

increased transiently during the early phase of germination and then decreased, but the levels of OPRCase-ODCase, UPRCase, and PRPP synthetase all fell after initiation of germination. In embryonic axes, the levels of all the listed enzymes related to the biosynthesis of pyrimidine nucleotides increased with the growth and development of the embryos (table 1). The presence of CPSase, OPRCase and ODCase has also been noted in dry seeds of pea plants^{11,12}.

We determined the levels of PRPP and ATP in various tissues. The levels of these compounds were extremely low in dry seeds, but they increased rapidly in cotyledons after imbibition, reached maximum levels at 24 h (PRPP) and 48 h (ATP), and decreased subsequently (figure 1). A rapid increase in the level of PRPP has also been observed in the cotyledons of peas, but the maximum was achieved 12 h after the start of imbibition¹¹. The levels of PRPP and ATP in the embryonic axes increased with growth, but the patterns of incremental changes in the levels of these two compounds were slightly different (figure 1). An increase in ATP levels during the first hours of imbibition has been observed in seeds of several plants¹, although conflicting results have been reported about the reactions involved in the formation of ATP during the very early stages of germination¹⁴⁻¹⁶. An increased level of ATP in cotyledons of black gram seeds seems to act as a trigger to set off the subsequent formation of phosphorylated high-energy compounds, such as PRPP, with a possible resultant enhancement in the rate of biosynthesis of pyrimidine nucleotides.

The results obtained here and those of previous studies using radioactive tracers and an inhibitor of protein synthesis^{2,3} lead to the following conclusions. (i) The enzymes that participate in the biosynthesis of pyrimidine nucleotides are present at adequate levels but are inactive because of dehydration in cotyledons of dry seeds and become functional after hydration of the enzyme proteins with imbibition. (ii) The levels of ATP and PRPP increase with imbibition by the seeds and enhance the activity of enzymes involved in the biosynthesis of pyrimidine nucleotides. (iii) At a later stage of germination, constituents of cotyledons are hydrolysed by the degradative enzymes, which are synthesized during germination, and the resultant products, such as amino acids, nucleosides, nucleobases and sugars, are transported to the embryonic axes and utilized for the active biosynthesis of pyrimidine nucleotides. (iv) In the embryonic axis, most of the enzymes

involved in the synthesis of pyrimidine nucleotides, as well as ATP and PRPP, are synthesized *de novo*.

19 January 1989

1. Mayer, A. M. and Poljakoff-Mayber, *The Germination of Seeds*, 3rd edn, Pergamon Press, Oxford, 1982, p. 85.
2. Ashihara, H., *Z. Pflanzenphysiol.*, 1977, **81**, 199.
3. Ashihara, H. and Kameyama, Y., *Curr. Sci.*, 1989, **58**, 635.
4. Nobusawa, E. and Ashihara, H., *Int. J. Biochem.*, 1983, **15**, 1059.
5. Kanamori, I., Ashihara, H. and Komamine, A., *Z. Pflanzenphysiol.*, 1980, **96**, 7.
6. Ashihara, H., *Z. Pflanzenphysiol.*, 1978, **87**, 225.
7. Ashihara, H., *Z. Pflanzenphysiol.*, 1977, **83**, 379.
8. Hirose, F. and Ashihara, H., *Z. Pflanzenphysiol.*, 1983, **110**, 183.
9. Ukaji, T. and Ashihara, H., *Z. Naturforsch.*, 1986, **41c**, 1045.
10. Ashihara, H. and Matsumura, H., *Int. J. Biochem.*, 1977, **8**, 461.
11. Ross, C. and Murray, M. G., *Plant Physiol.*, 1971, **48**, 626.
12. Kolloffel, C. and Verkerk, B. C., *Plant Physiol.*, 1982, **69**, 143.
13. Perl, M., *Planta*, 1980, **149**, 1.
14. Raymond, P., Al-Ani, A. and Pradet, A., *Physiol. Veg.*, 1983, **21**, 677.
15. Morohashi, Y. and Sugimoto, M., *Plant Cell Physiol.*, 1988, **29**, 893.

STABILITY OF INDOMETHACIN TO CONDITIONS OF ENZYMATIC RELEASE FROM TISSUE—SOME INTERESTING ASPECTS

V. SHANKAR, C. DAMODARAN and P. CHANDRA SEKHARAN

Forensic Sciences Department, Madras 600 004, India

WE have earlier^{1,2} proposed new methodologies for enzymatic hydrolysis of tissues using the two enzymes neutral proteinase (from *Bacillus subtilis*) and papain (from papaya). It was then of interest to investigate the stability of indomethacin (an analgesic) to the conditions employed for enzymatic hydrolysis

of tissues using these two enzymes. Aqueous solutions of the drug were incubated with (i) buffer alone, and (ii) buffer and enzyme, prior to extraction and quantitation of indomethacin in the reaction mixture by HPLC. The results proved to be interesting. The concentration of indomethacin in the reaction mixture after enzymatic action by neutral proteinase and subtilisin A revealed that only 67% and 38% respectively of the drug originally present could be recovered. In contrast, incubation with papain showed no degradation of indomethacin and complete recovery (100%) was possible. To test for benzoic acid and its derivatives as possible degradation products the chromatographic method of

Fewster and Hall³ was employed. The results were however negative, pointing out that indomethacin is transformed by neutral proteinase and subtilisin A by an as yet unknown mechanism.

5 May 1988; Revised 28 November 1988

1. Shankar, V., Damodaran, C. and Chandra Sekharan, P., *J. Anal. Toxicol.*, 1987, 11, 164.
2. Shankar, V., Damodaran, C. and Chandra Sekharan, P., *Forensic Sci. Int.*, 1988, 37, 243.
3. Fewster, M. E. and Hall, D. A., *Nature (London)*, 1951, 168, 78.

ANNOUNCEMENTS

ALL INDIA COURSE ON VACUUM SCIENCE AND TECHNOLOGY

The course, organized by the Indian Vacuum Society in collaboration with the Centre for Advanced Technology, Indore, will be held at the Centre for Advanced Technology, Rajendranagar, Indore, during October 16-26, 1989. For application forms and details contact: Shri A. S. Raja Rao, Convener, All

India Course on Vacuum Science and Technology, Centre for Advanced Technology, P.O. Rajendranagar, Indore 452 012, India.

Completed forms must reach the Convener before 15 September 1989.

FIRST NATIONAL SEMINAR ON CLINICAL NUTRITION IN VASCULAR MEDICINE

The seminar will be held at M.L. Theatre, KEM Hospital, Bombay, on 17 September 1989. Deadline for registration 2-9-1989. For details please contact:

Dr M. E. Yeolekar, Professor of Medicine, Secretary General, National Seminar on Clinical Nutrition, K.E.M. Hospital, Parel, Bombay 400 012, India.

NATIONAL SEMINAR ON THE ROLE OF SOIL AND WATER CONSERVATION IN MODERN AGRICULTURE

The seminar will be held at the Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, during October or November 1989. For details contact: Dr G. B. Roy,

Organizing Secretary, National Seminar on SWC, Department of Agricultural Energy, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur 741 252, India.
