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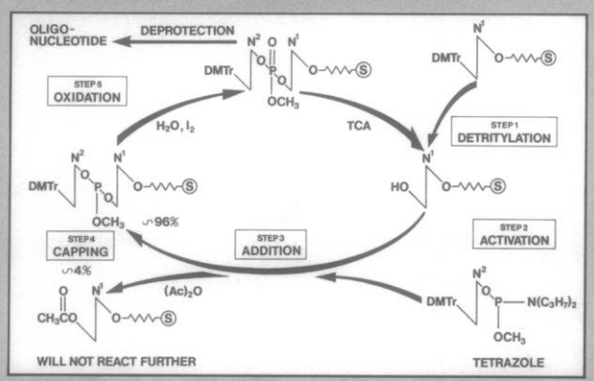
SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

BIOSYSTEMS UPDATE

Major Progress Announced in DNA Synthesis

Improvements in phosphoramidite chemistry, as implemented by Applied Biosystems, make it the fastest, most efficient, and most economical means of synthesizing DNA. If you haven't made DNA with our diisopropyl phosphoramidite nucleosides, you may not be aware of the many advantages this method has to offer.

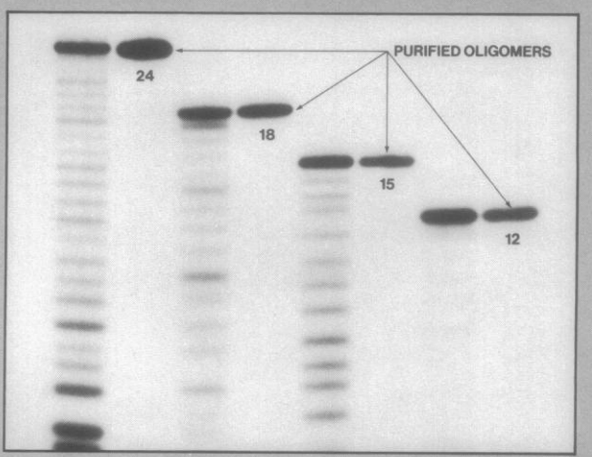


Synthesis cycle for phosphoramidite chemistry gives high yields of easily purified oligonucleotides.

Phosphoramidite chemistry provides 95-97 percent coupling efficiency and yields three to ten O.D. of purified DNA when synthesizing at only the one μmole scale. Oligonucleotides of greater than 50 bases have been synthesized using this method and 30-40 base fragments are routine.

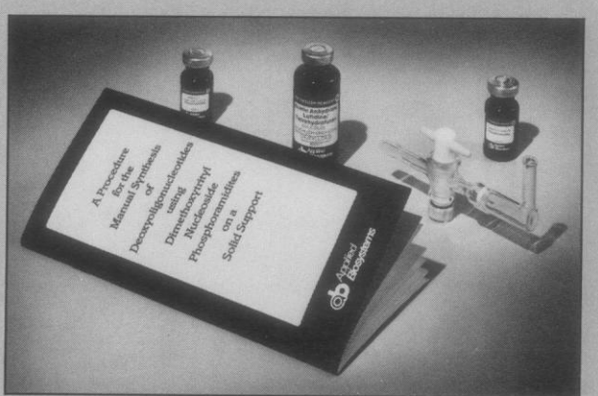
Recent price reductions allow synthesis for only $3-4 per base addition and the phosphoramidites have virtually unlimited shelf life, so waste is also eliminated. Even in solution, they are stable for weeks. The phosphoramidite chemistry also saves time—only 15-20 minutes are required for each complete base addition cycle.

This new chemistry is so convenient you'll never go back to older procedures. No dimers or trimers are ever needed. No pyridine is used and no redistillation is required. All reactions are carried out at room temperature so side products are minimized.



Autoradiogram of crude isolates and corresponding purified oligonucleotides. Purification is facilitated by a capping reaction which minimizes the longer chain impurities in the crude products.

Applied Biosystems has the total solution for your DNA synthesis needs. We provide ultrapure, highly stable reagents, the key to success using this reliable method. In addition, we provide a detailed procedure for manual DNA synthesis. As your requirements for custom DNA increase, our Model 380A DNA Synthesizer can make it automatically in your laboratory.



