my dejection, Martin suggested that we attempt to turn the suggestion in the original paper on the liquid-liquid partition chromatogram[2] (for which they received the Nobel Prize) into reality. This we very quickly did after an initial setback and opened up this new field. The potential was obviously enormous and we spent a couple of years in developing a new general purpose detector –the gas-density balance[3] –separating a wide range of volatile compounds, and studying the relationship between solution effects and relative retention volumes.

"Our results with paraffin hydrocarbons quickly got the attention of workers in the petroleum industry and the subject took off into its present ramifications. Other British and also American workers took it up and most of the potential power of the technology was soon outlined.

"It was very pleasant for Martin and me for a few years to know more about a major development than anyone else in the world, but it did not last long. Our later development of the technique for the separation, identification, and quantitative analysis of long chain fatty acids, led me directly into fatty acid biochemistry, where I have remained ever since, except for an increasing involvement in scientific bureaucracy. However, in both spheres I have attempted to apply the fundamental precepts I learned from A.J.P. Martin: (1) Nothing is too much trouble provided someone else does it; (2) Never answer the first letter; if it's important they'll write again; and (3) If there are twelve ways of tackling a problem, they're all wrong."

1. **James A T, Martin A J P & Randall S S.** Automatic fraction collectors and a conductivity recorder. *Biochem. J.* **49**:293-9, 1951.
2. **Martin A J P & Synge R L M.** A new form of chromatogram involving two liquid phases. *Biochem. J* **35**:1358-68, 1941.
3. **Martin A J P & lames A T.** Gas-liquid chromatography: the gas-density meter, a new apparatus for the detection of vapours in flowing gas streams. *Biochem J.* **63**:138-43, 1956.