



Fig. 1. Flow diagram for determination of total amino acid concentrations.

in the latter half of gestation the average total amino acid concentrations found were: maternal arterial plasma  $3.34 \pm 0.63$  (19), umbilical venous plasma  $6.28 \pm 2.32$  (30), umbilical arterial plasma  $7.25 \pm 2.13$  (30) (Hervey & Slater, in preparation).

This technique is more sensitive than a similar method using trinitrobenzene sulphonate (Palmer & Peters, 1965), but the decarboxylation method of Lacy & Crofford (1964) (see also Foley & Reynolds, 1968) probably remains the most precise automatic method for determining total amino acid concentrations.

#### REFERENCES

- Foley, T. H. & Reynolds, M. L. (1968). *Technicon 6th Colloquium in Amino Acid Analysis*. (In the Press.)  
 Lacy, W. W. & Crofford, O. B. (1964). *J. Lab. clin. Med.* **64**, 828.  
 Palmer, D. W. & Peters, T. Jr (1965). *Automation in Analytical Chemistry Technicon Symposia* p. 325.  
 Prenton, M. A. & London, D. R. (1967). *Technicon 5th Colloquium in Amino Acid Analysis* p. 70.

### Identification and estimation of ninhydrin-positive substances in physiological fluids

By G. LEAF, *Department of Biochemistry, The University, Glasgow*

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### Automated clinical chemistry

By T. P. WHITEHEAD, *Queen Elizabeth Hospital, Edgbaston, Birmingham*

The workload of the clinical chemistry laboratory doubles every 4 or 5 years. This increase occurs in teaching and non-teaching hospital laboratories in this country and in many other countries abroad. Such increases have forced new approaches in laboratory techniques and laboratory organization. In the Department of Biochemistry at the Queen Elizabeth Hospital, Birmingham, work study of the systems identified three 'bottle-necks'. These were first, the transport 'bottle-neck', that is, getting specimens from the ward to the laboratory and the report back from the laboratory to the ward. Second, the analytical technique 'bottle-neck' and thirdly, the data-processing 'bottle-neck'. New transport systems can only be introduced with prohibitive capital outlay. The analytical technique 'bottle-neck' has been intensively studied and the AutoAnalyzer is in very common use in hospital laboratories.

During the last years, attention has been focused upon data processing and the introduction of on-line computer facilities in many laboratories has already taken place or is about to take place. The computer in the clinical chemistry laboratory performs tasks which can be conveniently divided into two: first, acquiring data from the analytical equipment, calculating the result and associating it with patient identification; second, data-processing results, particularly with regard to quality control and other management techniques. Experience with computer work has shown that it can save clerical work by scientific staff but, what is more important, it is capable of providing information which was previously hidden, e.g., on-line monitoring of the AutoAnalyzer has shown that much more information can be obtained from the analogue signal normally transferred to a chart recorder. Blockages can be detected earlier and other defects in the system can be identified more precisely. In addition, data processing of results can lead to a much greater appreciation of the use of laboratory results in patient care. Several examples of the use of the computer in quality control have been published (see Whitehead, 1968; Whitehead, Becker & Peters, 1968; Whitehead & Carmalt, 1969). The computer is now an integral part of the clinical chemistry laboratory.

#### REFERENCES

- Whitehead, T. P. (1968). *Bio-med. Engng* **3**, 467.  
Whitehead, T. P., Becker, J. F. & Peters, M. (1968). *Computers in the Service of Medicine* Vol. 1, p. 115. London: Shegog & McLachlin.  
Whitehead, T. P. & Carmalt, M. H. B. (1969). *Br. J. Hosp. Med.* April, p. 49.

### The maintenance of analytical quality in the automated laboratory

By S. C. FRAZER, *Department of Chemical Pathology, University of Aberdeen, Foresterhill, Aberdeen*

The ways in which a laboratory's analytical work can be monitored are basically similar, whether or not the analytical processes are manual, or assisted in varying