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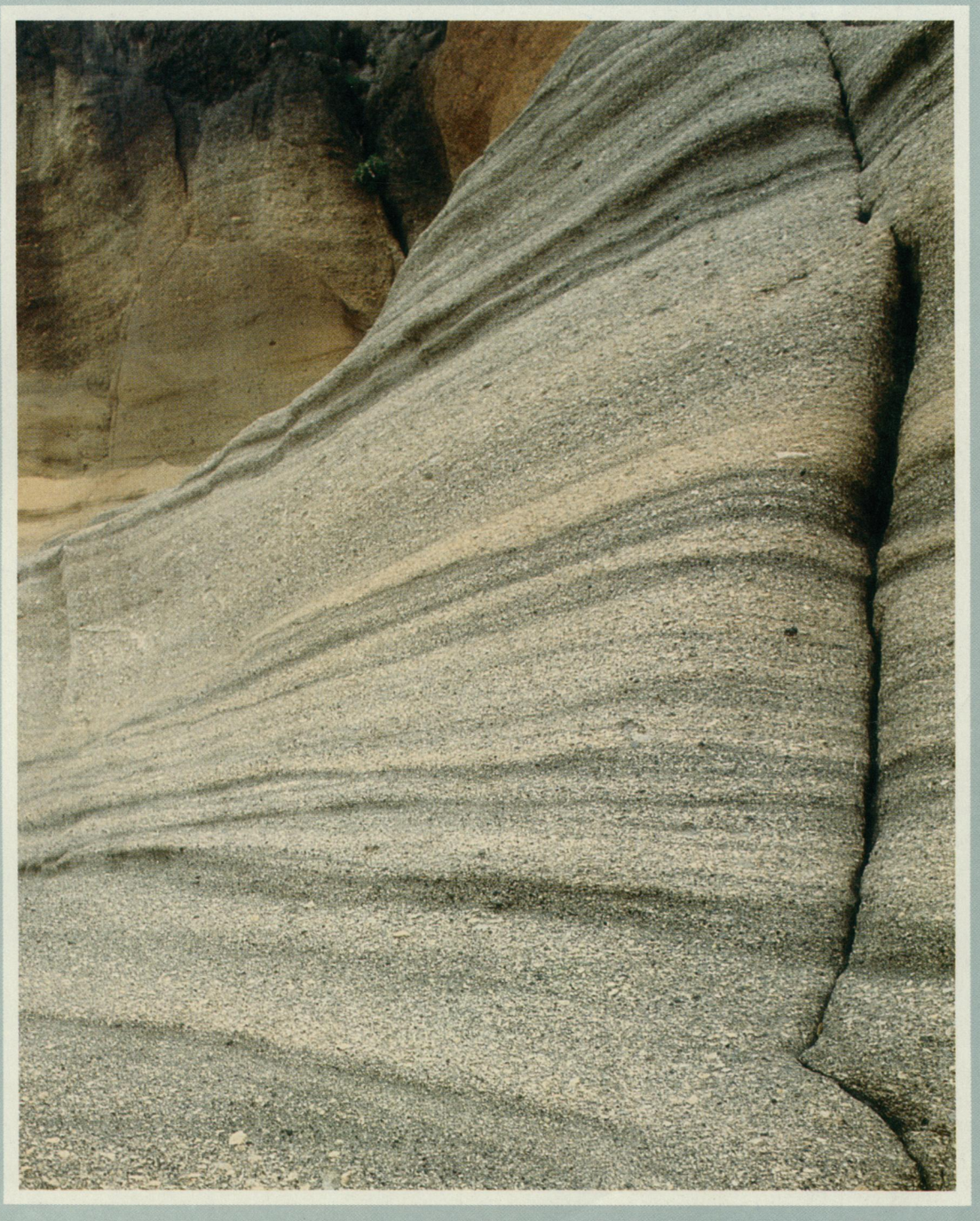

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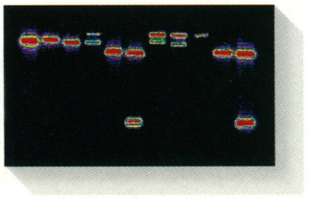