Write for our synthesis procedure and Model 380A DNA Synthesizer brochure.

Applied Biosystems

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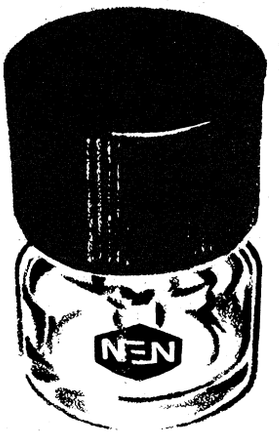

SNEAK PREVIEW

One of the most significant new releases of the year is a production of broad scope and imagination. With a cast of 1400 radiochemicals and many related products, including 200 new listings, its title is disarmingly modest: "The 1983 NEN Catalog."

It opens with a dramatic announcement: the industry's first simplified, comprehensive pricing system. Briefly, it says that every NEN research product is consistently priced for *all* quantities for *all* customers. Now you'll know the exact cost (including shipping) when you place your order—or even before you order, if you're simply planning.

The benefits of this new system are many, but they add up to simplicity and flexibility. Your NEN technical representative will gladly answer any questions you may have.

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7 October 1983

Volume 222, No. 4619

SCIENCE

LETTERS AAAS Human Rights Activities: *T. Eisner*; Corn Mold Controversy: *J. Tuite*; Automobiles and Acid Rain: *G. R. Hendrey*; Meningomyelocele: *J. L. Venes* 6

EDITORIAL The Global Agricultural Support System: *V. W. Ruttan* 11

ARTICLES The Desertron: Colliding Beams at 20 TeV: *R. Diebold* 13

Biotechnology in the Marine Sciences: *R. R. Colwell* 19

Mineralogic Information from a New Airborne Thermal Infrared Multispectral Scanner: *A. B. Kahle* and *A. F. H. Goetz* 24

NEWS AND COMMENT Nuclear Vote Threatens Draper Lab 28

The DNA Double Helix Turns 30 29

Bell Labs—New Focus on the Bottom Line 30

EPA, Utilities Grapple with PCB Problems 32

Briefing: No Consensus Yet on a Space Station; Organs for Sale; New Bioethics Panel Under Consideration; Genetically Engineered Plants Get a Green Light; Kerr Puts U.S.S.R. Off Limits to Los Alamos Scientists; VA Endorses Right to Die 34

RESEARCH NEWS Suspect Terranes and Continental Growth 36

New Way to Catalyze Polymerization 39

Century-Old Math Problem Solved 40

A Step Toward Artificial Chromosomes 41

AAAS NEWS Junior High Schools Focus for New Science Education Project: *J. Wrather*; Insurance Program Announcement; GEM Alumni—Success Stories; CHEMRAWN II Calls for Twofold Increases in World Food Production: *C. L. Rogers*; Editorial Search Committee Announced 42

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BOOK REVIEWS Primate Communication, *reviewed by P. Marler*; Herbivorous Insects, *P. Kareiva*; Selected Papers, 1945–1980, with Commentary, *L. M. Brown*; Books Received 44

REPORTS Heat Transfer Measurements of the 1983 Kilauea Lava Flow: *H. C. Hardee* 47

Alluvial-River Response to Neotectonic Deformation in Louisiana and Mississippi: *A. W. Burnett* and *S. A. Schumm* 49

Chesapeake Bay: An Unprecedented Decline in Submerged Aquatic Vegetation: *R. J. Orth* and *K. A. Moore* 51

Free Cupric Ion Activity in Seawater: Effects on Metallothionein and Growth in Crab Larvae: *B. M. Sanders* et al. 53

Catch a Falling Star: Meteorites and Old Ice: *I. M. Whillans* and *W. A. Cassidy* 55

Eccentric Ringlet in the Maxwell Gap at 1.45 Saturn Radii: Multi-Instrument Voyager Observations: *L. W. Esposito* et al. 57

