16 July 1982 • Vol. 217 • No. 4556

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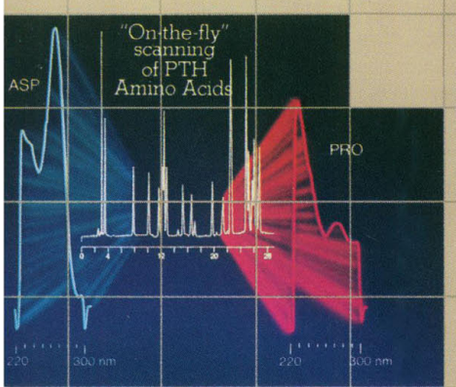
SCIENCE

GOAL:

Reveal hidden HPLC peaks



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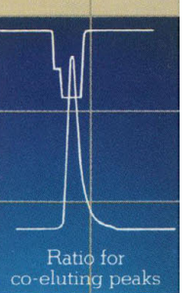
Ratio for co-eluting peaks

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ADENOSINE

Adenosine, [2,8,5′-^{3}H]-
15-(4′-aminobenzyl)-1-carazolol, [^{125}I]-
15-(4′-azidobenzyl)-1-carazolol, [^{125}I]-
Cyclohexyladenosine, *N*^{6}-[*adenine*-2,8-^{3}H-
Diethyl-8-phenylxanthine, 1,3-[*phenyl*-4-^{3}H]-
Methyl-2-phenylethyladenosine, L-*N*^{6}-1-[*adenine*-2,8-^{3}H, *ethyl*-2-^{3}H]-(Phenylisopropyladenosine)

α-ADRENERGIC

Aminoclonidine, *p*-[3,5-^{3}H]-
Clonidine · HCl, [4-^{3}H]-
Dihydro-α-ergocryptine, 9,10-[9,10-^{3}H(N)]-
WB-4101 (2,6-Dimethoxyphenoxyethyl) aminomethyl-1, 4-benzodioxane, 2-[*phenoxy*-3-^{3}H(N)]-
Epinephrine, *levo*-[*N-methyl*-^{3}H]- or [*N-methyl, ring*-2,5,6-^{3}H]-
2-[β-(4-Hydroxy-3-iodophenyl) ethylaminomethyl] tetralone, [^{125}I]-
Norepinephrine, *levo*-[7,8-^{3}H(N)]- or [*ring*-2,5,6-^{3}H]-
Phenoxybenzamine · HCl, [*phenoxy*-^{3}H]-
Prazosin, [*furoyl*-5-^{3}H]-
Rauwolscine, [*methyl*-^{3}H]-
Yohimbine, [*methyl*-^{3}H]-

β-ADRENERGIC

Azidobenzylcarazolol, L-*para*-[*benzyl*-3,5-^{3}H]-
Carazolol, DL-[3,6-^{3}H(N)]-
Dihydroalprenolol · HCl, *levo*-[*propyl*-1,2,3-^{3}H]- or [*propyl, ring*-^{3}H]-
Epinephrine, *levo*-[*N-methyl*-^{3}H]- or [*N-methyl, ring*-2,5,6-^{3}H]-
Hydroxybenzylisoproterenol, *p*-[7-^{3}H]-
Iodocyanopindolol, [^{125}I]-
Iodohydroxybenzylpindolol, [^{125}I]-
Isoproterenol, DL-[7-^{3}H(N)]-
Norepinephrine, *levo*-[7,8-^{3}H(N)]- or [*ring*-2,5,6-^{3}H]-
Propranolol, L-[4-^{3}H]-

ALANINE

Alanine, β-[3-^{3}H(N)]-

ASPARTATE

Aspartic acid, D-[2,3-^{3}H]-
Aspartic acid, L-[2,3-^{3}H]-

BENZODIAZEPINE

Diazepam, [*methyl*-^{3}H]-
Ethyl β-carboline-3-carboxylate, [*ethyl*-2-^{3}H]-
Flunitrazepam, [*methyl*-^{3}H]-
Flurazepam, [*ethylene*-^{3}H]-
Methyl β-carboline-3-carboxylate, [*methyl*-^{3}H]-
Propyl β-carboline-3-carboxylate, [*propyl*-2,3-^{3}H]-
RO5-4864, [*N-methyl*-^{3}H]-
RO15-1788, [*N-methyl*-^{3}H]-

