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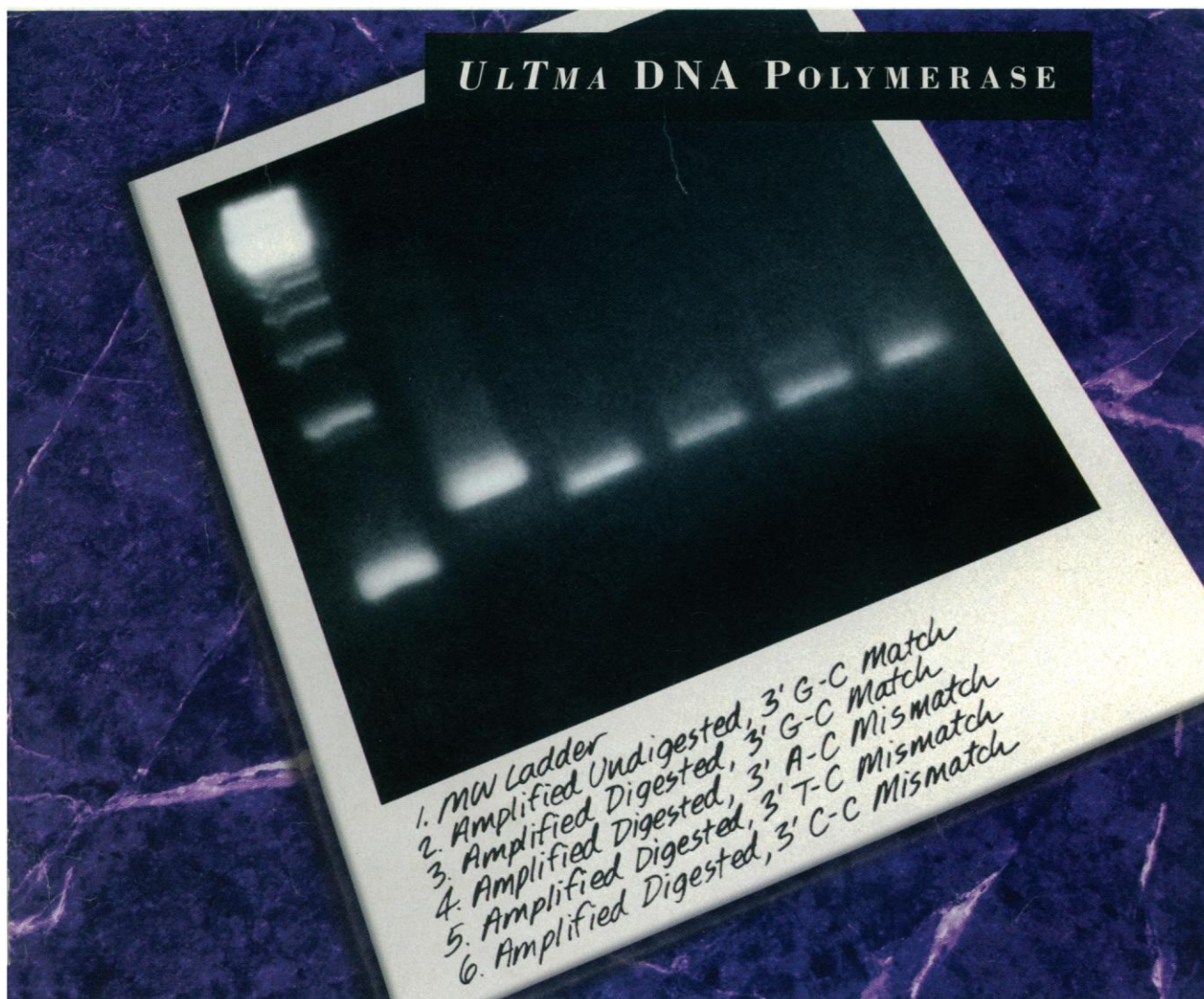
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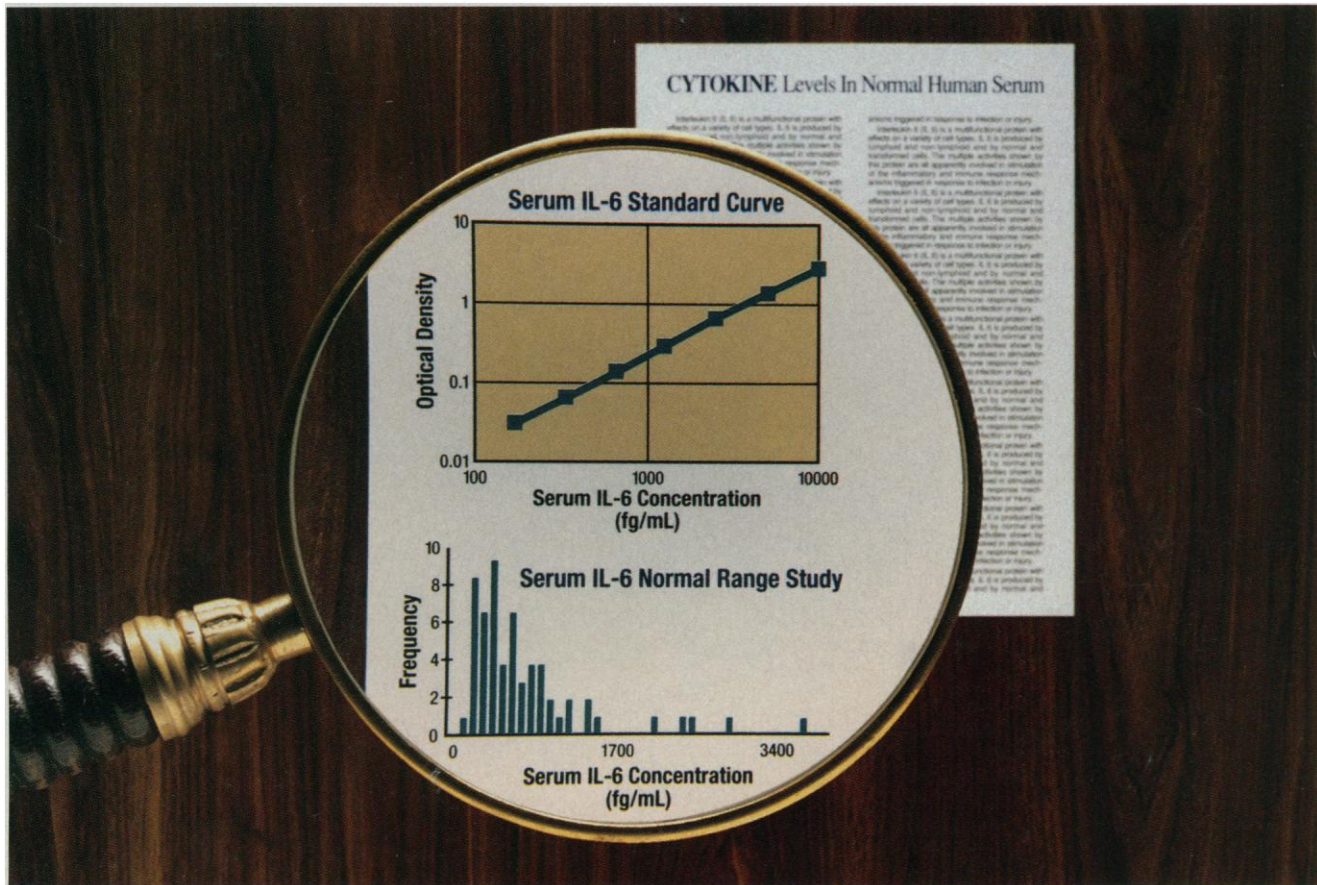
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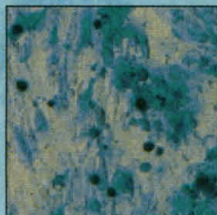
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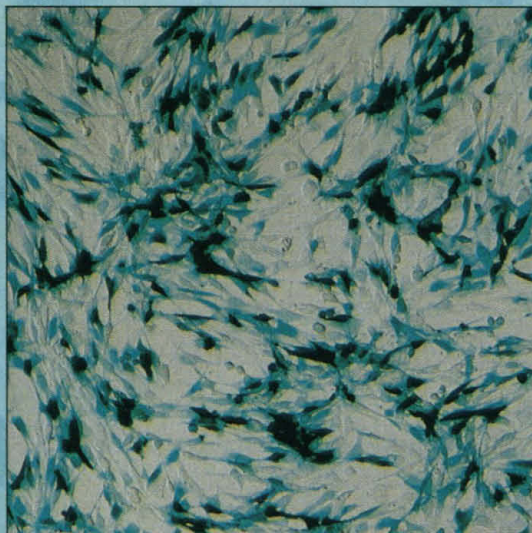
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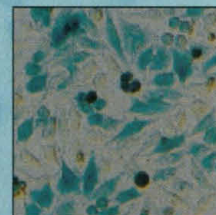
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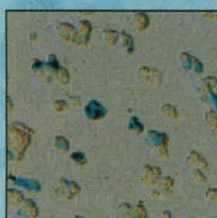
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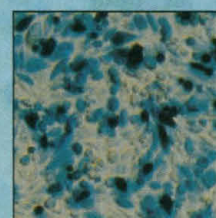
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1. Hawley-Nelson, P., Ciccarone, V., Gebeyehu, G., Jessee, J. and Felgner, P., (1993) *Focus* 15, in press.
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Melting temperature
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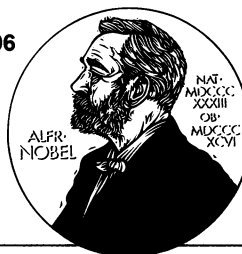
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COVER