Neuron-Glia Adhesion Is Inhibited by Antibodies to Neural Determinants: *M. Grumet, U. Rutishauser, G. M. Edelman* 60

In vivo Determination of the Pyridine Nucleotide Reduction Charge by Carbon-13 Nuclear Magnetic Resonance Spectroscopy: *C. J. Unkefer, R. M. Blazer, R. E. London* 62

Type II Collagen–Induced Autoimmune Endolymphatic Hydrops in Guinea Pig: *T. J. Yoo* et al. 65

Rapid Degradation of "New" Acetylcholine Receptors at Neuromuscular Junctions: *E. F. Stanley* and *D. B. Drachman* 67

Intracellular Recordings from Cochlear Inner Hair Cells: Effects of Stimulation of the Crossed Olivocochlear Efferents: *M. C. Brown, A. L. Nuttall, R. I. Masta* 69

Segregation and Mapping Analysis of Polymorphic HLA Class I Restriction Fragments: Detection of a Novel Fragment: *H. A. Erlich* et al. 72

Technical Comments: Eye Movements of Preschool Children: *R. N. Aslin* and *K. J. Ciuffreda*; *J. L. Dannemiller* et al.; *E. Kowler* and *A. J. Martins*; Co-Release of ACTH and β-Endorphin Immunoreactivity in Human Subjects in Response to Central Cholinergic Stimulation: *S. C. Risch* et al. 74

MEETINGS Gordon Research Conferences: 1984 Winter Schedule: *A. M. Cruickshank* 78

COVER

Multispectral thermal image of Death Valley, California. Furnace Creek Fan is located in the upper left and the Panamint Mountains are at the bottom. (North direction is left.) Digital image is processed to show spectral emissivity differences in color and temperature variation as differences in intensity. See page 24 [John Reimer, Jet Propulsion Laboratory, Pasadena, California 91109]

TIAA announces

MOD ONE...

a brand new concept in personal life insurance protection for families in the academic community that

- cuts first-year premiums up to 50%
- gives discounts of 33⅓% to 40% on large policies

Is digging up that first premium stopping you from providing all the financial protection your family deserves? Then here's really good news. With the introduction of MOD ONE* October 1, 1982, Teachers Insurance has cut up to 50% from initial premiums on term policies of $100,000 to $249,000. And we've trimmed off even more for policies of $250,000 and above. This means you now need only about half as much premium money "up front" to start a large new TIAA policy. Putting it another way, for roughly the same outlay as before you can now begin a new policy that provides twice as much immediate protection for your family!

Here's what men and women aged 35, for example, now pay for 5-Year Renewable Term policies of different amounts:

First-Year Premiums for TIAA 5-Year Renewable Term Policies

Policy Amount ▶	$50,000	$100,000	$150,000	$200,000	$250,000
Issued to men aged 35					
First-year premium	$126.75	$169.00	$253.50	$338.00	$380.25
Premium per $1,000	$2.53	$1.69	$1.69	$1.69	$1.52
Issued to women aged 35					
First-year premium	$110.25	$147.00	$220.50	$294.00	$330.75
Premium per $1,000	$2.20	$1.47	$1.47	$1.47	$1.32

As you can see, premium rates for policies of $100,000 to $249,000 are ⅓ less than those for smaller policies, and for policies of $250,000 or more, they're 40% less. Substantially lower first-year premiums for all ages and big discounts for larger policies encourage everyone to consider the higher levels of family protection they may have felt they just couldn't afford until now.

Premiums for MOD ONE policies increase beginning with the second year, but generous dividends, credited concurrently, will automatically reduce those premiums. Under the present dividend scale, expected payments for the second and subsequent years of the 5-year policy period in the examples above will be identical to the premium for the first year shown. While dividends cannot be guaranteed for the future, of course, TIAA has paid dividends on life insurance each year since 1918.

To receive personal illustrations of new MOD ONE policies, mail the coupon; or phone the TIAA Life Insurance Advisory Center Toll Free at 800-223-1200 (in New York, call collect 212-490-9000). No one will call on you as a result of your inquiry.