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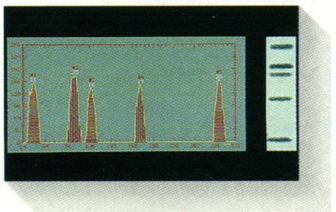

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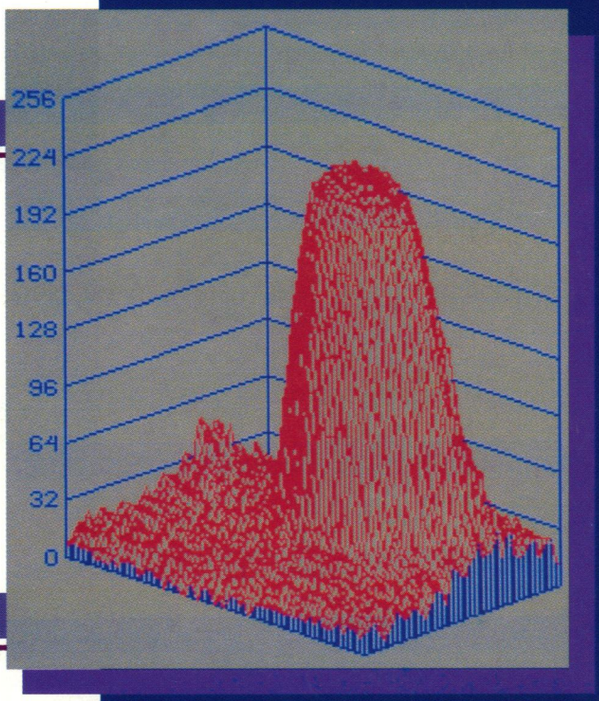

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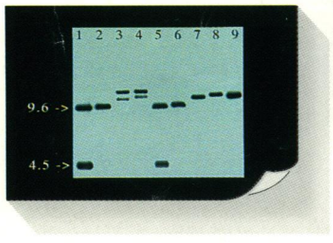

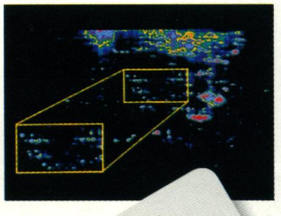

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References
1. Fox, J.S. (1989). *Strategies* **2**: 53-55
2. Bauer, J.C., and Fox, J.S. (1991) *Strategies* **4**: 6-7

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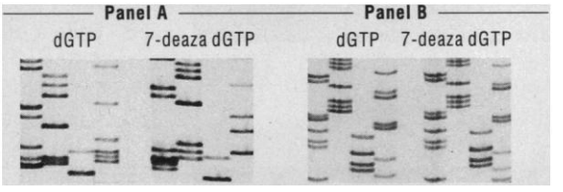

Resolution of compressed DNA at higher temperatures using the StrataTherm temperature controller.
ssM13 DNA was sequenced with dGTP or 7-deaza dGTP and electrophoresed on a 33cm 6% acrylamide gel maintained at constant temperature. Panel A: 40°C; panel B: 55°C.

Temp	Run Time	Mean Voltage
40°C	90 min.	1700 volts
55°C	50 min.	1900 volts

Table #1. Reduction in gel prewarming time and gel run time using the StrataTherm temperature controller.
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COVER Submarine fallout deposits in the Mio-Pliocene Shirahama Group, 500 meters west of the Senjojiki, near the southern tip of the Izu Peninsula, Japan. Pieces of pumice (light colored) are an average of six to seven times as large as codeposited rock fragments (dark colored); this ratio suggests that the deposits are formed by fallout of these particles from a submarine eruption column. Dark layers mark zones of reworking where ocean currents preferentially transported the lightweight pumice. See page 275. [Photograph by R. S. Fiske, Smithsonian Institution]

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This Week in

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Shifting sands in the Sahara Desert

The Sahara is the world's largest desert; its size fluctuates between about 7 and 9 million square kilometers. Images of the desert that reveal vegetation patterns, which are a direct reflection of rainfall, have been made by polar-orbiting meteorological satellites for the past decade. Between 1980 and 1990 many northward and southward shifts in the southern Saharan-Sahelian boundary have occurred. The year-by-year changes are described by Tucker *et al.* (page 299) and provide a valuable framework against which future shifts between desertification and steppe formation (more arable land) can be assessed; it will take several decades worth of data to reveal major trends that are occurring in the world's deserts. The techniques that are described in this study are currently being applied to analyses of desertification elsewhere on the planet's surface.

