Biotechnology Letters

EDITORIAL

With some encouragement, we return to February's topic of cellulase and related issues. We then asked "does waste exist?" (on which, see further overleaf); now we can ask "does cellulase do anything useful?"

First, note that if cellulase does anything at all, it only does it with cellulose, which is only part of the "lignocellulosic" materials we are supposed to be exploiting. Failure to exploit fully the non-cellulose components, and in particular the hemicelluloses, would be a waste of material in practice and is a waste of effort in research. Hemicelluloses and related substances make up from a third to a half of most vegetable wastes; the fraction which is most readily extracted, the most immediately bio-utilizable, and at the same time the most easily lost, even as mere effluent. For example in seeking to make an animal feed by bio-conversion of a plant waste, it will be comparatively easy to "improve" the digestibility of the cellulose fraction - at the expense of the hemicellulose, when the overall effect is actually a loss in feed value. So the biotechnology of pentose conversions - alongside their direct or chemical conversions into useful products - becomes a key aspect of biomass exploitation; happily (as our own pages show) one which is now receiving more serious attention. In particular, note that proposals for bio-conversions of mixed sugar streams, such as would result from combining cellulose and hemicellulose hydrolysates, need to take account of the diauxic metabolism of most organisms - even genetic constructs - on such mixtures, and of the likely effect of such diauxy on conventional continuous cultures.

Consideration of what to do with pentoses has raised a more general point: not to let our natural enthusiasm for biotechnology blind us to alternative non-biological routes for biomass exploitation. So, efficient combustion technology may be non-biological, but it remains highly desirable; pentose conversion to furfural is good process chemistry and can be sound economic sense, even though no biology is involved. And by the same token enzymic hydrolysis of cellulose must stand comparisons not with itself (my enzyme is better than yours) but with chemical hydrolysis; the rate of recent progress in the physico-chemical/engineering approach to lignocellulosics exploitation by way of non-enzymic cellulose hydrolysis may well come as a surprise to the dedicated enzymologists, when they eventually learn about it.

ERRATA (Even more about cellulase I)

Professor D. D. McLean of the University of Ottawa writes pointing out that his paper with M. F. Podrutzny on "Further Support for Fed-Batch production of Cellulases" (Biotechnology Letters, 7, 683-688; September 1985) should have referred to the work of T. G. Watson, I. Nelligan and L. Lessing [Biotechnology Letters, 6, 667-672 (1984)] in which a similar fed-batch system was reported to give even higher enzyme levels and productivities. The 1985 paper also contains a transcription error; on p. 686 in Table 1, row 5, the correct figures are:

20 g.L ⁻¹	6.5 IU/mL	90 IU.L ⁻¹ .h ⁻¹	325 IU.g ⁻¹ cellulose
----------------------	-----------	--	----------------------------------

ASTM BIOTECHNOLOGY OPERATIONS TAKING SHAPE

Not long ago we were pleased to note the initial stages of development of an ASTM involvement in biotechnology; that involvement is beginning to take organizational shape with the development of a main committee and a subcommittee structure - simplified after considerable discussion and now covering, inter alia, materials quality, characterization of biological systems, processes and control, environmental aspects, and terminology. All interested persons or organisations should apply for membership of ASTM through Midge Torzone at ASTM, 1916 Race St, Philadelphia Pa 19103 (USA).

SOMEONE OUT THERE....

Spurred by our first essay on cellulase, F. Wynn Hayes writes from WPC Associates of London; his letter is unfortunately too long to be passed on in full but here are some particularly apt passages:

"...That word 'waste' simply has to be qualified. Where the lignocellulose is used as a primary fuel, and where there is no cheaper fuel to hand, it is no longer 'waste' if it is burned efficiently. Of course if it is burned inefficiently...or composted and returned to the land inefficiently....the resource is wasted just as thoroughly as if it were not utilized at all."

"...The (sugar) industry itself, with the help of the boiler manufacturers, designed new furnaces which burned bagasse efficiently...so that now, a huge mountain of bagasse started to appear outside the mill. All the active little chemists then began to talk about cellulose, building boards, paper pulp, animal feeds, even saccharification...(whereas) the sugar mill engineers chose a quick way out...relaxed on the heat economies and control of steam usage so that...the bagasse mountain disappeared."

"...There is enough bagasse to keep a normal sugar mill going and still have anything from 10% to 20% left over. To avoid 'wasting' it one can - burn all the bagasse to make more steam and power and use that; hydrolyse the hemicelluloses and pentosans and use the resulting pentoses; go to one of the (other) bagasse-based operations ranging from alpha-cellulose to paper pulp to furfural."

We couldn't agree more; there is "waste" to be found, by increasing the efficiency of parts of the operation, and biotechnology is one (not the only) technology that has something (not everything) to say about some (not all) of the many (not one) ways of diverting it into 'not-waste'. Thankyou for the letter.

National University of Singapore Department of Zoology

Applications are invited for teaching appointments in the Department of Zoology.

Candidates should have a Ph.D. degree and who are trained in one or more of the following areas:

Developmental Biology, particularly molecular aspects involving aquatic animals
Marine Microbiology/Fish Pathology
Molecular Genetics of Protozoa

Gross annual emoluments range as follows:

Lecturer	S\$28,300 - 58,680
Senior Lecturer	S\$53,160 - 94,090
Associate Professor	S\$82,430 - 113,530

(STGE1 = S\$3.13 approximately)

The commencing salary will depend on the candidate's qualifications, experience and the level of appointment offered.

Leave, medical and provident fund benefits are provided. Depending on the type of contract offered, other benefits may include: a settling-in allowance of S\$1,000 (single) or S\$2,000 (married), subsidized housing at nominal rentals ranging from S\$100 to S\$216 p.m., education allowance for up to three children, subject to a maximum of S\$10,000 per annum per child, passage assistance and baggage allowance for the transportation of personal effects to Singapore. Staff members may undertake consultation work, subject to the approval of the University, and retain consultation fees up to a maximum of 60% of their gross annual emoluments in a calendar year.

Application forms and further information on terms and conditions of service may be obtained from:

The Director
Personnel Department
National University
of Singapore
Kent Ridge
Singapore 0511

NUS Overseas Office
Singapore High Commission in London
5 Chesham Street
London SW1
U.K.
Tel: (01) 235 4562