CALCIUM

Nitrendipine, [5-*methyl*-^{3}H]-

CHOLINERGIC

Acetycholine iodide, [*N-methyl*-^{3}H]-

Muscarinic

Choline chloride, [*methyl*-^{3}H]-
Dioxolane, L(+)-*cis*-[2-*methyl*-^{3}H]-
Oxotremorine-M acetate, [*methyl*-^{3}H]-
Propylbenzilylcholine mustard, [*propyl*-2,3-^{3}H]-
Quinuclidinyl benzilate, L-[*benzilic*-4,4′-^{3}H(N)]-
Scopolamine methyl chloride, [*N-methyl*-^{3}H]-

Nicotinic

Amino-4-guanidobutane, 1-[1,2-^{3}H(N)]- (Agmatine)
Bungarotoxin, α-[^{125}I]-
Choline chloride, [*methyl*-^{3}H]-
Nicotine, DL-[*N-methyl*-^{3}H]-
Tubocurarine chloride, *dextro*-[13′-^{3}H(N)]-
Maleimidobenzyltrimethylammonium iodide, 4-*N*-[*methyl*-^{3}H]- (MBTA)

DOPAMINERGIC

ADTN (Amino-6,7-dihydroxy-1,2,3,4-tetrahydronaphthalene, 2-), [5,8-^{3}H]-
Apomorphine, L-(−)-[8,9-^{3}H]-
Dihydro-α-ergocryptine, 9,10-[9,10-^{3}H]-
Dihydroxyphenylethylamine, 3,4-[*ring*-2,5,6-^{3}H]-
Domperidone, [*benzene ring*-^{3}H]-
Flupenthixol, *cis*-[*ring*-^{3}H]-
Haloperidol, [^{3}H(G)]-
Propylnorapomorphine, L-(−)-[*N-propyl*-^{3}H(N)]-
Spiperone, [*benzene ring*-^{3}H]-
Sulpiride, (−)-[*methoxy*-^{3}H]-

GABA

Aminobutyric acid, γ-[2,3-^{3}H(N)]-
Baclofen, DL-[*butyl*-4-^{3}H(N)]-
Dihydropicrotoxinin, α-[8,10-^{3}H]-
DMBB, (+)-[*butyl*-2,3,4-^{3}H]-
DMBB, (−)-[*butyl*-2,3,4-^{3}H]-
Muscimol, [*methylene*-^{3}H(N)]- or [4-^{3}H]-
Nipecotic acid, [*ring*-^{3}H]-
Piperidine-4-sulfonic acid, [*ring*-^{3}H]-
Tetrahydroisoxazolo (5,4-c) pyridin-3-ol,4,5,6,7-[5,7-^{3}H]- (THIP)

GLUTAMATE

Glutamic acid, L-[3,4-^{3}H]-
Methyl-D-aspartic acid, *N*-[*methyl*-^{3}H]-

GLYCINE

Dihydrostrychnine, [21,22-^{3}H]-
Glycine, [2-^{3}H]-
Strychnine, [*benzene ring*-^{3}H]-

HISTAMINE

H_1

Doxepin, [*methyl*-^{3}H]-
Histamine · 2HCl, [*ring, methylenes*-^{3}H(N)]-
Mianserin · HCl, [*N-methyl*-^{3}H]-
Pyrilamine, [*pyridinyl*-5-^{3}H]- (Mepyramine)

H_2

Histamine · 2HCl, [*ring, methylenes*-^{3}H(N)]-
Tiotidine, [*methyl*-^{3}H]- (ICI 125, 211)

