

Exobiology Laboratory
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University of Hawaii at Manoa
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(808) 948-8386

20 May 1984

Dr. S. Ranganayaki
Department of Chemistry
University of Allahabad
Allahabad
I N D I A

Dear Dr. Ranganayaki,

Thanks for your letter re Srivastava's candidacy for the Ph.D. evaluation. I had sent in my evaluation earlier, by airmail. In the event it has not arrived I include a copy.

Events have taken a curious course recently. I'm a candidate for the presidency of the University of Hawaii and shall be occupied full time at interviews, etc. Also, I have cancelled my sabattical leave. Hence I won't (now) be able to come to India. However, I might come there within several years on a different project, which is covered in the attached news release.

I appreciate your gracious hospitality and would dearly like to see your labs., talk with you and your husband, and to see India. In the long run it might be better to delay my visit, since I'm in the process of learning Urdu and am having difficulties with it!

My wife and I will be traveling to Sweden for the month of June to collect microbial samples far north of the arctic circle for work on closed ecosystems. Neither of us truly are prepared for the cold - after all, we're Hawaiians at heart.

Aloha,

Clair Folsome
Clair Folsome

End to World Hunger Near, Says UH Scientist

By June Watanabe
Star-Bulletin Writer

It looked like a mound of azuki beans — the sweet, pasty substance used as a filling in mochi, and sometimes found in the bottom of a shave-ice cone. Just one week earlier, it started out as a mass of kidney bean cells the size of a pencil tip.

Pointing to that tasty glop as an example, Clair E. Folsome, a University of Hawaii microbiologist, and Franklin T. Andrews, a semi-retired consulting engineer with entrepreneurial instincts, say they've got the solution to world hunger in their hands.

They're serious, and even have a patent pending.

As Folsome, an internationally known scientist specializing in the origins of life, said, "We're not going to gamble away our lives or reputations."

But right now they're trying to convince investors that the key to producing enough food for all the Earth's people — quickly, easily and cheaply — could become golden to those willing to assume the capital risks.

Andrews, 66, admits they haven't yet been able to lure any local investors, but says several potential backers from the Mainland have expressed interest. And, Folsome says, they've gotten feelers from the governments of India, Saudi Arabia — "tentatively" — and the People's Republic of China.

IT WAS FOLSOME, 48, who developed the process of "chemobiotic tissue culturing" in which, very simply put, the cells of a plant are made to reproduce without need of soil, irrigation

and fertilizers or even benefit of roots, stems and leaves.

To get the kidney-bean paste, for example, Folsome sterilized one bean, scraped off some tissue from the inside and put it into a flow-through dialysis tube. That tube, in turn, was immersed in a diluted plant-growth medium that contained sugars, minerals and other trace elements.

Given a ton of kidney beans and the right equipment, Folsome maintains he could reproduce another edible ton in 10 hours, although there are a number of details to be worked out. A primary one is whether the reproduction of a fistful of beans can be duplicated on a much larger scale.

Folsome's work on this dates back 21 years.

"In 1963 (while teaching in Australia), I played around with growing plant cells in cultures," he said in a recent interview. "That's nothing new — everyone does that. But they do it to study (the cells). I did it to get maximum growth rates."

But even though he was able to reproduce white-clover cells and fruit-fly tissue, he said he dismissed the idea as idle scientific curiosity.

ENTER ANDREWS. About seven years ago, the two men who knew each other socially, toyed with the idea of putting another of Folsome's research projects to commercial use. Nothing became of that.

"Then (about four years ago) Clair told me he could create cells on a continuing basis," Andrews recalled. "Me being an engineer, I immediately thought of the concept of growing all

types of foods."

"Frank wants to introduce a revolution on Earth, producing food independent of climate and the environment," Folsome said.

Because of his long-standing work on developing life-support systems in space, Folsome said he's interested in it as a means of establishing "a permanently based space station."

But both men also acknowledge they are interested in it for financial gain, although — once they get it going commercially — they say they would be willing to turn the technology over free to the National Aeronautic and Space Administration.

Folsome says he's developed the process independent of his university research and so far, has sunk \$40,000 of his own money into the project. Andrews, who has spent about half that amount, says they're looking for private capital because there are too many restrictions tied to government funding.

IT'S HARD to say exactly how much it would take to start operating a plant that could produce food chemobiologically, Andrews said. Because the technology already exists, however, it wouldn't take that much to set up an operation, he said.

India, for example, reportedly has 600 defunct beer breweries, Folsome said, and they would be ideal for conversion into a food reproduction plant.

Andrews said he recently talked to a representative of the Chinese government about the idea and made the following proposal: \$50 million to buy the process, with \$5 million of that advanced for research and development,



FOOD FOR THOUGHT—Clair Folsome, left, and Franklin Andrews with a mashed mound of kidney beans they claim took only a week to grow in the laboratory. —Star-Bulletin Photo by Craig T. Kojima.

then an additional \$5 million for each factory.

Folsome said if someone gave him \$5 million today, he could start churning out food in a year.

Considering their claims, both men maintain they have been

met with relatively little skepticism.

Why hasn't anyone else come up with this idea?

"Because it's too simple," Folsome said. "We're just using plant cells to make plant cells. The

consequences of this would be as in the Industrial Revolution and are entirely unpredictable. But even if we fail (to market the idea), the concept will be carried on. The most important part is to get the word out."

C. E. Howe



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6 January 1986

Prof. Krishna Bahadur
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I N D I A

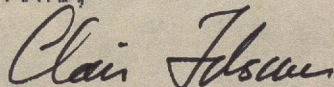
Dear Krishna,

I would be honored to be an examiner of the D. Phil. thesis of Miss M. Bahadur on the topic of "Studies on the Origin of Life". A copy of the letter sent to the Registrar is enclosed.

From 14 to 22 November I was in India, working with ATUL Ltd. and ANIL Starch on a biotechnology project for food production. Time scheduling was so tight that I could not get to your University for a visit, however I plan to return to Allahabad within the next 6 months and will let you know more definitely as soon as I do.

Most of my recent work on origins of life has concerned the UV driven photochemical reduction of CO₂ to organic carbon mediated by phase bounded systems. We find that liposomes and other structures with a high dielectric constant are most efficient in this reaction. Will send you some reprints when we sort out our data some more.

Aloha,



Clair Folsome

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15 January 1987

Dr. S. Ranganayaki
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I N D I A

Dear Dr. Ranganayaki,

Thanks for your letter of 22 November which somehow only got to me by January!

I have received and sent my reply re Ragini Srivastava's D. Phil. thesis. It is quite good and careful work.

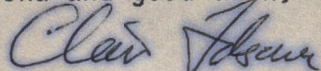
As far as retirement goes, there is no age limit here. Although most choose to retire near age 60-65, some continue to work as late as age 75+. I have no plans for retirement!

Research funds and fellowships are extremely hard to obtain here due to massive cutbacks in federal support of research in a laughable effort by Congress to balance the budget. About the only avenue I can suggest is to try the East West Center. This institute is financed by the US Congress and is intimately associated with the University of Hawaii. Fellowships from the Senior Researcher level to graduate students are provided. If you or Dr. Bahadur are interested in pursuing this route, the address is:

The East West Center
(Open Grants Office)
E-W Center Road
Honolulu, Hawaii 96822

If you could obtain support from them, I could find laboratory space. However, laboratory materials and supplies would be in moderately short supply.

Aloha and good luck,


Clair Folsome

Dr. C. E. Folsome



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VIA AIR MAIL

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