Although they may ring some alarm bells, the News Focus articles on alternative medicine do not fully convey the dangers of this "integrated medicine" approach. Recently, a 10-year-old girl in Evergreen, Colorado, was smothered to death by four therapists practicing a New Age regression technique called "rebirthing." They wrapped this child in a blanket to simulate the womb, trying to reenact her birth to rebond her to her adoptive mother. They ignored her pleas for help, considering them a sign of the progress of the therapy. She died of suffocation.

The alternative medicine craze promises many dangers down the road. In Pittsburgh this past year, the press has reported two breast cancer deaths of young women who were drawn away from standard treatment by the pied pipers of alternative medicine. The Pittsburgh Poison Center has reported significant increases in poisonings due to herbs and dietary supplements. The public's understanding of science is being dangerously undermined by the rise of "integrated medicine."

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The support that alternative medicine has received from the U.S. Government, through the National Institutes of Health, which created the National Center for Complementary and Alternative Medicine and allocated almost $70 million (U.S. currency) this year for research, seems to be founded more on political and economic grounds than on scientific interest ("Stephen Strauss's impossible job," by Erik Stokstad). The fact that the industry behind it generates about $27 billion in annual sales and that around 42% of the U.S. population tries some sort of alternative medicine is enough for policymakers and economists to pay keen attention to this phenomenon. This trend is not restricted to the United States but is permeating most countries through industrial strategies, the Internet, and traveling practitioners. The scientific community is by and large skeptical about the advantages of investigating highly questionable healing recipes, but the phenomenon itself and the fact that most patients find at least some sort of consolation merit scientific investigation.

Many aspects of scientific medicine can deter patients, who instead opt for other types of therapies. Medical care is increasingly expensive, whereas alternative medicine is cheaper. The high-technology tests—such as computer tomography scans, magnetic resonance, endoscopies, radiotherapies, and biopsies—are often bothersome or painful, but traditional remedies are in general innocuous. Pharmacological treatments frequently have side effects such as allergies, vomiting, headaches, and others, whereas traditional remedies usually have none. And a situation frequently overlooked is the confusion and frustration patients experience in a modern hospital. They are often sent from one department to another and undergo various tests before any physician talks with them, and even then patients may receive little comfort or explanation of what is going on. Even the most care-conscious doctor is often unable to assure the patient of the outcome, providing only probabilities while reciting possible complications.

In strong contrast, the practitioner of alternative medicine takes care directly of patients and gives them confidence and assurance. These practitioners serve what seems to be a more spiritual role in the lives of their patients compared with the role traditional doctors play, and many patients seem to approach alternative medicine with a religious-like faith. Many remedies act through this psychological attitude, perhaps via a neuroendocrine-immune pathway that has just begun to be unraveled (*1*). Even the well-known placebo effect could be due to a similar phenomenon. Investigating the role that these psychosomatic links play in the outcome of alternative medicine remedies and in the placebo effect could be far more beneficial to scientific medicine than the double-blind, placebo-controlled trials of rattlesnake powder or coffee enemas.

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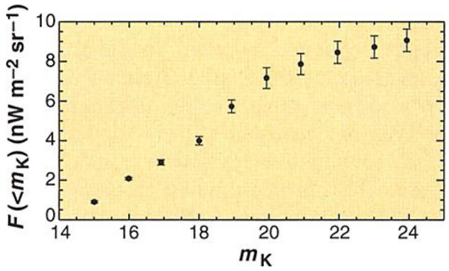
Looking Behind the Stars

In his Perspective "An infrared look behind stars" (*Science*'s Compass, 14 Apr., p. 281), Craig J. Hogan discusses recent developments (*1, 2*) in measuring the total cosmic emission at near infrared wavelengths, based on data from the Diffuse Infrared Background Experiment (DIRBE) on the Cosmic Background Explorer (COBE) satellite. This emission, otherwise known as the cosmic infrared background (CIB), is the sum total of the redshifted light emitted by early generations of evolving and forming galaxies. The Perspective contains a couple of inaccuracies that warrant further discussion.

First, the near infrared CIB has been uncovered by us (*3*) from the DIRBE data using a fluctuations analysis technique, and our results precede those of Wright and Reese and of Gorjian *et al.* (*1, 2*). In this method, one looks for the CIB by measuring its spatial structure, or fluctuations, resulting from the clustered distribution of distant galaxies. Because of the strength of galaxy clustering, the levels of the fluctuations on the DIRBE beam angular scale of ~0.5° are expected to be about 10 to 20% of the CIB mean level. Within the statistical uncertainties, the numbers we found for the CIB fluctuations agree with the later investigations at 2.2 and 3.5 μm that Hogan discusses, but our detections cover a larger range of wavelengths: 1.25, 2.2, 3.5, and 4.9 μm. This provides more information about the spectral energy distribution of the CIB. Our numbers have also been corroborated by the data from Japan's Infrared Telescope in Space (*4*), from which the angular spectrum of the CIB fluctuations over a substantial range of angular scales has been resolved. The mean levels of the CIB from these data are also in agreement with the DIRBE data analysis reported in (*1, 2*), as is a substantially earlier analysis of the DIRBE data at 3.5 μm (*5*). These findings suggest that distant galaxies must contribute to a measurable CIB, and they also refine our understanding of how galaxies have evolved in brightness, and in clustering, through much of the history of the universe.