OPIATE

Dihydromorphine, [*N-methyl*-^{3}H]-
Enkephalin (5-L-leucine), [*tyrosyl*-3,5-^{3}H(N)]-
Enkephalin (5-L-methionine), [*tyrosyl*-3,5-^{3}H(N)]-
Enkephalin-(2-D-alanine-5-L-methionine), [*tyrosyl*-3,5-^{3}H]-
Enkephalin (5-L-leucine), [*tyrosyl*-^{125}I]-
Enkephalin (5-L-methionine), [*tyrosyl*-^{125}I]-
Enkephalinamide (2-D-alanine-5-L-methionine), [*tyrosyl*-3,5-^{3}H]-
Ethylketocyclazocine, [9-^{3}H]-
Morphine, [*N-methyl*-^{3}H]-
Naloxone, [*N-allyl*-2,3-^{3}H]-
Phencyclidine, [*piperidyl*-3,4-^{3}H(N)]-
SKF-10,047, [*N-allyl*-2,3-^{3}H]-

SEROTONIN

Dihydro-α-ergocryptine, 9,10-[9,10-^{3}H(N)]-
Hydroxytryptamine binoxalate, 5-[1,2-^{3}H(N)]-
Hydroxytryptamine creatinine sulfate, 5-[1,2-^{3}H(N)]-
Lysergic acid diethylamide, [*N-methyl*-^{3}H]-
Mianserin · HCl, [*N-methyl*-^{3}H]-
Spiperone, [*benzene ring*-^{3}H]-

PEPTIDE LIGANDS

Angiotensin II (5-L-isoleucine), [*tyrosyl*-3,5-^{3}H(N)]- or [*tyrosyl*-^{125}I]-
Bradykinin, [2,3-*prolyl*-3,4-^{3}H(N)]- or (8-tyrosine)-triacetate, [8-*tyrosyl*-^{125}I]-
Formyl-methionyl-L-leucyl-L-phenylalanine, *N*-[*phenylalanine ring*-2,6-^{3}H(N)]-
Formyl-L-norleucyl-L-leucyl-L-phenylalanine, *N*-[*phenylalanine ring*-2,6-^{3}H(N)]-
Luteinizing hormone, [^{125}I]-
Melanotropin release inhibiting hormone, [L-*prolyl*-2,3,4,5-^{3}H(N)]-
Substance P, [2-*prolyl*-3,4-^{3}H(N)]- or (8-tyrosine), [^{125}I]-
Thyrotropin releasing hormone [L-*prolyl*-2,3,4,5-^{3}H(N)]- or [^{125}I]-
Thyrotropin releasing hormone (3-methyl-histidine^2), [L-*histidyl*-4-^{3}H(N), L-*prolyl*-3,4-^{3}H(N)]-

RELEASE-UPTAKE AGENTS

Amino-4-guanidobutane, 1-[1,2-^{3}H(N)]- (Agmatine)
Amphetamine sulfate, D-[^{3}H(G)]-
Chlorpromazine hydrochloride, [*benzene ring*-^{3}H]-
Desmethylimipramine hydrochloride, [2,4,6,8-^{3}H]-
Dihydrocapsaicin, [*nonanamide*-6,7,9-^{3}H(N)]-
Imipramine hydrochloride, [*N-methyl*-^{3}H]-
Nitroimipramine hydrochloride, 2-[*N-methyl*-^{3}H]-
Reserpine, [*benzoyl*-^{3}H(G)]-

STEROID

Androgen

Dihydrotestosterone, [1,2,4,5,6,7,16,17-^{3}H(N)]-
Hydroxyandrost-4-ene-3, 17-dione, 19-[6,7-^{3}H(N)]-
Methyltrienolone, [17α-*methyl*-^{3}H]-
Testosterone, [1,2,6,7,16,17-^{3}H(N)]-
Testosterone, Δ^6-[^{3}H]-

Estrogen

Estradiol, [2,4,6,7,16,17-^{3}H(N)]-
Iodo-3, 17β-estradiol, 16α-[^{125}I]-
Moxestrol, [11β-*methoxy*-^{3}H]-
Tamoxifen, [*N-methyl*-^{3}H]-