Buckyball structure and function

The list of novel structural features and properties of buckyballs (C_{60} molecules) continues to grow. C_{60} molecules have been found to be conductors and superconductors. Allemande *et al.* found that a doped fullerene (C_{60} doped with the organic ion tetrakis(dimethylamino)ethylene) can act as a molecular ferromagnet (page 301). They describe the preparation of the molecular solid and its transition at 16 K to a "soft" ferromagnet, one for which there is no hysteresis loop during the magnetic transition. Saunders examines what would be the energetically preferred form of fully reduced C_{60} ($C_{60}H_{60}$) (page 330). $C_{60}H_{60}$, or buckminsterfullerane, has enormous strain energy, and a computer search indicates that, if ten of the hydrogen atoms are oriented toward the inside of the spheric molecule, strain on the rings would be relieved and the lowest steric energy level would be reached.

Early chemical differentiation of Earth

Modelers of the earth's formation and of the differentiation of mantle and core have had a problem: they have been unable to account simply for the high abundance in the mantle of siderophile elements—those elements like gold, iridium, and rhenium that fractionate into the iron core. A new calculation by Rama Murthy shows that if partitioning of siderophile elements between mantle and core occurred at temperatures high enough to liquidize much of the material of the earth and not just material at the surface or at shallow depths—temperatures between 3000 and 3500 K—equilibration of mantle silicates and core materials would lead to siderophile element abundances that are approximately like those that are currently observed (page 303). By this extrapolation of available laboratory data to high enough temperatures, the siderophile problem appears to have been solved.

Horsepower

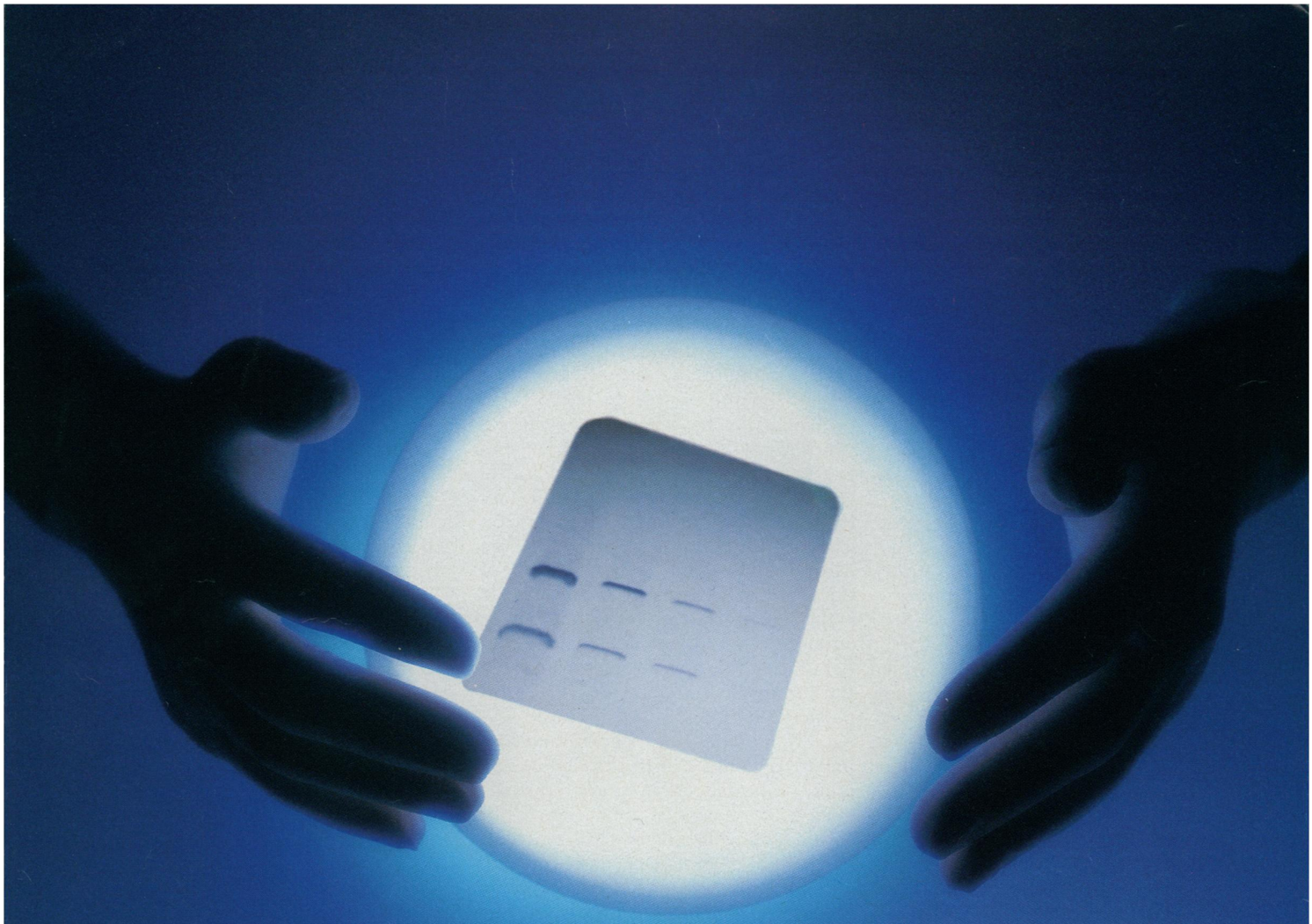
What causes a horse to switch from a trot to a gallop? A study by Farley and Taylor shows that the gait transition takes place when forces on the horse's bones, muscles, and tendons reach a critical level (page 306). Galloping reduced the force on the musculoskeletal system and is therefore likely to significantly reduce the risk of injury to the skeleton and muscles. Dynamic features of the trot-to-gallop transition were analyzed with horses that were running with and without weights on a motorized treadmill. Whether or not they were wearing weights, the horses switched from trotting to galloping when the same peak force was reached; in horses running with weights this level of force was reached at lower speeds than for those running without weights. The gait transition speed proved to be one at which galloping is more energetically costly than trotting; thus safety rather than an energy advantage—which for many years was regarded as the trigger for the switch—appears to drive the gait transition.

