Art /(sci) 2 x tech = taste

The divide demarcating culinary artistry and scientific wizardry is shrinking to common ground. There's acreage here for everyone.

By Christopher Styler

There have been technological advances in the culinary arts ever since some pelt-wrapped cave dweller stuck a spear through a piece of meat to create the first spit.

In the intervening millennia, science and cooking have marched in ever-increasing lockstep. That doesn't mean that the art and science behind cooking have always been comfortable bedfellows. A mere 20 years ago, chefs viewed food scientists as another species, and the suspicious side glances were, more often than not, returned. "In my early years in research and development," cites Patrick McDonnell, senior partner of McDonnell Kinder & Associates, a culinary strategy and marketing firm, "there was disrespect between chefs and scientists. Old-school food scientists thought, 'If you're a chef, you're basically emotional, probably blue collar, and not educated in the sciences.' Chefs felt that food scientists may have had the smarts and the degrees, but they didn't know a whole heck of a lot about food."

But the iceberg of mistrust is thawing. Steve Schimoler, current president of the Research Chefs Association (RCA), is familiar with the scientific principles behind cooking and their growing importance in the coming years. He credits the détente between chef and researcher as a matter of corporate survival. "The 80s saw an explosion of creativity in independent restaurants; the chains saw this as a way to capture some very cool ideas and bring them to a larger audience," he explains. "But labor was tight, getting tighter and more difficult to manage. Enter the "culinologist" — a chef trained in the arts and sciences of producing large quantities of consistently delicious food."

"Culinology," a neologism that blends "culinary" with "technology" and is trademarked by the RCA, is how Schimoler describes the mission and essence of his organization. Schimoler, who knows the restaurant and R&D worlds (he is General Manager-Culinary Business Development at SYSCO Corporation and runs the Mist Grill in Waterbury, VT), sees the growing importance of kitchen science as a trend with no chance of slowing. "The culinologist is not destined to work in one kitchen of a 400-unit chain managing scratch recipes," Schimoler explains, "but rather to work in R&D kitchens devising ways to get these foods from a central location to individual units." Schimoler points to a number of factors other than consistency driving the "big boys" toward culinology: everything from obesity, trans fats and genetically modified organisms (GMO's) to sustainable agriculture and the safety of the food supply are concerns shared by a growing number of consumers. From Schimoler's point of view, properly trained culinologists can and will address these concerns in a way chefs cannot.

MacDonnell, who also started with a classical approach to cooking and made a leap into the world of corporate R&D, was one of the first American chefs to interpret nouvelle cuisine successfully in the US. After his stint as executive chef at the Rainbow Room atop Rockefeller Center, the largest grossing restaurant in the US at the time, McDonnell joined a team at General Foods that introduced a product line known as Culinova Fresh Express, a variety of refrigerated, ready to reheat entrees. "There were a few people at General Foods," McDonnell recalls, "who realized they needed to move from side dishes to the center of the plate." He spent 6 years at General Foods and rose from division/corporate chef to VP of Techni-Culinary development.

In the early 90s, McDonnell accepted a position as director of R&D with ConAgra, leaving partner Coral Kinder to run McDonnell Kinder & Associates. "It wasn't until I was in a position where I worked directly with food scientists that I really started to make the dynamic work," McDonnell recalls. "Our team at ConAgra, which was charged with fast track product development for retail and foodservice, included two home economist, three food scientists, two registered

dieticians, and three chefs. We let the person with the expertise in a certain area lead the team through those areas."

McDonnell echoes Schimoler's feelings on the growing trend of "real chefs" involved in R&D. "American attitudes toward chains have evolved in a positive way," McDonnell cites, "as chains have continued to up the stakes. That's when the chains started getting into working with chefs."

McDonnell and Schimoler agree on something else: Much of what is driving the need to deliver high quality food to numerous locations came with the introduction of the "limited time offer," known as the LTO. Essentially the big chains' version of the little restaurants "daily special," the LTO was a way to encourage and create repeat customers who might normally tire of the same menu. Without R&D chefs creating viable means to deliver these "specials" to multi-unit operations, the LTO wouldn't exist.

"Sonic are masters at putting some really cool items on the menu for a while," states McDonnell. "When interest in an item starts to wane, they have something ready to go in its place. The larger chains are asking,'can we do that?'"

