

Is This a Protein?

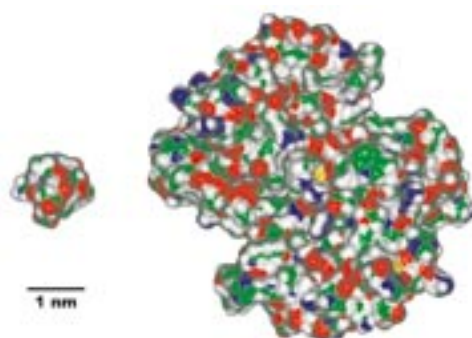
Design of a Foldable 10-Residue Peptide

- Pursuing minimal elements of a protein -

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We have designed a peptide termed chignolin, consisting of only 10 amino acid residues, on the basis of statistics derived from more than 10,000 protein segments. The peptide folds into a unique structure in water and shows a cooperative thermal transition, both of which may be hallmarks of a protein. Also, the experimentally determined β -hairpin structure was very close to what we had targeted. The performance of the short peptide not only implies that the methodology employed here can contribute toward development of novel techniques for protein design, but it also yields insights into the *raison d'être* of an autonomous element involved in a natural protein. This is of interest for the pursuit of folding mechanisms and evolutionary processes of proteins.



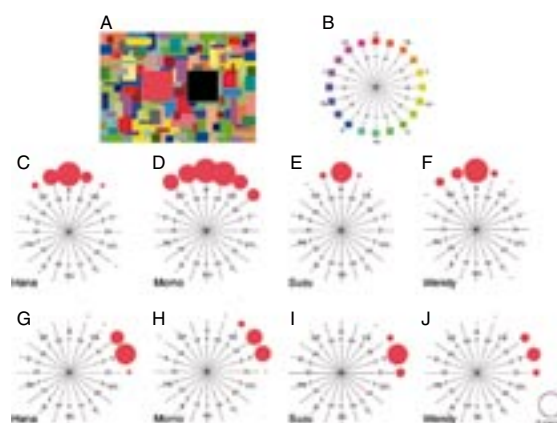
Comparison of molecular size between chignolin (left, with 10 amino acid residues) and human hemoglobin, one of representative protein (right, with 574 residues).

Color Perception is not Innate But Acquired After Birth

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It was tested whether or not early experience is necessary for color perception. Infant monkeys were reared for nearly a year in a separate room where the illumination came from only monochromatic lights. After extensive training, they were able to perform color matching. But, their judgment of color similarity was quite different from that of normal animals. Furthermore, they had severe deficits in color constancy; their color vision was very much wavelength-dominated, so they could not compensate for the changes in wavelength composition. These results indicate that early visual experience is also indispensable for normal color perception.



Color identification. A, Schematic illustration of stimuli. B, 20 Munsell chips as stimuli. C-F, Normal monkeys' responses under the illumination where the x- and y values of a white chip (N9.5) were 0.331 and 0.331. G-J, Color deprived monkeys' responses under the same illumination as c-f. K-N, Normal monkeys' responses under the illumination where the x- and y values of a yellow chip (5Y) were equivalent to those of a red chip (5R) in c-j. O-R, Color deprived monkeys' responses under the same illumination as k-n. Responses to each chip were represented as a diameter of a circle and plotted at the position that corresponds to the Munsell Color Order System.