Scanning electron micrograph of the head of *Odontomachus* altered to show both cocked and closed mandibles. The mandible strike of this ant is among the fastest movements known (0.33 to 1 millisecond), a

reflex of a trap-jaw mechanism that is stimulated when trigger hairs on the inner edge of the mandible (not visible) are touched. See page 561. [Original photo: Ed Selig; additional photo illustration: Elizabeth Carroll]



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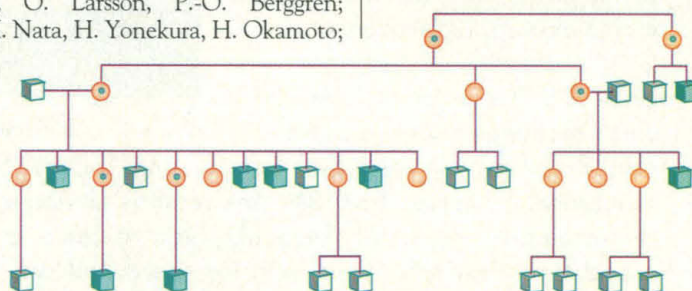
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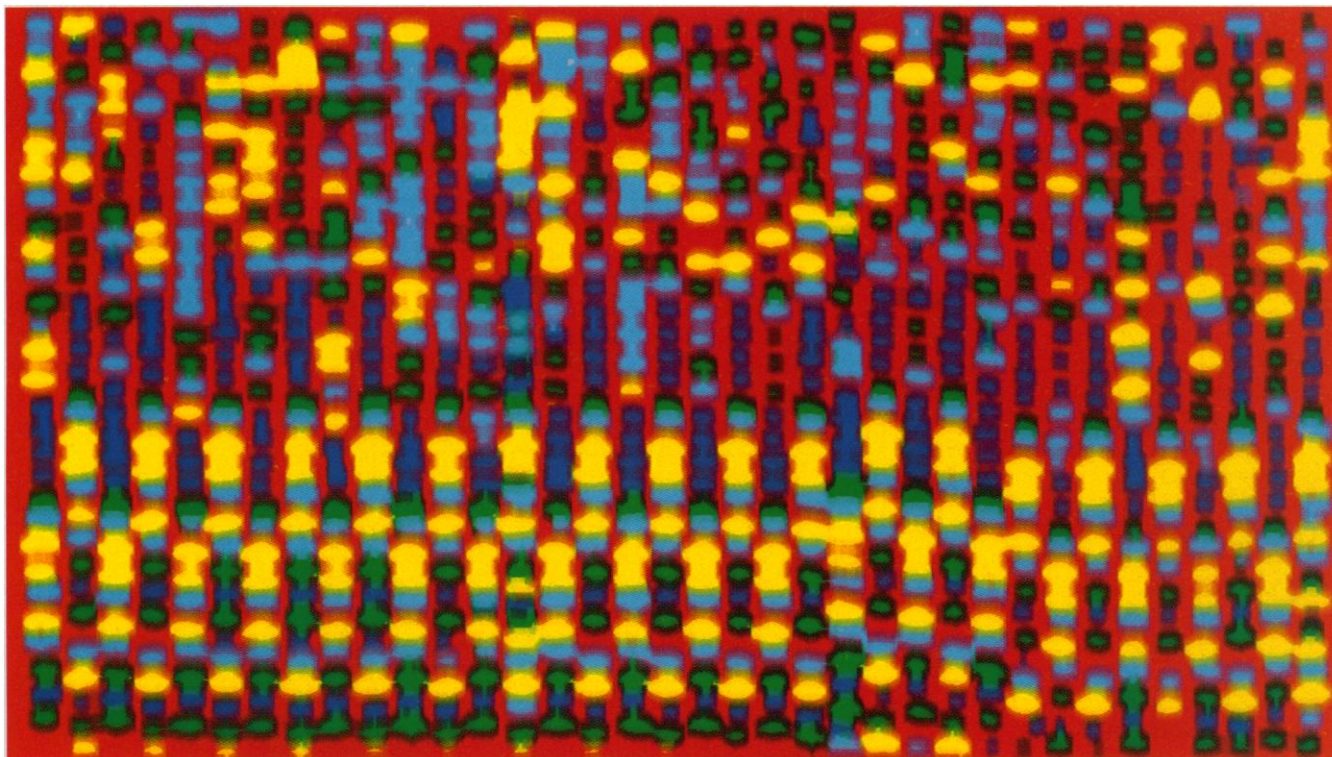
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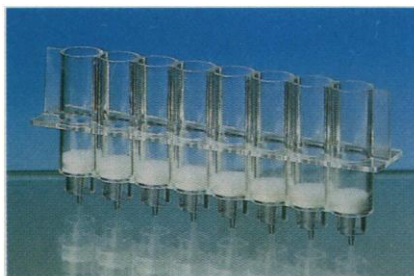
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Attraction at a distance