Jeffrey Cousminer, currently Director of Product and Flavor Development for the savory food division of Firmenich, Inc., is another "old school" research chef with his feet firmly planted in the world of art and science of cooking. (Firmenich is a "flavor house" — a catchall name for companies that work with food and beverage manufacturers to develop products. These flavor houses have become major players in culinary research.) Always interested in cooking, Cousminer attended two years of college with a heavy dose of science, but left for the Culinary Institute of America when he read about its move to New York. He bounced back and forth between kitchens and colleges until he ended up with a Master's degree in food science and nutrition to accompany his CIA diploma. "It intrigued me, that blend of creative cooking and scientific principle. Except the two weren't at all integrated back then. 'Food science' was purely science as it concerns edible things, from the molecular level on up."

Because of this lack of integration, Cousminer, armed to the teeth with experience and degrees, floundered until he was “discovered” by a recruiter who was looking for someone with both degrees. “According to the recruiter I was only one in USA with both degrees at that time.” Hired by General Foods Co. in 1984, Cousminer’s job was to “translate the culinary gold standard created by the test kitchen team in White Plains into mass producible retail items.”

Cousminer directs research activity, flavor creation and application at Firmenich. “Flavor chemists, chefs and food technologists are all in my group,” Cousminer explains. “It’s my responsibility to foster the interaction among the three professions.” Large retail manufacturers and muti-unit chain operations looking to improve products they already have or create new products are Firmenich’s biggest clients. “The end user, a restaurant chain, for example, doesn’t buy anything from us, per se,” explains Cousminer. “But they’ll buy a marinated chicken that we’ve developed from their supplier.”

“I don’t think we’re in the stage of evolution that smaller operations are aware of what we do,” states Cousminer, “or can afford what we do.” He does, however, envision a day when smaller chains and multi-unit restaurants will rely on some form of help from flavor houses like Firmenich.

David Burke, noted chef of David Burke and Donatella restaurant in New York, took a similar but different path to the world of R&D. Burke, who started as a dishwasher in New Jersey at the age of 15, went on to attend the Culinary Institute of America and work with some of the 1980s most accomplished chefs, both here and in France. He remembers the basics of science early in his education at CIA: “It was in the sauce kitchen that I first learned about science, the principles behind emulsions and so on. I realized I was learning more than recipes; if you knew the principles you could take it where you wanted.”

During his time at Brooklyn’s River Café, then under the reign of Charlie Palmer, Burke started playing with flavored oils, foams, and foods turned into powder — like dehydrated ketchup that Burke used “like red salt.”

“We had a tuna tartare on the menu,” Burke recalls, “that had ginger and horseradish in it. I figured we had the peelings from both already, why not try a flavored oil that would end up in the finished dish?”

Burke was able to build on his growing knowledge of food science when he was hired by Lipton in the late 80s. “I put a team together with people like Ed Brown (currently at Sea Grill in Manhattan) Douglas Rodrigues (OLA, Miami/NYC), Rick Moonen (RM, NYC), and Michael DeGeorgio (Il Cortile, NYC). Rick handled seafood, Rodriguez was doing his thing, and so on. I was the group head. We developed real dishes. It was Lipton’s end of things to get those flavors into bottles or packages and get them into stores.”

Burke has combined his own knowledge with that of other professionals to create and launch several products, including Smith and Wolensky’s Steak Sauce, a line of upscale lollipops (goat cheese, foie gras, and smoked salmon among them), and salmon pastrami, distributed by Perona Farms.

Whereas Burke used to hand his creations over to the R&D department of a corporate giant, he finds himself much more involved in that end of things now. “The question I always ask myself,” Burke says, “is, ‘How do I make this restaurant quantity food and get it shelf stable and out to the markets?’ Well, the stuff I’m learning at Manheimer now is incredible,” says Chef Burke, referring to J. Manheimer, Inc, the Teterboro, NJ based flavor house. “ I need a foaming agent for something I’m working on, I know who to call. I’m doing a dessert with a volcano shape, and I want the volcano to erupt when I pour a sauce into it, I know where to go.”