Glucocorticoid

Dexamethasone, [6,7-^{3}H(N)]-
Dexamethasone mesylate, [6,7-^{3}H]- and unlabeled
Hydrocortisone, [1,2,6,7-^{3}H]-
Triamcinolone acetonide, [6,7-^{3}H(N)]-

Mineralocorticoid

Aldosterone, D-[1,2,6,7-^{3}H(N)]-

Progesterone

Dihydroprogesterone, [1,2-^{3}H(N)]-
Nor-17α-ethynyltestosterone, 19-[6,7-^{3}H(N)]-
Progesterone, [1,2,6,7-^{3}H(N)]-
Promegestone, [17α-*methyl*-^{3}H]-

VITAMIN D_3

Dihydroxyvitamin D_3, 1α,25-[26,27-^{3}H]-
Hydroxyvitamin D_3, 25-[26,27-^{3}H]-
Vitamin D_3, [1,2-^{3}H(N)]-

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Slash-and-burn agriculture in the Amazon rainforest. Tropical forests often mask nutrient-poor soils with high levels of toxic aluminum. Ashes released after burning the vegetation provide a temporary layer of fertilizer that is soon removed by leaching, erosion, and crop harvesting. These marginal lands are nevertheless the focus of increasingly intense settlement by pioneers. Several international agricultural research centers are investigating ways of boosting food production from such problem areas. See page 215. [Nigel J. H. Smith, University of Florida, Gainesville 32611]

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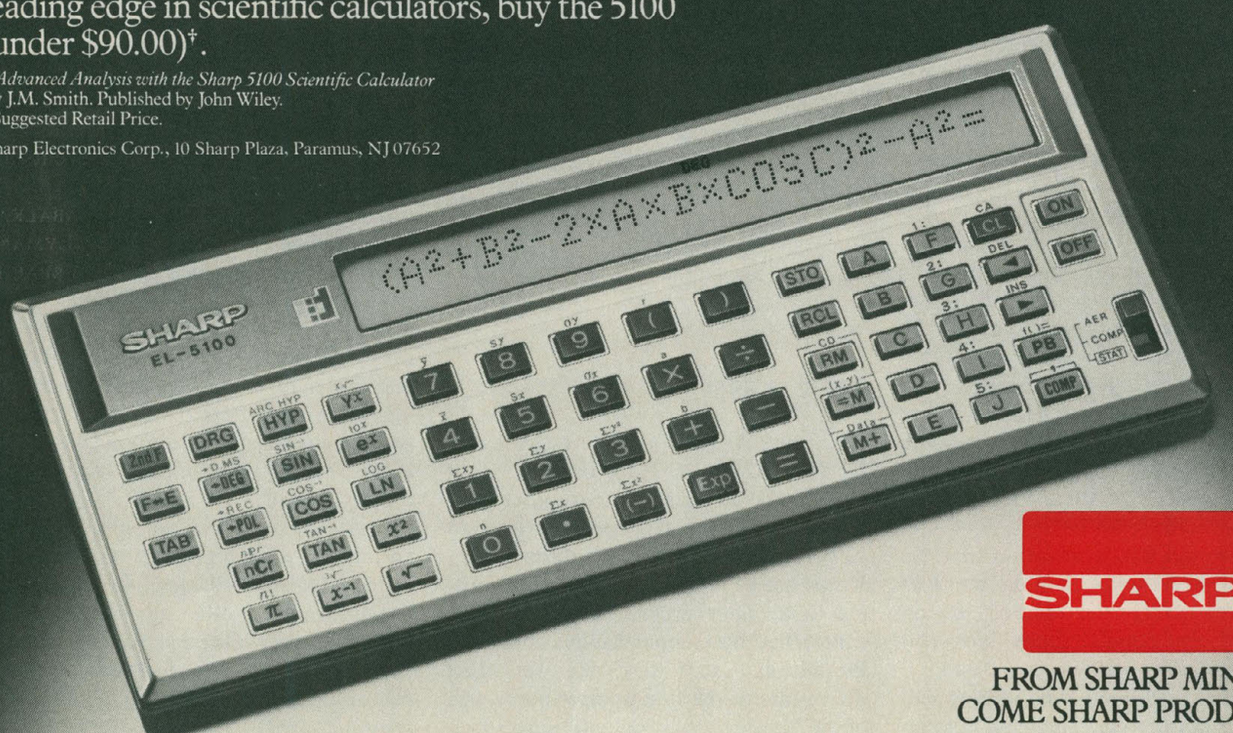