Although hydrophobic forces are invariably invoked to account for the interactions of solvated macromolecules and biopolymers, its molecular origin is still uncertain. Tsao *et al.* (p. 547) have used atomic force microscopy to investigate the interaction between hydrophobic surfactant monolayers suspended on a mica surface and on the tip of the microscope. The attractive force was observed and measured in both aqueous and nonaqueous media. No such force was seen for polyethylene or polyfluoroethylene layers. The authors present a model to account for these observations.

Gathering dust

Meteorites large enough to make shooting stars or, more rarely, to reach the Earth's surface and produce craters are a spectacular but relatively insignificant fraction of the extraterrestrial material that constantly bombards the Earth. By analyzing impact craters on the surface of the Long Duration Exposure Facility, which spent 6 years above the atmosphere, Love and Brownlee (p. 550) have obtained a direct measurement of the flux of micrometeoroids in the nanogram to milligram range. They estimate that 40,000 tons of such dust settles onto the Earth every year, the greatest contribution coming from particles of approximately 10 micrograms.

Mantle melting

Knowledge of the melting temperature of (Mg,Fe)SiO₃-perovskite, the primary mineral phase in the lower mantle, is critical

Records of ancient atmospheres

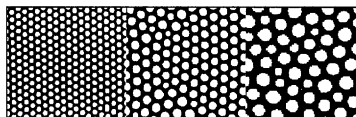
Although current fossil evidence of Archean life is sparse, additional information can be obtained from the study of geochemical signatures, such as isotope ratios, that are indicative of organic processing. Such results would have broad implications for understanding the evolution of Earth's atmosphere. Ohmoto *et al.* (p. 555) studied the sulfur isotopic composition of individual pyrite grains that formed about 3.4 billion years ago in marine rocks in South Africa. The spread of isotopic ratios beyond the likely range for hydrothermal mineralization or other inorganic processes imply that the pyrite formed from sulfate-reducing bacteria and that the rates of reduction were higher than those in normal marine sediments today. Such rates would require the presence of appreciable oxygen in Earth's early atmosphere.

for understanding mantle dynamics: If mantle temperatures are close to the perovskite melting temperature, the viscosity becomes quite sensitive to temperature, and it would be possible that the mantle melted extensively when the Earth was hotter in the past. Zerr and Boehler (p. 553) measured perovskite melting in a diamond cell heated with a CO₂ laser to pressures of 625 kilobars, conditions appropriate for the upper part of the lower mantle. The measured melting curve is significantly higher than earlier measurements and considerably greater than likely mantle temperatures. In a Perspective, Brown (p. 529) highlights some of the implications and differences with earlier work.