Burke’s latest project is Flavor Magic, essentially spices adhered to a sheet of plastic, that will be available in both retail and food service venues. “Just lay your salmon onto the strip, flip it over, and you’ve got marinated salmon,” Burke explains. Flavor Magic, which will launch in 12 flavors, is perfect for mass production, claims Burke. And that is precisely why foodservice distributors like Sysco and Aramark will start to sell it as soon as it is ready to roll. Burke says Flavor Magic came directly from his work with drying agents and non-caking agents he did with the team at Manheimer.

There is a steady, inexorable trend toward chefs making the move to R&D and either working with food scientists or learning those skills on their own. It has happened fairly quietly, but already some rumblings have been heard in the world of education, which is gearing itself up for this brave new world. According to Burke, the venerable CIA is working on a branch of the school which is tailored to individuals seeking to enter the world of R&D; they have asked Burke, who already sits of the board of the RCA, to sit on the board of the new endeavor.

This new attention to the science behind cooking — whether you're struggling to instruct better-educated chef-students or seeking to shatter pre-conceived ideas of what's for dinner, can manifest itself in many ways. The RCA is behind several degree and accreditation programs. The first degrees in Culinology were awarded from the University of Nebraska in fall of 2003. Clemson University is launching its own program this month **[au note: Sept 2004]**, with 30 future culinologists already enrolled. "We're also going to get people already in the business into continuing education," states Schimoler. "We introduced a program this past June at Johnson & Wales University to cater to an emerging sector of young people that see R&D work as an attractive career opportunity." Schimoler's claim that the average salary of R&D chef is about twice that of traditional chef will only make that more attractive. "If chefs don't have a good understanding of science, they'll be left out in the cold," Schimoler predicts. "The word 'chef', in my opinion, ten years from now will be replaced with 'culinologist.'"

Perhaps the most telling moment of just how far this industry has come in such a short time is the story behind the luncheon given at the RCA's conference in Savannah last March. Steve Schimoler came up with the idea to pair six of the nation's top chefs with six food manufacturers. The fact that the meal was prepared off premises by the food manufacturers, and not in-house by the chefs themselves, was kept top secret.

When the luncheon was over and the chefs took their bows, they gave credit where credit was due. Even in a room full of research chefs, the thought

that a six-course meal of that caliber be prepared in six different facilities miles away, came as a real eye-opener.

Jay Kimball, director of R&D and product development for Chef John Folse & Company Manufacturing, walks us through the process:

"Chef John Folse & Company was paired up with Rick Tramonto of Tru in Chicago. Rick developed a recipe for a poached salmon fillet paired with fennel puree and Mediterranean vinaigrette, a dish with three separate manufactured components. Rick sent us a sample by overnight delivery, so we could see what were dealing with. Before we got started we took a physical viscosity test of the fennel puree and took a drained weight of the vinaigrette to determine the amount of particulates in the vinaigrette. We wanted to make sure what we ended up with was as close to Rick's dish as possible. Then we had to go to work on a number of ingredients. Rick called for fennel pollen that was sold by a farmer in Ohio in 1-ounce jars. We worked with a flavor house to duplicate that flavor and also the taste of a small-batch *verjus* in the sauce, which we did by using grape juice, flavors and colors. We replaced Rick's boutique olive oil with a product similar in flavor and color that we got from Italy in 55-gallon drums. Lemon and orange zest were replaced with citrus oils. So before we even started development one version, we went head to head on the difficult ingredients.

"After we created several versions, we came up with one that we thought was perfect. We sent a sample to Rick and he called back to say it was wonderful. We often get bogged down by what we can't do; this was a great opportunity to show what we *can* do."

Chef John Folse of the aforementioned manufacturing company is, among many other things, the president-elect of the Research Chefs Association. Folse, who opened his first restaurant, Lafitte's Landing, in Donaldsonville, LA 26 years ago, went on to buy a catering company in the mid 80s. By the time some of the newly opened casinos along the Gulf coast approached him inquiring about a supply of authentic Louisiana food like gumbos, etouffes, and red beans and rice – Folse's specialty at the time — he was familiar with volume cooking. "I knew how to feed 1,000 people," Folse recalls. "But I didn't know how to make large

quantities of gumbo and get it to a location hundreds of miles away." Folse filled his first order for gumbo — 600 gallons — standing alone in the ballroom of his restaurant and, in his words, "counting 5-gallon batches until I got to 600." When Folse started in the manufacturing business, it was a seat-of-the-pants kind of process. When making his first 4,000-pound order of red beans, for example, he knew as soon as he added 200 pounds of bacon fat to the kettle, that there had to a better way.

