Mr. H. C. H. Graves (Vitamins, Ltd., 23 Upper Mall, Hammersmith, London, W.6): With reference to methods of studying the biological value of proteins, it appears that we are now moving away from the old conception of biological values, which ignored calorie requirements. The method outlined by Dr. Kosterlitz does take into account calorie intake. Clinicians also seem to appreciate the necessity of carbohydrate additions to hydrolysates, as Dr. Anderson has mentioned. The ignoring of calorie requirements has, in the past, led to difficulties of interpretation of experimental results.

Dr. A. B. Anderson: The chief obstacle to the use of hydrolysates is their unpalatability, but in my experience they can be rendered more palatable by being neutralized and flavoured with aniseed.

As regards *Professor Marrack's* enquiry about gastro-enteritis, we have not had much experience in Glasgow. Clinicians are not satisfied with results, but administration has been mostly by mouth.

Concluding Remarks

Dr. D. P. Cuthbertson: I would remind the meeting of Rubner's remark that "Protein contains the magic of life, ever newly created, ever dying". Much that has been said by Dr. Stewart, Dr. Davidson and Mr. Griffiths, and much of the discussion at this meeting has emphasized this viewpoint.

Dr. Anderson and Captain Stevenson have dealt with certain clinical aspects, and more particularly with the use of protein hydrolysates. When the Medical Research Council were set the problem of advising on the preparation of hydrolysates for use in Western Europe they expected to have to treat patients with a great diminution of digestive enzymes, and often in a semi-comatose condition. This opinion was based largely on descriptions of the condition of the starving destitutes of the Bengal famine. As it turned out, the clinical picture was different, and the chief problems were largely those of administration and of combating the distressing psychological state of the victims.

In India, the starving subjects were frequently in a state of coma, whereas in Holland patients were often alert until death supervened quite suddenly. Intravenous methods were fraught with difficulty owing to the large volumes of dilute solution which had to be used and on account of which oedema worsened. Further, such methods were associated in the minds of the unfortunate patients with the Nazis' methods of extermination. Oral hydrolysates were unpalatable, and in any case were not required as the patients could use intact protein. Indeed, treatment with skim milk and glucose was much the most effective method.

If a perfectly safe hydrolysate of protein can be obtained and administered in sufficient amounts to spare body protein, then there is no doubt that it might prove a life saving measure in certain conditions where there is a marked defect in the ability to ingest, digest or absorb sufficient protein.