Did Algae Freedom Fighters Win the Cold War?, Part 1

By JIM LANE, Editor, Biofuels Digest

MOSCOW — It was the evening of the day in 1990 that Saddam Hussein rolled his tanks into Kuwait, igniting the First Gulf War. I was camped out in the cafeteria at the Cosmos Hotel, north of Moscow's center, watching the one working television and waiting for Gorbachev to make a statement on the invasion.

He never showed. A far bigger crisis had befallen the Communists, although I didn't understand it then and was irritated by it. Instead of Gorbachev and the great drama of the Gulf War, we got a pleading Agriculture minister, asking the young people of the Soviet Union to drop what they were doing, rush south towards the grain belt, and help out with the harvest.

Glasnost, or "openness," seemed to be working well enough in the USSR — after all, here was the minister openly talking about the harvest problems right on state television. But perestroika, or "restructuring" — seemed to be getting nowhere.

So, the minister made his appeal. Response was tepid, and the harvest failed. It was one more nail in the coffin of the Soviet system, which finally collapsed the following year.

This past week in Rotterdam, I ran into algae biofuels' very own "Dr. No", John Benemann — known for his succinct and characteristic analysis of new ventures aimed at making renewable fuels from algae: "It won't be affordable.".

We got to taking about the role that algae played in the last days of the USSR. I began to see the events of that terrible period in the Soviet Union, so many years ago, in a new light.

The Soviet microbiology programs

"In the Soviet Union, after World War Two," Dr. Benemann told me, "the industrialization of agriculture, and particularly commodity animal feed production, along the lines of other central command and control industries, was a vexing problem. A major, semi-secret effort was started in the 1950s to develop an industrial process based on the conversion of oil into feeds, by bacterial and yeast fermentations (the so-called single-cell protein, SCP, approach, also tried in the West, in particular by BP, using methanotrophic organisms grown on natural gas, one can note).

"Over the following decades enormous production systems were set up all over the Soviet Union producing millions of tons of animal feed, a great success in fulfilling the five year plan goals. Unfortunately consumption, by the animals (they refused it) was not as successful, and problems of contamination with residual hydrocarbons were a problem. Failure of the Soviet system to produce sufficient feed was a significant contributory reason for its collapse."

Those darn little one-celled freedom fighters. Making themselves unpalatable to cattle — is it really possible that they brought down the old regime and ended the Cold War?

Food and the fall of the Soviets

Looking back at 1990, it makes sense. The whole country seemed to be in a state of food siege. It was time for the grain harvest and there weren't enough hands and machines to bring it in. Much of the food that was being produced was being held in the countryside, we were being told — trucks that headed north towards Moscow were getting hijacked, so went the rumor going around.

The protein program was seen as a way out of the mess. A new protein source for livestock meant less land used up growing fodder. Meaning that more land could be used to grow grains for human consumption, or other crops. Or that resource could be freed up for industrialization. Or that the USSR would be less exposed in years of poor harvests. When the program failed — those hopes faded.

Senator Charles Grassley of Iowa once said that every society "is always nine meals away from a revolution." That does as good a job as anything of explaining why, about nine meals later in this crisis week of 1990, the council up in Leningrad voted to change the city's name back to St. Petersburg. At the time, everyone I knew assumed that the Leningrad council was making an empty gesture of defiance and protest. But the name change stuck.

Turning to microalgae

Dr. Benemann said one time that "if algae looks good, we're in big trouble," — whether that is true or not, the Soviets apparently turned in their desperation, not only to single-celled yeast proteins, but to microalgae.

“In parallel with the fermentation program,” John added, “a major effort was also carried out to produce SCP with microalgae, with both closed photobioreactors and open systems developed and deployed on a production scale, in the more favorable locations of the Soviet Union, for example in Tashikistan. It should be noted that the Soviet Union had a microalgae program initiated in the 1950s to support their cosmonauts in space, something the USA then copied, and that the first industrial production of beta-carotene from Dunaliella salina was developed in the Ukraine in the 1960s.”

“The Soviets commanded their technology leaders in East Germany and Czechoslovakia,” Benemann explained,” to help develop their algae feed production effort. The Hydrobiological Institute in Trebon, at that time in Czechoslovakia, developed an open culture system, consisting of very shallow inclined trays. This system was used to produce Scenedesmus, and the Trebon group published many interesting scientific papers, and by the late 1970s, a one hectare production plant was built in Bulgaria.”

After the fall of the Berlin Wall, it came to a comical end.

“With the end of the Soviets,” Benemann recalled, “the Trebon group tried to become a commercial enterprise, but it took them a few years to recognize that the market demanded Chlorella, not Scenedesmus. Eventually they switched over, as did the Bulgaria plant, but nothing much has come of it, commercially. The Trebon group continues to do very good research and has also started a small company to supply research equipment to algae companies. Their cultivation system, has, however, scaling limitations that would prevent its commercial development.”

I had a chance to see cultivation limitations for myself.

Back in the days of the Soviet Union, it was nearly impossible to get permission as a journalist to travel on an unrestricted basis in the countryside. Occidental Petroleum CEO Armand Hammer was in the last year of his life, but kindly worked his magic to make me welcome west of Moscow in the Nakhabino forest, where he was developing a resort complex, so long as I traveled unofficially.

It was a tough journey to persuade a driver to undertake — it was illegal to take a foreign journalist that far out of the Moscow ring. I would be welcome in Nakhabino — but it took a wad of hard currency to secure a ride. Upon arrival, my driver fled as soon as I was out of the car, and I never saw him again.

It was a dacha-dotted forest, and a graveyard. Nearly 50 years after the Battle for Moscow, you could still turn up rusted out helmets and spent ammunition from 1941. Foxholes and bomb craters formed shallow depressions here and there.

Everywhere you looked, this part of Russia was covered with silver birch — which loved the acidic soil. To knock it down enough of it to make a building site to erect anything, you needed some equipment and a permit. You couldn’t get either. There was some rule, I was told, still on the books in those dying days of the old regime,

that you couldn't remove silver birch unless you had a use for it — and it couldn't simply be combustion. Silver birch is too hard a wood to be useful in construction — so you really couldn't find a permitted use for it, then.

By this time, import controls had eased up and you could get Western farm and construction machinery in via Finland, if you worked the system hard enough. But for some reason — at least in this part of Russia — you couldn't import spare parts. Obtaining them in-country required a special permission from the local Nakhabino council. I have no idea why. And you could never get a permit, no matter how hard anyone tried, and I never figured that out, either.

Small wonder that scale-up problems were happening in the exotic world of industrial biotechnology and microbial engineering. They were happening in tree stump removal.

Please tune into the Chemical Equipment Daily for part two of this two-part piece.

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