A lot has changed since those first batches of gumbo and the oceans of bacon fat. Folse founded his manufacturing company in 1991 which now produces about 30 million pounds of food a year and he's due to open a $4 million USDA manufacturing plant September 2004. It wasn't an easy road. "Early along the way I realized I needed help, some kind of stabilizer for the roux for the gumbo, or a base that gave the same flavor to the red beans that I got from bacon fat and ham hocks, for example," relates Folse. "I just started making calls, trying to connect with people who had the answers." Over the years, Folse has learned to approach each new project with a positive, can-do attitude. "When we hear something like'You can't manufacture an emulsified, frozen sauce that stays emulsified,' we always answer 'Why not?'" Folse did just that, by working with an equipment manufacturer to construct a high-speed vortex mixer that could handle 1000 pound batches of sauce.

"Back when I was starting out in the restaurant business, when you walked into another chef's kitchen all the cabinets were suddenly closed," Folse says with a laugh. "Now we have this amazing resource for sharing, this coming together of chefs and scientists. Even casual concepts are upgrading their food, and with the increased concern over health issues, we are constantly seeking to broaden our knowledge." Folse sees his mission during the two-year tenure of his presidency clearly: To work diligently in the marketing area to set up RCA as ultimate brand in culinology and to bring an industry awareness of the need for better education for R&D chefs. To achieve his first goal, Folse envisions events that throw the spotlight on RCA, turn new and experienced chef on to the

possibilities that exist in culinology, and honor chefs and food scientists who stand out in this field, thereby branding the association in the industry.

Toward the second end, Folse would like to see all culinary schools and universities add basic food science to their curricula, and to let the education community know that these opportunities exist in the field of culinology.

The Independents

Research chefs, food scientists, nutritionists and, now, culinoligists work largely behind the scene to affect their changes. But what seems to be grabbing all the press nowadays are those chefs who are blurring the limits between science and cooking. This “techno-food,” not loved by all, has only recently burst forth as a full-fledged movement, likely to have all the impact that Nouvelle Cuisine wielded in the late 70s and early 80s. Ferran Adria, the now-legendary chef at El Bulli outside Barcelona Spain, is widely regarded to have taken the pairing of science and cooking to the highest heights, with dishes like foie gras processed in a way to turn from a gravelly texture to its more familiar silky smoothness in the mouth. “Genius!” some cry. “Lab food,” sniff others.

“There are a lot of interesting techniques and equipment in the world of food manufacturing that have application in fine dining situations,” states Wylie Dufresne, whose groundbreaking Manhattan restaurant WD~50 takes advantage of many of these. “The science of candy making alone would leave any chef with a lifetime’s worth of ideas to pursue.” Dufresne cannot pinpoint a moment when he began to look at cooking differently; he has always been intrigued by the science behind cooking. “It’s been a long process to get where I am now,” Dufresne states. “You start to wonder why things are working, or why they’re not. I was trying to make junket, milk thickened with rennet, and found myself wondering why it wasn’t working. I basically started reading, teaching myself, ‘Ok, maybe if I take rennet and add casein, that will get me where I want to go. One thing leads to another and I found myself wondering, ‘If I dissolve the casein in mushroom stock, will I get mushroom cheese?’”

Heston Blumenthal, whose restaurant The Fat Duck in Bray, England was awarded its third Michelin start this year, puts it succinctly on his website: “We are part of a growing group of chefs, scientists and psychologists that are looking at food and the way that we eat from a different angle, the approach being more holistic and with new controlled experimentation, one that does not automatically take historic kitchen lore and tradition for granted.” Describing what he does as “molecular cuisine,” Blumenthal has spent years breaking the barriers between the senses and delving into areas previously more familiar to psychologists than to chefs. In fact, his network of colleagues, built over the last 15 years, includes micro-biologists and chemists as you might expect, and two experimental psychologists, which you may not. According to Blumenthal, “Memory overrides all the senses when it comes to food.” His own forays into the world of food memory started spontaneously and simply enough; while viewing cartoons with his son he was reminded of the Pink Panther candy bars he ate as a child. Several calls later and he had tracked down the artificial flavor he recalled from his youth. “It was satfisfying to see it was exactly as I remembered it, but it didn’t do me any good as a chef,” Blumenthal relates. What did turn out to be a rewarding experience was to set cards on tabletops asking guests to recall favorite food of *their* youth. Blumenthal then set out to recreate them in startling new ways, turning the Brit comfort classic of sardines on toast, for example, into a sorbet. “If nothing else, we figured it would provoke guests to think about food they may otherwise have forgotten about.” Challenging traditional perceptions and awareness of foods lies at the core of The Fat Duck’s philosophy.