Bubble ripening

Transitions from an ordered to a disordered or an amorphous state are common phenomena in solid-state science; structural phase transitions and the onset of ferromagnetism are examples. Seul and Murray (p. 558) have investigated the interactions that lead to such a transition in an idealized two-dimensional ordered array of magnetic zones or "bubbles" in thin

samples of a garnet. As the temperature changes, there is an interplay between the collective degrees of freedom of the assembly and the degrees of free-



dom and size of the individual zones that leads to a topological frustration. The evolution of disorder arises through dislocations that produce intermediate states of decreasing order.

Rapid deployment

Many animals have developed extremely fast escape responses to avoid predation, but predators have also developed some extremely fast weapons. For example, trap-jaw ants quickly snare their prey in powerful mandibles. Gronenberg *et al.* (p. 561; see cover) studied the mandible strike in *Odonotomachus bauri* with high-speed cinematography. They found that jaws could close within one-third of a millisecond. Contact of the prey with the trigger hairs of the ant activate the mandible movement. The trigger hairs act as mechanoreceptors, and their sensory cells have very large sen-

sory axons (15 to 20 micrometers in diameter) that may rapidly conduct the signal.

Splicing requirements

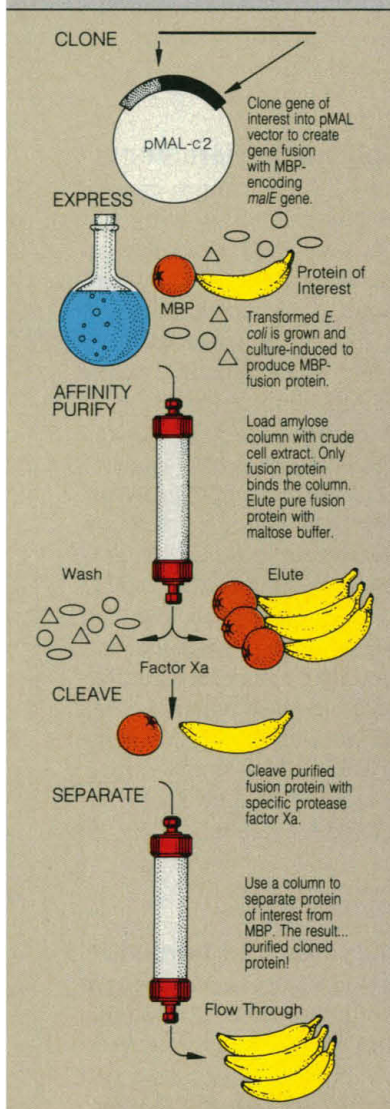
The basic mechanism of pre-messenger RNA splicing has been conserved in evolution. One factor required in vitro in mammalian nuclear extracts for proper pre-splicosome assembly is U2 auxiliary factor (U2AF). Two reports provide evidence that U2AF is required for splicing in vivo. Temperature-sensitive mutants in yeast have been identified that are defective in pre-mRNA processing. Potashkin *et al.* (p. 573) have cloned a gene that can complement such a defect and found that it encodes a product similar to mammalian U2AF. Kanaar *et al.* (p. 569) have isolated the U2AF homolog from *Drosophila* and find that it is required for viability.

Enzymes and behavior

Altered metabolic processing of neurotransmitters such as serotonin and dopamine has been associated with aggression in animals and humans. Brunner *et al.* (p. 578) previously identified a large kindred in which several males were affected by borderline mental retardation, impulsive aggressiveness, and abnormal behaviors. An associated genetic defect was assigned to the p11-p21 region of the X chromosome in the vicinity of the monoamine oxidase genes. The authors show that monoamine processing is altered and monoamine oxidase A activity is deficient in the affected males, each of whom had a point mutation in a monoamine oxidase A structural gene that changes a glutamine to a stop codon.

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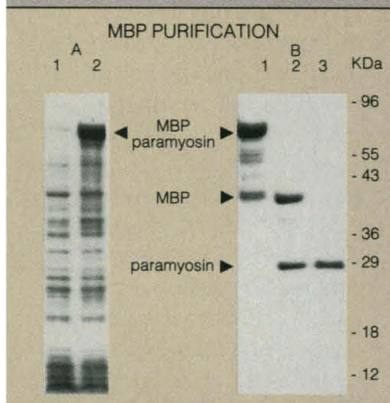
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SDS-polyacrylamide gel electrophoresis of fractions from the purification of MBP-paramyosin-ΔSal. A: Lane 1: uninduced cells. Lane 2: induced cells. B: Lane 1: purified protein eluted from amylose column with maltose. Lane 2: purified protein after factor Xa cleavage. Lane 3: paramyosin fragment eluted from second amylose column.