HTLV-I in mycosis fungoides

Infection with HTLV-I, the human T cell leukemia/lymphoma virus type I, is associated with the development of certain aggressive adult T cell leukemias and lymphomas. Patients with a number of other rare cutaneous T cell lymphomas have no detectable antibodies to this virus. However, searches in the cells of such patients, specifically those with mycosis fungoides, indicated that portions of the genetic material from HTLV-I were present (page 317). Hall and colleagues report that, in patients with mycosis fungoides, cells from the skin lesions have incomplete HTLV-I provirus sequences. It appears that the initial infection in mycosis fungoides may involve an exogenous HTLV-I virus, and that at some point in infection certain viral sequences are deleted. This may explain the relatively indolent nature of the infection.

HIV-1 entry into cells

The human immunodeficiency virus HIV-1 typically enters cells by binding to a receptor called CD4; however, the virus has also been observed to enter and infect cells that lack CD4. Harouse *et al.* found that, in two cell lines derived from cells of the nervous system, a glycolipid that is typically found in association with myelin, called galactosyl ceramide (GalC), can serve as a receptor for HIV-1 (page 320). Antibodies to GalC blocked entry of HIV-1 into the cells and prevented development of HIV-1 infections. The gp120 protein of the virus is the viral component that interacts with GalC; gp120 is also the protein that binds to CD4 receptors. Neurologic symptoms in HIV-1 infections are common, and GalC may be one of the molecules involved in neuropathogenesis of HIV-1–infected individuals. ■ RUTH LEVY GUYER



