Brocklehurst, K., Baines, B. S. & Mushiri, M. S. (1980) *Biochem. J.* **189**, 189–192
Brocklehurst, K., Baines, B. S. & Kierstan, M. P. J. (1981) *Top. Enzyme Ferment. Biotechnol.* **5**, 262–335
Brocklehurst, K., Baines, B. S., Salih, E. & Hatzouli, C. (1984) *Biochem. J.* **221**, 553–554
Buttle, D. J. & Barrett, A. J. (1984) *Biochem. J.* **223**, 81–88
Kunimitsu, D. K. & Yasunobu, K. T. (1967) *Biochim. Biophys. Acta* **139**, 405–417
Polgár, L. (1981) *Biochim. Biophys. Acta* **658**, 262–269
Polgár, L. (1984) *Biochem. J.* **221**, 555–556
Schack, P. (1967) *C.R. Trav. Lab. Carlsberg* **36**, 67–83

Names and numbers of papaya proteinases

Chymopapain seems to be heterogeneous in at least two respects. Results from many laboratories (cited by Buttle & Barrett, 1984; Brocklehurst *et al.*, 1985) show that there are multiple forms separable by cation-exchange chromatography, and two of the major forms have been termed 'chymopapain A' and 'chymopapain B', respectively. The second form of heterogeneity is that reflected in the reactivity of the catalytic sites with two protonic state probes, reported by Brocklehurst and co-workers (cited by Brocklehurst *et al.*, 1985). The method of identifying forms by use of the probes may not be easy to reproduce in other laboratories (Khan & Polgár, 1983; Polgár, 1984), and the forms distinguished in this way do not necessarily equate with the chromatographically distinguished forms A and B (Brocklehurst *et al.*, 1985). Nevertheless, it has been suggested that chymopapains A and B are two distinct enzymes (sic) (Baines & Brocklehurst, 1982).

We reconsidered the possibility that chymopapain may be best thought of as a single enzyme, despite the existence of multiple forms, and concluded that it was indeed more helpful to 'lump' than to 'split' the chymopapains. One strong reason for this view was that polyclonal antisera raised against chymopapain (a chromatographic 'B' form), reacted with all the peaks of chymopapain from a cation-exchange column in a reaction of complete immunological identity (Buttle & Barrett, 1984). This suggested to us that the multiple forms are products of a single gene, and that differences between them are probably the result of post-translational events. It was our impression that the most important of these post-translational modifications probably occur during commercial processing of the latex, as artefacts, but we agree with Brocklehurst *et al.* (1985) that at least some may occur *in vivo*.

We are disinclined to regard 'chymopapain A' and 'chymopapain B' as distinct proteinases so long as there is no evidence that they differ (*a*) in primary structure, or (*b*) in catalytic specificity. Differences of both kinds would normally be expected between separate enzymes. We would therefore suggest that for the present it is best to think of chymopapain as a single enzyme with multiple chromatographic forms. If, despite the evidence that we have, it transpires that there are multiple genes coding for the multiple forms of chymopapain, and if the forms can be found to differ as proteinases, then it would be necessary to think again.

On the question of the name for the most basic of the proteolytic enzymes of papaya latex, we are pleased that there now seems to be general agreement on the appropriateness of 'papaya proteinase'. Our suggestion of the name 'papaya proteinase III' was on the historical basis that this was the third papaya proteinase to be identified, having been discovered by Schack (1967) after papain (Balls *et al.*, 1937) and chymopapain (Jansen & Balls, 1941). Numbers create less typographical problems than Greek letters, and we feel that this chronological scheme is not only sound, but also establishes a system that can easily accommodate the naming of further enzymes. By contrast, the present controversy over chymopapain serves to illustrate that the ion-exchange chromatographic properties of an enzyme are a poor basis for classification.

We thank our colleagues for much helpful discussion.

Alan J. BARRETT and David J. BUTTLE
Department of Biochemistry, Strangeways Research Laboratory, Worts Causeway, Cambridge CB1 4RN, U.K.

(*Received 4 March 1985*)

Baines, B. S. & Brocklehurst, K. (1982) *J. Protein Chem.* **1**, 119–139
Balls, A. K., Lineweaver, H. & Thompson, R. R. (1937) *Science* **86**, 379
Brocklehurst, K., Salih, E., McKee, R. & Smith, H. (1985) *Biochem. J.* **228**, 525–527
Buttle, D. J. & Barrett, A. J. (1984) *Biochem. J.* **223**, 81–88
Jansen, E. F. & Balls, A. K. (1941) *J. Biol. Chem.* **137**, 459–460
Khan, I. U. & Polgár, L. (1983) *Biochim. Biophys. Acta* **760**, 350–356
Polgár, L. (1984) *Biochem. J.* **221**, 555–556
Schack, P. (1967) *C.R. Trav. Lab. Carlsberg* **36**, 67–83