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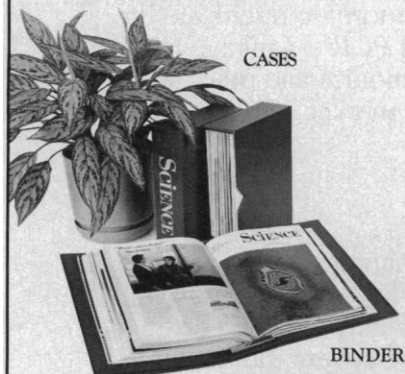
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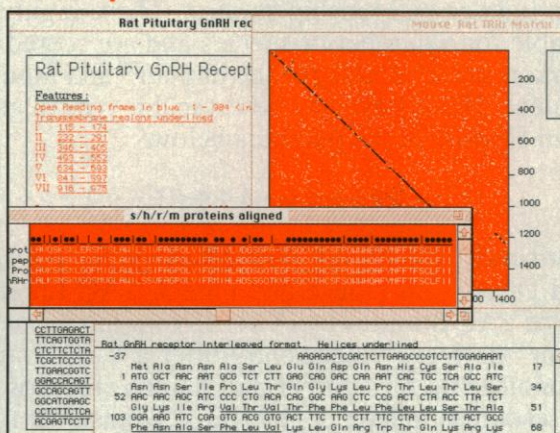
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5. Meyers, R.M., and D.R. Cox, personal communications

6. Goold, R.D., G. diSibio, H. Xu, D.B. Lang, J. Dadgar, G.G. Magrane, A. Dugaiczky, K.A. Smith, D.R. Cox, S.B. Masters, and R.M. Myers (1993) *Human Molecular Genetics* 2, 1271-1288.

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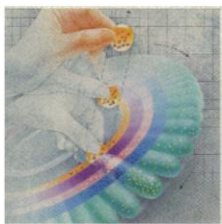
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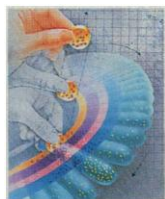
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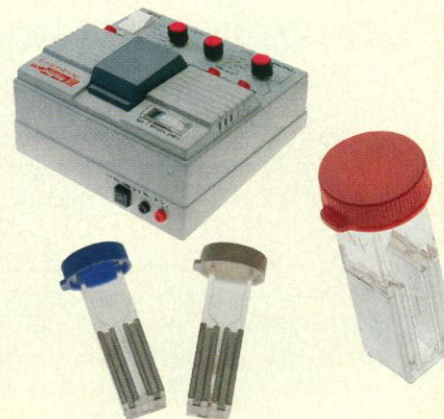
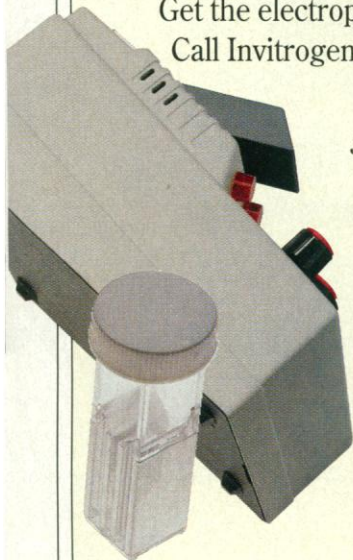
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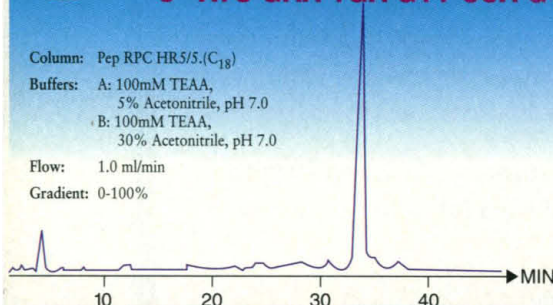
OligoPilot™

OligoPilot™ Large Scale Oligo Synthesizer is designed for synthesis from 10 μ mol to 400 μ mol (up to 800 μ mol capacity with high load support).