Eligibility to apply for TIAA life insurance is extended to employees of colleges, universities, private schools, and certain other nonprofit educational and research institutions. The employee's spouse is also eligible provided more than half of their combined earned income is from a qualifying institution.

Note to present TIAA policyowners: MOD ONE premium rates apply only to policies issued on or after October 1, 1982, but cash dividends payable in accordance with the 1982 scale will continue to provide equitable treatment for policies issued prior to that date.

*Modified first-year premium.

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S310

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Please mail me the facts about new TIAA MOD ONE life insurance policies with personal illustrations of low-cost Term policies for my age.

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Home Address _____

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If your spouse is also eligible according to the rules at left, please fill in: _____
Spouse's name _____ Birthdate _____

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7 October 1983, Volume 222, Number 4619 **SCIENCE**

The Global Agricultural Support System

For the architects of the post–World War II set of global institutions, meeting world food needs and reducing poverty in rural areas were essential elements in their vision of a world community that could ensure all people of freedom from want and insecurity. Agencies such as the U.S. Agency for International Development and the World Bank have used the development of national agricultural research systems as a major instrument for aiding poor countries in meeting domestic food needs. In a number of countries, assistance from external agencies has played an important role in the development of strong national agricultural research systems. But in too many cases, domestic economic and political support has failed to materialize. A period of rapid institutional development, supported primarily by external assistance, has often been followed by the decline or even collapse of research capacity as external project support has been phased out.

In my judgment, such cycles of development and decay are a result of the traditional project approach that agencies have used in encouraging the development of national agricultural research capacity. External assistance provides an alternative to the development of internal political support, and experience has shown that such political support within a country is vital to the continued development of national research programs. National research directors have frequently found, however, that generating external support requires less political effort than developing domestic support and have chosen the easier path. The system of external support needs to be reformed in a way that will redirect political entrepreneurship toward building domestic support for agricultural research.

One innovation that might be used is for the development assistance agencies to move toward a "formula funding" or "revenue sharing" approach in which the size of donor contributions is linked to growth of domestic support for agricultural research. A second alternative would be for the group of donors to establish a support consortium that would engage in joint planning and funding of the host country's agricultural research program. This method is being used successfully in Bangladesh.

Objections to such reform proposals more often come from the outside agencies than from the recipient country. Assistance agencies often prefer to have a free hand in directing assistance resources toward the achievement of short-run political rather than long-run development objectives. And the aid constituencies in the developed countries typically have their own reform agendas which they attempt to have national aid agencies impose on recipient countries.

Why are reforms needed in the system of external support? In the developed countries agriculture has made a transition from a resource-based to a science-based industry. In 1925 corn yields in Argentina were higher than those in the United States. Fifty years later corn yields were more than twice as high in the United States as they were in Argentina. This was not a result of changes in resource endowments; it was due to the scientific and technical advances embodied in the corn seed and other inputs used in agricultural production in the countries.

By the end of this century there will be few areas in world where agricultural production can be increased by expanding the area cultivated. Countries that cannot take advantage of yield-increasing biological and chemical technology will find it increasingly difficult to maintain their export earnings from agriculture or even to meet their domestic food needs. Only a country that establishes its own research capacity in agriculture can gain access to the advances in knowledge that are available to it from the global scientific community and embody that knowledge in the technology suited to its own resource and cultural endowments.—VERNON W. RUTTAN, *Department of Agricultural and Applied Economics and Department of Economics, University of Minnosota, Minneapolis 55455*

This editorial is based on a paper presented at the Colorado State University International School for Economic Development Studies on 11 March 1983.

The best of the old becomes the best of the new.

If you are using research biochemicals in your laboratory, chances are you've heard the phrase, "excellence in biochemistry". For over 30 years P-L Biochemicals has earned the right to use these words with a long history of product "firsts" and consistent quality. From this well-established tradition and firm foundation will come some very exciting changes in the very near future.

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Yes we've changed our name...

But not our commitment.

The commitment of both companies to produce outstanding products from the most recent technology remains foremost in the objectives of this new organization. Look to the future for exciting new developments from **Pharmacia P-L Biochemicals, Inc.**

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