Jose Andres, chef/owner of D.C.’s Jaleo, Zaytinya and Café Atlantico restaurants, is a protégé of Adria’s. (He goes to Spain to work with Adria for several weeks every summer.) Andres sees nothing odd about mixing the old and the new. “It’s a funny moment right now, the way science and cooking are coming together. One one hand, it’s a great time to talk about local and organic produce, and everybody can get behind that. It seems that introducing more science and technology is contrary to this approach, but it’s not.”

Andres is never at rest. It is his insatiable curiosity that has led him to some pretty offbeat combinations. Take cotton candy, which even Andres admits has a “certain circus-y, junk food association.” Andres is spinning webs of the confection to encase seared foie gras — a sweet/rich combination that is definitely a departure from the glazed pineapple and mango of recent years.

A passionate chef and believer in a strong science background for every chef, Andres declares firmly, “Harold McGee, Robert Wolke — these guys books should be on every chef’s shelves,” referring to the authors of *On Food and Cooking* and *What Einstein Told His Cook: Kitchen Science Explained*, respectively. That doesn’t mean Andres goes it alone: for years he has been working with Steve Shriver, a computer programmer by training, a passionate food scientist and researcher of exotic fruits by hobby. (Shriver’s been known to fly half way around the world to sample a “new” fruit.) It was Shriver who brought to Andres’ attention something called the “miracle fruit.” Native to Nigeria and western Africa, the miracle fruit “contains a proteinaceous molecule that bonds with the sour receptors on the tongue,” according to Shriver. “The result is that someone who samples a miracle fruit is incapable, for anywhere from 30 minutes to 2 hours, to perceive sour tastes.” Andres used miracle fruit as the centerpiece of a dish he calls “lemon before and after,” which consists of two slices of lemon with a miracle fruit in between. “You taste the lemon, then the fruit, then the lemon again,” Andres explains. “The difference is remarkable. Some people tell me ‘That isn’t a dish — three pieces of fruit on a plate,’ but I tell them that a dish is anything that makes you think about food in a new way.” Andres takes this and other criticism in stride. “In a way, it sounds to me like when Galileo announced that the world is not the center of the universe, or when anyone who knew about medicine was considered a witch.”

At Moto restaurant in Chicago, Chef Homaro Cantu not only pushes the boundries of what is considered a dish, he invents equipment related to the dining experience. His inventions include flatware with a helix-like handle that can hold herbs and other aromatics within the spiral. Although not directly

consumed, these aromatics enhance the flavor of a dish by stimulating the sense of smell.

Deconstruction figures prominently into the picture in much of this new food. At WD~50, Dufresne rethinks the elements of a lamb sandwich by starting with a thinly sliced pickled lamb's tongue and pairing it with tomato molasses and a fine brunoise of Romaine core. Dufresne doesn't hold the mayo, he rethinks it: "I was able to come up with cubes of deep fried mayonnaise by creating an eggless mayo that starts with milk, sheet gelatin and gellan, a gelling agent. Into that is emulsified oil and mustard, salt and lemon juice. Once set, I can cut it into cubes, bread it and fry it." And what is listed on Cantu's menu as "cold apple pie with hot ice cream" is actually a pipette filled with three separate components: warm crème anglaise (the "ice cream"), jellied Granny Smith apples and what Cantu describes as a "mulched crust" — a cooked pie crust reduced to a powder. One simply squeezes the tip of the pipette and squirts the contents into one's mouth.