3
THREE FOLD
REDUCTION IN
SOLVENT USAGE —
REDUCED SOLVENT
DISPOSAL COST

5'-ATC GAA TGA GTT CCA GTT-3'

Column: Pep RPC HR5/5.(C₁₈)
Buffers: A: 100mM TEAA,
5% Acetonitrile, pH 7.0
B: 100mM TEAA,
30% Acetonitrile, pH 7.0
Flow: 1.0 ml/min
Gradient: 0-100%



OligoPilot™ utilizes an innovative pump driven flow-through column design and a new polymer support matrix, Primer Support. The flow-through design gives you the following benefits:

- Significant reductions in amidite usage, 1.5 molar equivalents
- Fast detritylation, 2 min. at 200 μ mol scale
- Short cycle times, 7 hours at 200 μ mol for a 20-mer
- Reduced waste volume, 415 ml at 200 μ mol scale
- Average yield per cycle of over 99%
- 12 amidite ports for DNA, RNA or modified amidites

The pump driven flow-through design ensures the active phosphoramidite concentrations remain high even at small molar excesses. This design also makes the most efficient use of other reagents and allows for rapid reagent change at up to 75 ml per minute.

Primer Support contributes to the overall performance due to its hydrophobic nature. Its hydrophobicity ensures that any water introduced with the oxidation step does not remain in the system, reducing coupling efficiency in later steps. The lack of labile sites also minimizes spontaneous chain elongation off the support which is sited for silica based supports.

OligoPilot is fully programmable via an external computer. In addition, the computer tracks reagent usage and identifies the batch numbers for each reagent used for each oligo synthesis.


The on-line trityl monitor provides continuous display of coupling efficiency of each step. In the event of a poor coupling, the monitor can stop the synthesis before additional reagents are wasted.

