we found several aspects of this model intriguing, keratinocytes do not lack the capacity to provide costimulatory signals.

In studies of normal human keratinocytes (the principal cell type in skin), we have shown that these epithelial cells, when activated, express major histocompatability complex (MHC) class II molecules and can function as nonprofessional APCs by providing costimulatory signals to T cells that support proliferative responses to a variety of mitogens and bacterial superantigens (*3*). While keratinocytes do not appear to express either CD80 or CD86 (ligands for the T cell costimulatory pathway mediated through CD28), we have shown that they do express CD40 (*4*), a molecule also found on professional APCs and which has been proposed to have direct T cell costimulatory activity (*5*), particularly for interleukin-4 (IL-4) production (*6*).

As keratinocytes are frequently confronted and stimulated by an array of environmental toxins and allergens, this raises the question of why pathogenic immune responses are not seen more frequently. One reason may lie in the types of cytokines produced by "keratinocyte-supported" T cells and by the activated keratinocytes themselves. Activated T cells receiving accessory signals from keratinocytes produce T_H2 cytokines (IL-4, IL-5, and IL-10) almost exclusively, with minimal or absent production of the T_H1 cytokine IFN-γ (*7*). This "immune-deviation" is a result of the inability of keratinocytes to produce IL-12, because the defect in IFN-γ production by "keratinocyte-supported" T cells is reversed with exogenous IL-12 (*7*). Keratinocytes themselves produce IL-10, which inhibits the expression of CD80 and CD86 on professional APCs (*8*). This action would reinforce T_H2 responses by inhibiting the ability of professional APCs (which induce T_H1 responses) to costimulate T cells.

We have proposed that immune deviation of this type, although not classical tolerance in the sense of absence of an immune response, is likely to be an important mechanism of self-tolerance, as it is perceived on a macroscopic level (*9*). The report of 22 March (p. 1728) by T. Forsthuber *et al.*, as well as work by Chen and Field (*10*), indicate that immune deviation is an important mechanism of neonatal "tolerization." Immune deviation of this type has also been implicated in oral tolerance (*11*). It is probably not coincidental that the gut and the skin, two organs with large surface areas that regularly come into contact with potentially dangerous environmental antigens, each appear to be able to have immunologic tolerance through an active, nonpathogenic immune response, rather than through the absence of an immune response.

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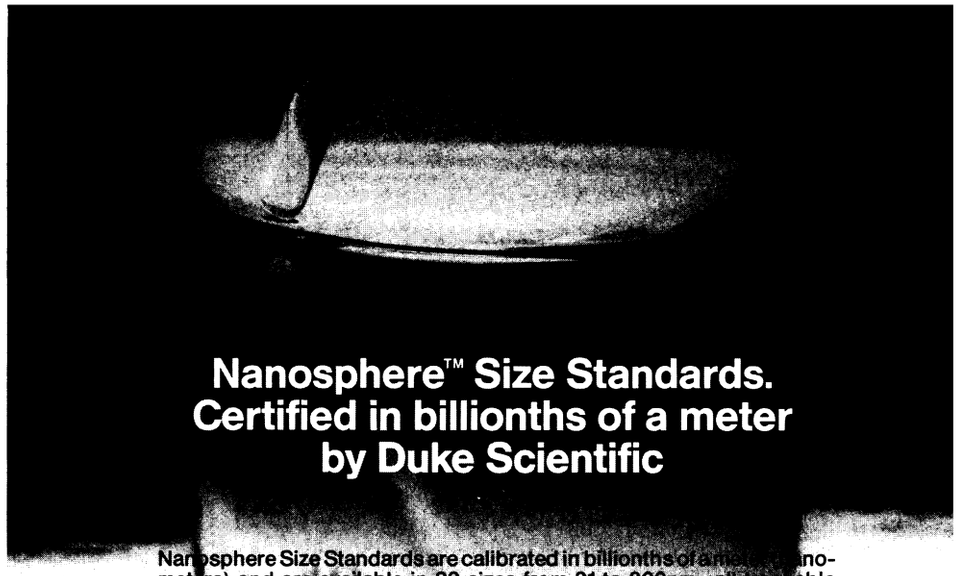
■

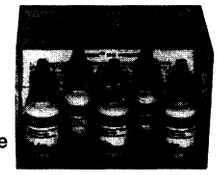
β Sheets and Spider Silk

Although Alexandra H. Simmons *et al.* state that their excellent nuclear magnetic resonance work on the supramolecular structure of spider dragline silk (Reports, 5 Jan., p. 84) is inconsistent with our previous electron microscopy-based investigations (*1*), in fact it supports our findings.

From direct observations of diffracting regions in silk fibres, we concluded that the β-sheet REPEAT (approximately 13 Å for two sheets) is dictated by the inclusion of large amino acid sidegroups in the loosely conserved Gly-Gly-X (X = Tyr, Gln, Leu) sequences; we noted that this repeat falls in the range of other published data (*2*) for the *Nephila* genus. The diffracting regions are too large (and they have the wrong inter-sheet spacing) to consist solely of the available polyalanine runs. Also, they are an order of magnitude larger than the displacement lengths of the Gly-Gly-X–based sequences.

We suggested (*1*) that the diffracting regions are β-sheet crystals "made from MIXED strands of polyalanine and Gly-Gly-X," and that "it is possible that the fine-scale contrast variations present in the crystal . . . are due to such compositional/structural variations." Therefore, our description of these crystals is not correctly represented by Simons *et al.* when they state (p. 85)





Thiel *et al.* interpreted analytical transmission electron microscopy of individual crystallites in dragline fibers as evidence of a crystalline phase of glycine and bulky residues, composing about 50% of the samples.

While the bulky residues in the Gly-Gly-X motifs necessarily dominate the *inter-sheet spacing* of the mixed crystals in our model, we have clearly admitted the existence of significant amounts of polyalanine in the composition of these same crystals. The report by Simmons *et al.* therefore does not invalidate our earlier result. Our comparing the diffracting regions to nonperiodic layer crystallites, which are analogous to the "protocrystals" subsequently designated in the report by Simmons *et al.*, reinforces this picture.

We were unable to observe pure β-sheet polyalanine crystallites by transmission electron microscopy. However, we recognized that previous literature provided arguments for their existence, and we explained why they would not be detected under our experimental conditions. Our 1994 paper (*1*) therefore accommodates the existence of two distinct populations of polyalanine crystal, one of which we were able to characterize in that work. The Cornell group has provided welcome information regarding the orientation distribution of both crystallite populations.

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Response: Although the data in the 1994 paper by Thiel *et al.* (*1*) do not address whether or not the crystals contain mixed strands of polyalanine and Gly-Gly-X motifs, these data (*1*) could, as Thiel and Viney state, be consistent with the concept of mixed strands.

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Corrections and Clarifications

The News article "How congressional pressure shaped the 'Baltimore case' " (16 Aug., p. 873) by Jock Friedly referred to Suzanne Hadley as being at George Washington University on paid leave from the National Institutes of Health (NIH). Hadley is an NIH employee officially assigned to George Washington University, where she is a visiting associate professor in the Department of Psychiatry and Behavioral Sciences.

Letters to the Editor

Letters may be submitted by e-mail (at science_letters@aaas.org), fax (202-789-4669), or regular mail (*Science*, 1200 New York Avenue, NW, Washington, DC 20005, USA). Letters are not routinely acknowledged. Full addresses, signatures, and daytime phone numbers should be included. Letters should be brief (300 words or less) and may be edited for reasons of clarity or space. They may appear in print and/or on the World Wide Web. Letter writers are not consulted before publication.