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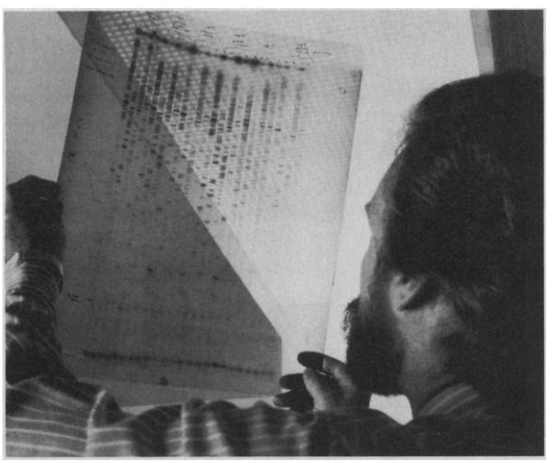
Biotechnology: It's more than a promise at NEN



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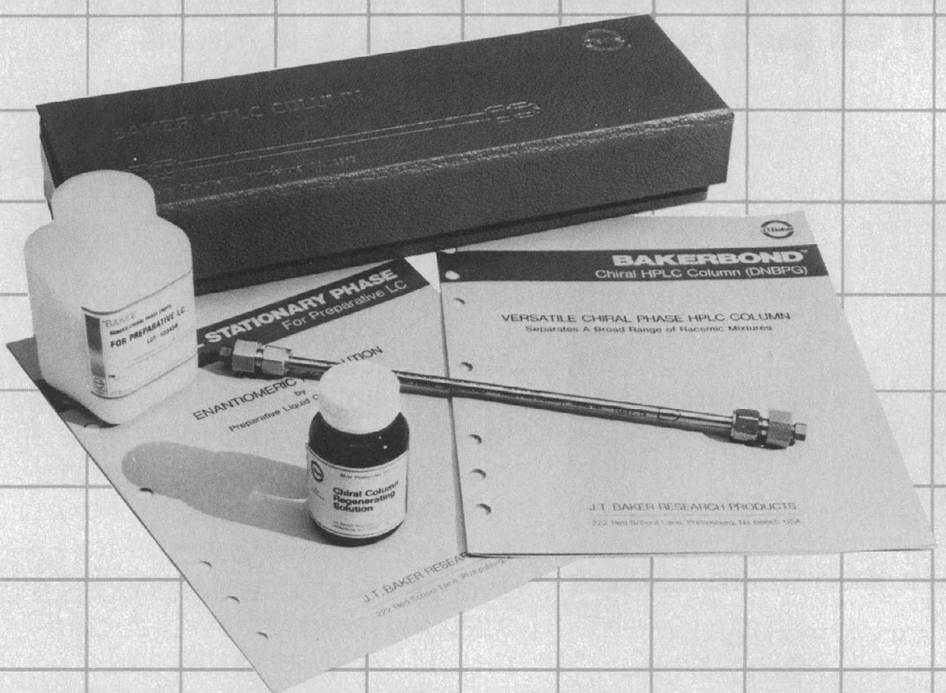