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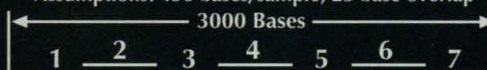
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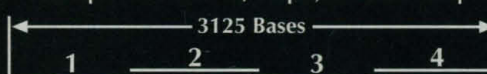
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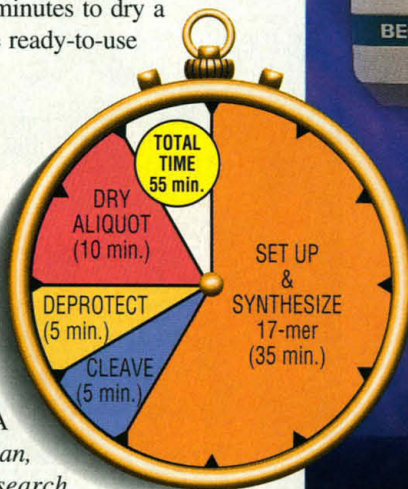
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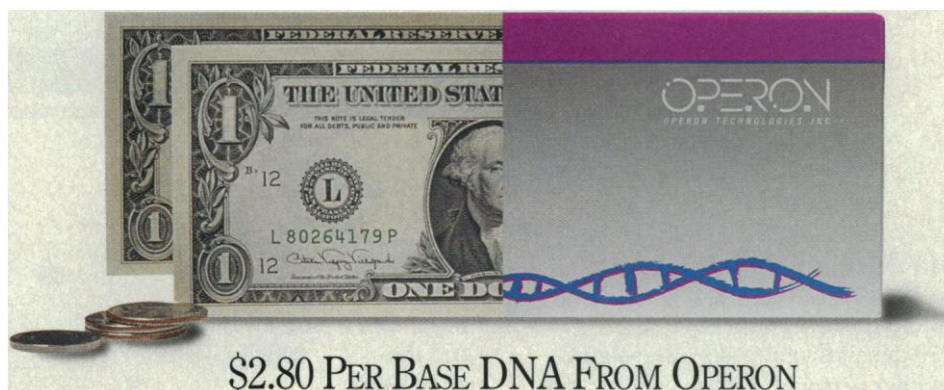
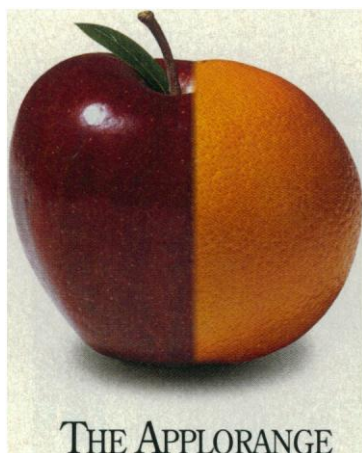
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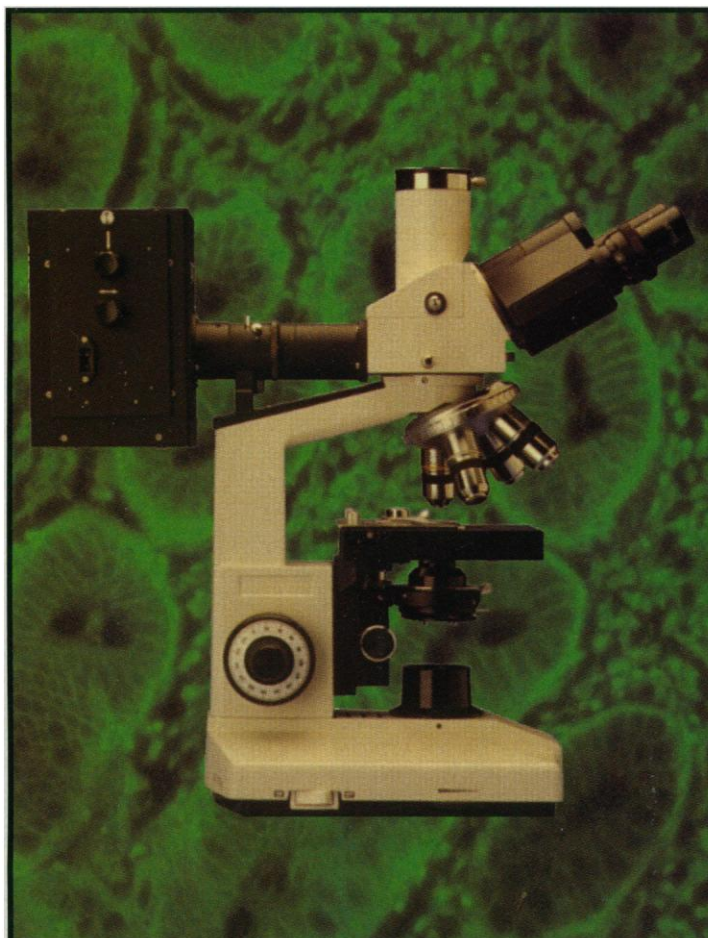
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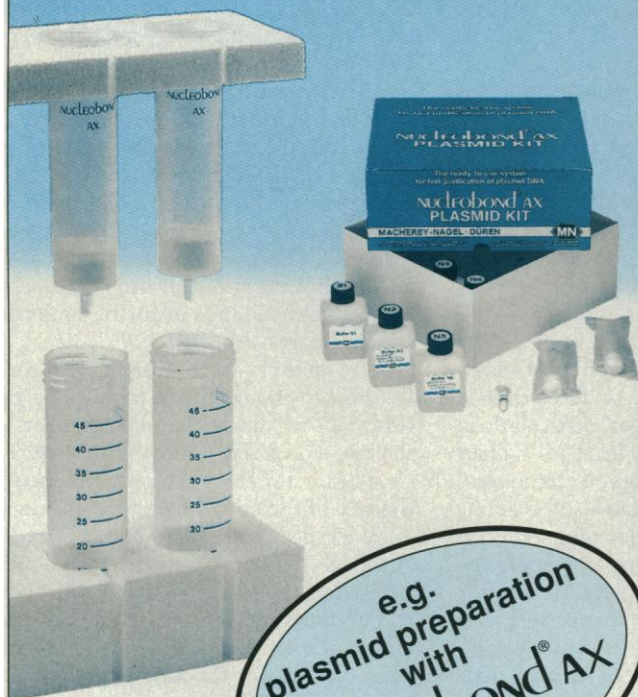
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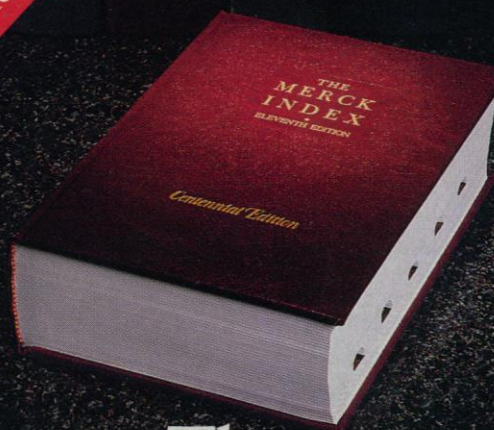
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