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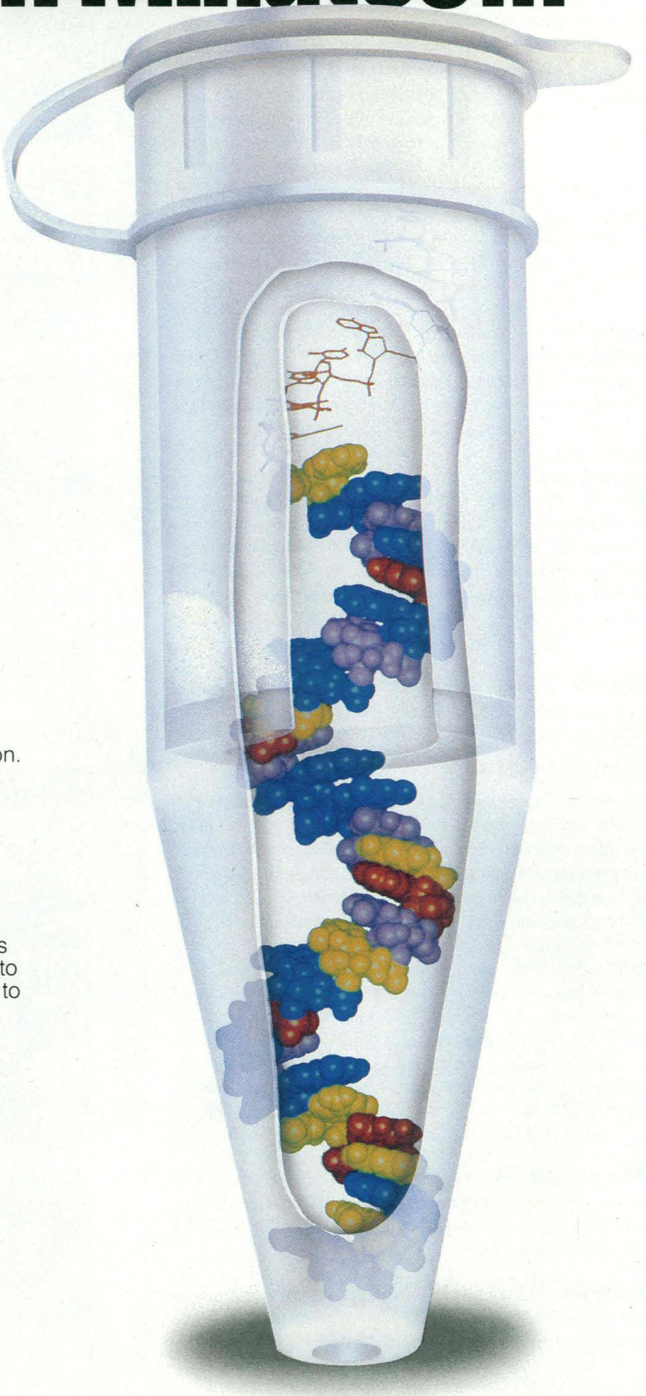

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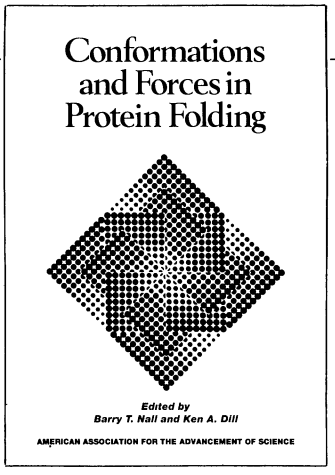
Conformations and Forces in Protein Folding



Barry T. Nall and Ken A. Dill, editors

Protein folding, the self-directed transition from disorganized chains to highly ordered and functional biological structures, is of increasing practical concern for the biotechnology industry and for interpreting DNA sequences. In the biological sciences folding is of major importance in the "self-assembly" process that produces the protein catalysts that facilitate and regulate cellular chemistry. Folding plays a role in such diverse cellular processes as macromolecular transport and assembly, targeting of proteins to intra- or extracellular locations, and in vivo stability of proteins.

Several aspects of folding addressed include forces and interactions important to protein stability and function, methods for determining proteins, studies of alterations in structure in mutant proteins, mechanistic investigations of the folding process, and analyses of auxiliary factors that modify or catalyze protein folding.

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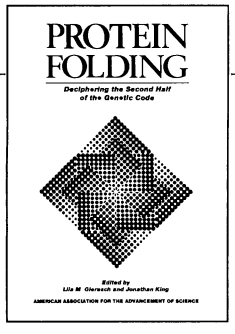

Protein Folding: Deciphering the Second Half of the Genetic Code

Lila M. Gierasch and Jonathan King, editors

1990; 342 pp.; indexed and illustrated; color plates #89-18S — softcover; $39.95 (members $31.95); ISBN 0-87168-353-9

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