ing enough to apply them to a seemingly unrelated field. Photobiochemist Francis P. Gasparro of the Yale University School of Medicine is seeking cell-surface targets for psoralen – a treatment for psoriasis and cutaneous T-cell lymphoma – to help explain the drug's apparent ability to stimulate an immune response against abnormally dividing skin cells. He read Bennett's research reports and saw a possible connection.

Because Bennett's papers "made [cell-surface DNA] look real," Gasparro says he decided to investigate whether surface DNA might play a role in psoralen treatment. So far, his experiments have revealed that the light-activated drug binds to DNA on human lymphocyte membranes (SN: 7/1/89, p.5).

Gasparro, who presented the finding at a Yale photobiology symposium last June, says other researchers have reacted positively, albeit with surprise. He believes he has convincingly shown that surface DNA exists, but says additional experiments will be needed to determine its potential role in photobiology.

Most scientists initially react to the recent surface-DNA research with reservations, but then become "quite fascinated by it," Bennett says. The continuing flow of funds for such work, coupled with accumulating reports in prestigious journals, indicates the scientific community just might give surface DNA a chance to answer some provocative questions.

Where, for instance, does the membrane-bound DNA originate? Most of the scientists who pioneered studies in this area believe it's manufactured in the nucleus and somehow transported to the cell surface. But Gasparro and Bennett think it comes from dying cells that expel their nucleic acids into the bloodstream, where the DNA circulates until receptors on living cells "grab" it. "No one knows what happens to DNA in the body after it's released from [dead] cells," notes Bennett. "It's a black box that people have just ignored."

And how does surface DNA manage to survive the DNA-digesting enzymes in blood? Gasparro, basing his hypothesis on ultraviolet-spectral data showing that surface DNA has an unusual molecular composition, suggests it undergoes some chemical modification that protects it. Surface DNA may contain unusual nucleotide building blocks or added methyl groups, he speculates.

Perhaps most puzzling is the mystery of what purpose the DNA receptors evolved to serve. Bennett believes they provide a way for healthy cells to recycle DNA from dead ones, in "a salvage pathway for conserving DNA's building blocks."

Scientists do not know whether the DNA taken up by the receptor actually becomes part of a cell's genetic material or alters cell function in any way. But the receptor's existence provides great fodder for scientific imaginations. For example, Hefeneider says, "it would be very exciting for us" if this DNA receptor provided the entry route for "antisense" DNA – short DNA pieces that can bind to and cripple specific viral or cancer-causing genes inside a cell (SN: 6/10/89, p.360).

Alternatively or additionally, the DNA itself might exert an immunologic influence while still on a cell's surface, as Rosenberg and Golub have suggested. An immunologic role might have multiple medical implications. For instance, if immunosuppressed T-cells were shown to contain membrane DNA, scientists might be able to develop drugs that act on the DNA to boost immunity in AIDS patients – an idea Golub says Rosenberg once suggested to him.

For now, membrane-bound DNA poses far more questions than answers – and those questions grow ever more intriguing as scientists improve their understanding of the controversial phenomenon. But if additional labs confirm Bennett's results, and if researchers can genetically reproduce the receptor in functional form, the nucleic outcast might someday code for a few clinical answers. □

Letters continued from p.227

'Better than chicken soup'

If you want to flush a number out of the bushes, just publish (as you did) a statement like "No numerical estimates exist for ... lycopene in foods" ("More veggies join fight against lung cancer," SN: 8/12/89, p.102).

The numbers exist; they just haven't been corraled. My "Father Nature's Farmacy" data base indicates that tomatoes contain 1 to 78 parts per million lycopene, the higher figure for the ripest tomato. Lycopene is also listed, but without quantification, for apricot, carrot, eggplant, grapefruit, papaya, pot marigold, stinging nettle, tea and watermelon. I'd like to hear from any other readers who have quantitative data on lycopene or lutein.

Your article makes tomato soup – or better yet, a 20-vegetable synergistic soup, seasoned with 10 antioxidant herbs and spices – look even better than chicken soup as a cancer preventive. What could be healthier for smoking Americans than switching from cancer sticks to carrot sticks?

James A. Duke
Botanist
Germplasm Services Laboratory
USDA Agricultural Research Service
Beltsville, Md.

Stuck with the stuff?

"Making the Right Stuff" (SN: 8/12/89, p.108) both amazed and concerned me. I am amazed that such detailed and exacting technology exists with which to address specific problems. However, my concern is that this avenue of materials creation might contribute to the already unacceptable waste problems facing the world. If Mother Nature is not producing these materials, will she be able to reduce them?

Our friends in Washington would do well to consider legislation requiring all manufacturers to provide explicit information on how their products, once they've outlived their purpose, can be disposed of and/or recycled without endangering the environment.

Jan Eveleth
New Haven, Conn.

Superplants: Use and misuse

"Please Pass the Genes" (SN: 8/19/89, p.120) contains a statement that sounds like an agribusiness public relations release. It would be naive to think that genetically engineered, herbicide-resistant crop plants will be produced so that "farmers might someday be able to abandon the more damaging herbicides."

Indeed, by producing resistant crop strains, farmers will be able to use the more broadly damaging herbicides. The instances where some other environmental advantage is obtained, such as using an herbicide with faster degradation, will be the exception, not the rule.

Paul D. Morrell
San Francisco, Calif.

People have been "tinkering with genes" in plants since the dawn of agriculture, not just "since the early 1900s" as you state. Constant selection for high yield or better taste changed crop genetic makeup long before any knowledge of genetics. Genetic engineering is largely a more efficient method of producing superior plants, as a word processor is more efficient for writing than a quill pen.

But what are we going to do with high-lysine tobacco – make high-protein cigarettes?

David R. Hershey
Assistant Professor of Horticulture
University of Maryland
College Park, Md.

High-lysine tobacco has no commercial future, only research value. – I. Wickelgren

Cattle, sheep and cheat

As long as the cattle- and sheep-growers' associations dictate the grazing policies of the Bureau of Land Management and the U.S. Forest Service, cheat grass will win ("Combustible grass winning the West," SN: 8/19/89, p.127). It is an indicator of the overgrazing fostered by these agencies.

R. O. Baird
BLM Regional Range Examiner, retired
Tubac, Ariz.

CORRECTION

In "Cloudy Concerns" (SN: 8/12/89, p.106), the statement that a 1,000-kilometer cloud system is "100 billion orders of magnitude" larger than a 10-micron water droplet should read "11 orders of magnitude larger" or "100 billion times as large." Orders of magnitude increase by a power of 10.

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Editor, SCIENCE NEWS
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