With what he describes as "high school science," Cantu is up to some pretty sophisticated stuff. Lately he's been toying with liquid center glass noodles, made by thickening liquid with an alginate and pouring strands of the solution into a bath of calcium chloride. The calcium chloride sets the exterior of the "noodle," but leaves the center liquid. "I'd like to figure out a way to suspend things like caviar in the center," says Cantu matter-of-factly, as if he were talking about which flavor to make a sorbet.

"A lot of people tend to believe that everything has already been done," says Cantu, who got his start in Charlie Trotter's kitchen. "I don't believe that."

Whereas the RCA recommends a hands on approach — degrees in Culinology, continuing education and so on — independent chef/owners like Andres and Blumenthal see the inevitable wave of the future quite differently. "I don't design my own kitchen — I hire a designer," Andres states. "I don't grow my own produce either, so why shouldn't I make a food scientist part of my team?" Shriver, Andres' fruit-loving cohort in chemistry, who is working on several

projects with him, states, “One of the things Jose wants me to work with him on is how to encapsulate flavors, basically gelatinous films encasing flavored liquid.”

Food like this may or may not be your cup of tea, but there is no denying it’s getting hot. As Michael Whiteman, president of restaurant consulting firm Joseph Baum & Michael Whiteman Co., puts it, “In the hands of the right people it can range from interesting to grotesque. In the hands of the wrong people it can be plain grotesque.” Whiteman sees this movement’s growth, partly at least, as a result of the marketing pressure placed on chefs to stand out.

Whiteman is similarly practical when it comes to assessing the future of the movement. “I think it’s like an art movement: when it pushes itself into an extreme position, it collapses. I wouldn’t be surprised to see a lot of the Merlins out there collapse.”

Ingredients

David Burke, meanwhile, is at work unlocking the secrets of *umami*, the Japanese word for the mouth watering sensation that is brought on – by among other things -- MSG. “It is found in natural ingredients, too,” observes Burke, “like dry-aged beef, aged cheeses like Parmigiano-Reggiano, and some types of seaweed.” To deliver the mouth-watering goods, Burke has been making a brine of seaweed, sugar and water and using that to marinate proteins like chicken breasts.

“The thing that is becoming obvious about guys like Ferran Adria, David Burke and Heston Blumenthal,” observes Mark Stech-Novak, noted designer of up-to-the-minute kitchen spaces, “is that they’re looking at food on an elemental level. There are a lot of ways to get flavor out of food,” he continues. “Simple ways like cooking two ingredients together in a pot, for example.” But other methods are becoming increasingly important. He points to extraction — via alcohol, oil or water — as an increasingly common means of conveying flavor, and recalls his time spent cooking in France. “There was a guy there who used mini-stills to create little batches of eau-de-vie, in flavors like celery and artichoke. Some of these things were vile on their own, but a few drops in a bowl

of soup made all the difference in the world. As the body of knowledge of grows, there is more for inspiring chefs to draw from."

Extraction is indeed hot and getting hotter, or, technically, cooler according to Steve Schimoler. A company called Primal Essence has put out a line of liquid flavor essences created by extracting flavor using carbon dioxide under high pressure and low temperature. "Normally, extracts are made using benzine or hexane, pretty volatile compounds," Schimoler explains. "This type of extraction is cleaner for two reasons: first, primal Essences' use of quality ingredients and second, the fact that CO2 extraction leaves behind no residual nasty stuff." These essences, in flavors like cumin, basil, black pepper, and a dozen or so others, are easily soluble in water or oil. "They are really pure," states Blumenthal. "I was amazed at some of them, even the black pepper, which is notoriously hard to extract." Chefs Dufresne and Blumenthal have expressed interest in working with Primal Essence to develop custom flavors for their restaurants.

Equipment

"Science means equipment too, no?" posits Chef Andres. "These new machines and techniques, like the Pacojet, the Thermomix, and sous vide cooking. I don't think we've scratched the surface yet."

Stech-Novak agrees. "A lot of chefs have moved past making ice creams and sorbets with the Pacojet." (A Pacojet makes sorbets and ice creams by finely shaving fruit or other ingredients that have been covered with liquid and frozen. No pureeing or cooking of the ingredients is necessary.) "They're taking the shaved material created with the Pacojet and spreading it out on a sheet pan, then drying it. To take something to a powder from a frozen state is completely different than something that is dried from the fresh or cooked state."

