of L-tyrosine methyl ester shows the presence of a group in the enzyme having a pK value of approx. 9.5. This group could conceivably be a thiol group, as the enzyme is known to be inactivated on storage and is reactivated by the addition of reduced thiols. In keeping with this hypothesis the enzyme was found to be inactivated by iodoacetamide at pH 7.5, and this inactivation is prevented by the addition of adenosine 3'-phosphate 5'-sulphato-phosphate, but not L-tyrosine methyl ester, to the alkylation mixture.

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- Banerjee, R. K. & Roy, A. B. (1968). *Biochim. biophys. Acta*, **151**, 573.
 Dalziel, K. (1957). *Acta chem. scand.* **11**, 1706.
 Dodgson, K. S., Basford, J. M., Jones, J. G. & Mattock, P. (1967). *Indian J. Biochem.* **4** (Suppl.), 7.
 Segal, H. L. & Mologne, L. A. (1959). *J. biol. Chem.* **234**, 909.

Purification and Partial Characterization of Peroxidase from Red Algae

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Halogenated organic compounds have been reported in various red algae (see Craigie & Gruenig, 1967; Ó hEocha, 1961). Halogenation in mammals and in some fungi is catalysed by peroxidase (Coval & Taurog, 1967; Morris & Hager, 1966) and this led us to undertake a survey of this enzyme in appropriate species of the Rhodophyta.

Peroxidatic activity was determined spectrophotometrically with *o*-dianisidine as hydrogen donor (Worthington Biochemical Corp. Descriptive Manual). In a typical preparation, *Cystoclonium purpureum* was ground either in a roll mill or in a mortar and allowed to extract into 0.1 M-phosphate buffer, pH 7, for 1 hr. After centrifugation at 100 000g for 90 min. nearly all the activity was in the pellet. The particulate nature of the enzyme is unusual, as plant peroxidases are typically in the soluble fraction. The addition of polyvinylpyrrolidone during extraction did not alter this pattern. The pellet was resuspended in buffer and then centrifuged as before; this procedure was repeated. The enzyme was then solubilized by the addition to the suspended pellet of an equal volume of a 2% digitonin solution (Kaplan, Colowick & Neufeld, 1953); nearly all the activity now remained in the supernatant after centrifugation at 100 000g for 90 min. The enzyme was further purified by acetone fractionation followed by gel filtration

through a column of Sephadex G-75, with 0.02 M-glycine-NaOH buffer, pH 9.0.

The peroxidase has optimum pH between 5.2 and 5.8; maximum activity was obtained with 0.8 mM-hydrogen peroxide. The enzyme was most stable at about pH 9.0; its stability to heat was less than that of other peroxidases tested.

Gel filtration on Sephadex G-75 and G-100 suggested that the molecular weight of the algal peroxidase is approx. 40 000. The purified enzyme was resolved into five or six bands by vertical starch-gel electrophoresis in the pH range 7-9. Such heterogeneity in plant peroxidases is common (see Shannon, Kay & Lew, 1966; Evans, 1968).

The algal enzyme has unusual substrate specificities in that positive results were obtained with *o*-dianisidine, *o*-toluidine and *p*-phenylenediamine, whereas other well-known peroxidase substrates, such as benzidine and guaiacol, did not react. The possible role of peroxidases in the biosynthesis of halogenated compounds in red algae is still under investigation.

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- Coval, M. L. & Taurog, A. (1967). *J. biol. Chem.* **242**, 5510.
 Craigie, J. S. & Gruenig, D. E. (1967). *Science*, **157**, 1058.
 Evans, J. J. (1968). *Plant Physiol.* **43**, 1037.
 Kaplan, N. O., Colowick, S. P. & Neufeld, E. F. (1953). *J. biol. Chem.* **205**, 1.
 Morris, D. R. & Hager, L. P. (1966). *J. biol. Chem.* **241**, 1763.
 Ó hEocha, C. (1961). *Colloq. int. Cent. nat. Rech. sci. Paris*, no. 103, p. 121.
 Shannon, L. M., Kay, E. & Lew, J. Y. (1966). *J. biol. Chem.* **241**, 2166.

The Amino Acid Sequence of Penicillinase from *Bacillus licheniformis*

By R. J. MEADWAY. (*Department of Molecular Biology, University of Edinburgh*)

The amino acid sequence of penicillinase from *B. licheniformis* 749/C is apparently homologous with that from *Staphylococcus aureus* (Ambler & Meadway, 1969) and is:

- 1 Lys-Thr-Glu-Met-Lys-Asp-Asp-Phe-Ala-Lys-
- 11 Leu-Glu-Glu-Gln-Phe-Asp-Ala-Lys-Leu-Gly-
- 21 Ile-Phe-Ala-Leu-Asp-Thr-Gly-Thr-Asn-Arg-
- 31 Thr-Val-Ala-Tyr-Arg-Pro-Asp-Glu-Arg-Phe-
- 41 Ala-Phe-Ala-Ser-Thr-Ile-Lys-Ala-Leu-Thr-
- 51 Val-Gly-Val-Leu-Leu-Gln-Gln-Lys-Ser-Ile-
- 61 Glu-Asp-Leu-Asn-Gln-Arg-Ile-Thr-Tyr-Thr-
- 71 Arg-Asp-Asp-Leu-Val-Asn-Tyr-Asn-Pro-Ile-
- 81 Thr-Glu-Lys-His-Val-Asp-Thr-Gly-Met-Thr-
- 91 Leu-Lys-Glu-Leu-Ala-Asp-Ala-Ser-Leu-Arg-
- 101 Tyr-Ser-Asp-Asn-Ala-Ala-Gln-Asn-Leu-Ile-
- 111 Leu-Lys-Gln-Ile-Gly-Gly-Pro-Glu-Ser-Leu-
- 121 Lys-Lys-Glu-Leu-Arg-Lys-Ile-Gly-Asp-Glu-