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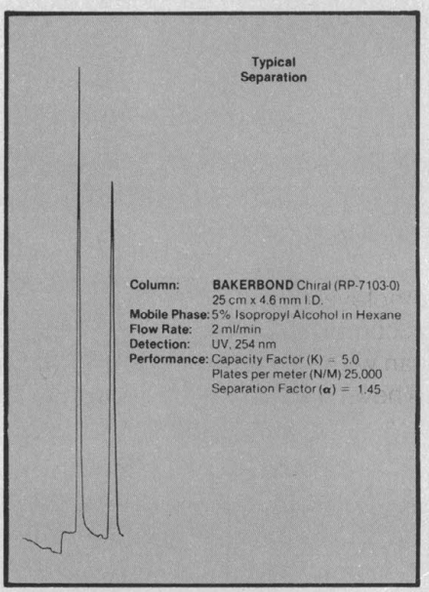

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16 July 1982, Volume 217, Number 4556 **SCIENCE**

R & D in the Fiscal 1983 Budget

The President's budget for fiscal year 1983 treated R & D fairly well, given the economic exigencies and the policy orientations of the Reagan Administration.* Within these policies, some fine-tuning of the amounts for R & D deserves serious consideration; some of this may be done by Congress as it acts on the details of the budget. What will be the outcome in Congress? The spending targets in the budget resolution leave open the possibility that the R & D budgets finally approved by Congress could approximate closely the recommendations in the President's budget.

For budget function 250, the only category that consists entirely of R & D (National Science Foundation, Department of Energy general research, and NASA), the resolution provides exactly the same amounts as in the President's budget. This is preferential treatment. The general congressional guideline of freezing 1983 budgets for discretionary spending at the fiscal 1982 budget levels would have meant a cut of about 10 percent.

Totals for most of the other functions also seem adequate to include the amounts budgeted for R & D, except for national defense R & D, where the 3.6 percent reduction in total budget authority could mean a cut of as much as $1 billion in the $4.4 billion increase recommended in the budget.

The final outcomes, however, will depend on how R & D is treated by Congress in the detailed authorization and appropriations bills, and whether the appropriations bills as passed are acceptable to the President. Detailed congressional action could produce R & D budgets that are revised, perhaps improved, versions of the President's budget. But a presidential veto and another standoff between the President and Congress would probably result again this year in percentage across-the-board reductions applied indiscriminately to R & D along with other programs.

The longer term outlook for R & D is, at best, bleak. Even under optimistic economic assumptions, total funding available for nondefense R & D faces a reduction in constant dollars of as much as 30 percent over the 5-year period FY 1983 to FY 1987, unless continued high deficits, substantial increases in taxes, a major cutback in defense, or some combination of these becomes acceptable economically and politically. The establishment of plans and priorities for federal support of R & D within a total level of resources that is declining in real terms is the single greatest challenge facing the scientific and technical leadership in the government and the scientific and technical community as a whole.

There are plenty of other challenges. I will mention only three:

1) There is the challenge to all of us to see that something, besides talking, is done about the problems of science and engineering education at all levels. Our decentralized education system needs leadership. Will the federal government provide it? If not, who will?

2) There is the challenge to industry to show that the U.S. private sector, in the favorable regulation and tax environment of the Reagan Administration, can match competition from other nations in developing and marketing new and improved products based on advances in science and technology.

3) There is an urgent challenge to Congress and the Executive Branch to find ways to temper the operation of the budget process. I counted 160 distinct steps in the budget process as it now "works." At a minimum, we must insulate from controversies on overall budget policy the core of largely noncontroversial functions of government for which the range of likely budget adjustments does not have an appreciable impact on the size of the deficit, the level of revenues, or the state of the economy. We should be able to conduct important activities like R & D within the framework of approved long-range plans and clearly defined fiscal envelopes, without the continual disruptions and uncertainties that characterize the present budget process.—WILLIS H. SHAPLEY, *Consultant, AAAS*†

*W. H. Shapley, A. H. Teich, J. P. Weinberg, *Research and Development: AAAS Report VII* (AAAS, Washington, D.C., 1982). †Excerpted from remarks at Seventh Annual AAAS Colloquium on R & D Policy, 23 and 24 June 1982.

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