Second, Hogan says that "the measured strength of the [near infrared] background is close to theoretical estimates." However, the opposite is true: The near infrared CIB seems to be substantially larger than what is expected from theoretical analysis (*6, 7*). Similar conclusions are reached when the CIB flux is compared directly with the cumulative radiation from galaxy populations seen in deep galaxy surveys. For example, at the wavelength of 2.2 μm (K band) the mean CIB level is about 23 nanowatts per square meter per steradian (nW m^{-2} sr^{-1}), with 20 to 25% uncertainty. The integrated flux produced by the observed galaxies in deep galaxy surveys out to the given K-band brightness level expressed in the astronomical "magnitude" system is plotted in the figure. [The astronomical magnitude is proportional to the logarithm of the radiation flux (F) at that band (m_K), with band K centered at 2.2 μm]. What the figure shows is that the total flux contributions continue to increase, but saturate at magnitudes near $m_K < 20$.

The cumulative CIB flux from all galaxies observed to date out to $m_K = 24$ turns out to be 8.7 nW m^{-2} sr^{-1}, with a few percent uncertainty [see, for example, (*8*)]. [Galaxies at $m_K = 24$ are located at cosmological red-shifts $z >> 1$ (*6*)]. Thus, the observed galaxies contribute only 30 to 40% of the total CIB flux at 2.2 μm. CIB fluctuation numbers are a little more difficult to interpret theoretically, but lead to essentially similar conclusions (*3*). What these high levels of the near infrared CIB imply



Cumulative flux (*F*) at 2.2 μm produced by galaxies brighter than the magnitude m_K (*9*).

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about galaxy evolution and formation remains to be seen, but if the CIB detections are confirmed in future data, they would imply very significant levels of star formation in the early universe.

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9. Galaxy counts data used in producing this figure are given in references of, for example, (*6*).

Response

I readily acknowledge that the recent work reviewed in my Perspective confirms the important earlier estimates of Kashlinsky and Odenwald based on fluctuation analysis. The new work by E. L. Wright and E. D. Reese and by B. Gorjian *et al.* has added to the reliability of their result by making a detailed subtraction of the near infrared emission from foreground stars.

On the other hand, I disagree with Kashlinsky and Odenwald that the cumulative K-band flux from observed galaxies, and even less so from theoretical extrapolations of observed galaxy populations, is currently nailed down at the level of a few percent. Even the local luminosity density derived from the local luminosity function of galaxies in the optical bands has current estimates differing by up to 30%; in addition to the difficulty of absolute flux calibrations, the deep infrared imaging data still suffer from very small fields of view and, consequently, large sampling errors. Kashlinsky and Odenwald are, however, correct in pointing out the possibility that some flux may be unaccounted for, and I agree with the main thrust of their comment—that careful comparison of the diffuse backgrounds with galaxy catalogues will continue to be an important constraint on models of galaxy formation.

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CORRECTIONS AND CLARIFICATIONS

News Focus: "Microbes display their versatility at ASM meeting," by Evelyn Strauss (16 June, p. 1958). The fungi shown in the figure on p. 1959 are growing on rare earth aluminum phosphate, not aluminum phosphate, as stated in the legend.

News Focus: "A new breed of scientist-advocate emerges," by Kathryn Brown (18 Feb., p. 1192). The source of the dialogue in the illustration of miscommunication between scientists and policy-makers was not credited. It was quoted from "Cultures in collision," an article currently in revision at *Conservation Biology*, by D. Brosnan and R. Menasse.

THE MCKNIGHT ENDOWMENT FUND
FOR NEUROSCIENCE

MCKNIGHT MEMORY AND BRAIN DISORDERS AWARD

The McKnight Endowment Fund for Neuroscience has established a new McKnight Memory and Brain Disorders Award to stimulate the development of novel applications of basic neuroscience for the diagnosis, treatment, and prevention of human memory and brain disorders.

The Fund is interested in supporting neuroscientists who propose unique research opportunities that focus efforts on diseases and disorders of the brain, including diseases of memory attributable to neurodegeneration, and disorders such as spinal cord injury, stroke, drug addiction, schizophrenia, and mood disorders. Collaborative projects between basic and clinical neuroscientists are welcomed, as are proposals that link basic with clinical neuroscience.

Six Memory and Brain Disorders Awards will be granted each year, each providing $100,000 annually for three years. Interested investigators should submit a **two-page letter of intent**. It must include a brief statement describing the goals of the project for which support is sought and indicating how an award would accelerate this work. Applicants should emphasize new directions for their laboratory that will extend ongoing work in promising ways. Funds may be used toward a variety of research activities but not the recipient's salary.

Investigators who are conducting research at institutions within the United States are invited to apply. Applicants cannot be employees of the Howard Hughes Medical Institute or scientists within the intramural program of the National Institutes of Health.

The selection committee, whose members are listed below, will invite a small number of applicants to submit more detailed proposals. Funding will begin on April 1, 2001.

Letters of intent, not to exceed two pages, should be sent to:

McKnight Memory and Brain Disorders Award
The McKnight Endowment Fund for Neuroscience
600 TCF Tower · 121 South Eighth Street
Minneapolis, Minnesota 55402

Letters must be received by **September 15, 2000.** In the letter, please include the email address of the principal investigators and a title for the project.

Selection Committee
Larry Squire (Chair)
Samuel Barondes · Fred Gage · Charles Gilbert
Jeremy Nathans · Eric Nestler · Carla Shatz

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