And the Thermomix, Stech-Novak points out, is important because of it fuses blending and heating abilities. "Making an herb-infused oil while you're heating the oil lightly and blending it slowly, gives you a much more intense product than simply steeping herbs in oil."

“I’m seeing some of the equipment used in larger chains start to filter down into smaller operations,” observes Patrick McDonnell, citing the impingement oven and smaller cook-and-hold ovens that fit smaller restaurant kitchens in particular.

Likewise, using a vacuum tumbler to flavorize fish fillets, poultry, chops and steaks is nothing new to multi-unit chains and food manufacturers. What is news is the increasing presence of tumblers in smaller, independent restaurants. Vacuum tumblers work by combining individual portions of a particular protein with a marinade and removing the air from the chamber, which causes the marinade to penetrate the protein more thoroughly. “All these new arrows in the quiver that the R&D world has been utilizing are getting a lot of chefs excited,” Schimoler states.

Doug Care of Doug Care Equipment, Inc. in Springville, CA has been selling a gang of vacuum tumblers to small, independent restaurants. “These small tumblers, which hold as little as 8 pounds of ingredients,” Care states, “work on same principle as the larger ones. I used to sell mostly to chains, including Kookooroos,” he continues, referring to a multi-unit operation specializing in rotisserie and roasted chicken and turkey. “But now I deal mostly with single-restaurant owners.”

Sous vide — French for “under vacuum” — the practice of cooking food in a vacuum sealed bag, was pioneered in France in the 1970s as a way to cook foie gras with less shrinkage; improved flavor was a happy by-product. Sous vide cooking of individual or large batch items that are then flash-frozen for wide distribution is one area that is definitely on the rise.

Cuisine Solutions, a specialist in the area of sous-vide cooking which got its start in 1989, has infiltrated all fields of the food service industry from retail and food service (hotel chains, convention centers, caterers, and restaurants), to military and “on board” (airlines, trains, cruise ships).

Marc Brennet, VP of product development for Cuisine Solutions, is emblematic of the classically trained chef who once looked down his nose at “boil-in-a-bag” cooking, but is now sold on it, big time. His epiphany came when,

after 12 years of cooking for an ambassador in Washington, DC, he was wooed by Cuisine Solutions. “I took the tour of their plant,” Brennet recalls, “which was really more of a kitchen. I was stunned by the quality of the food. It was completely different than my expectations.”

Brennet and the other members of his team develop new items and supervise preparation of existing items. Exact preparation varies depending on the item. In the case of Cuisine Solution’s braised pork shanks with Portobello mushroom sauce, for example, the procedure is as follows: The shanks are seared for color and flavor, but remain about 95% raw. The mushroom sauce is cooked separately. Both items are cooled to between 34° and 38° F, “a very important part of the process,” according to Brennet. Shank and sauce are combined, in either single or multiple portions, and vacuum sealed in plastic bags. Then they are cooked in water at a specific temperature for a specific time. When cooked, the water is drained from the tank and is replaced with 34° F water; within 30 minutes the shanks are completely cooled. Brennet claims that this quick cooling helps slow cooked proteins like the pork shank absorb more of the cooking liquid. After a 24-hour stint under refrigeration — more absorption — the shanks are flash frozen and are ready for distribution. Food prepared under these strict guidelines not only more than meet USDA and HAACP guidelines, they touch on another industry hot button: food safety. “People think that in order to pasteurize something, it must be cooked to a very high temperature. That’s not necessarily true—you can eliminate harmful bacteria and other organisms by cooking for a longer time at lower temperature.” And because items cooked sous vide are, by definition, vacuum-sealed, they stay uncontaminated longer.

Brennet can rattle off the reasons other chefs across the country are becoming believers. “First you have consistency,” he states. “If you pick two pieces out of a thousand we produce, they will be exactly the same. As a classically trained chef, I know that if you roast 50 racks of lamb, the first won’t be the same as the fiftieth. Also, there is much better moisture retention, and much, much better flavor.”

Portion control is a big deal to operators, especially in volume operations. Brennet's outfit has the clout to order cuts of meat and fish to within ½-ounce of specified weights — not always the case, even in a large hotel. "Chefs have changed from 20 years ago," states Brennet. "They look at balance sheets, labor costs, the training level of their staffs. By using prepared proteins and sauces, chefs can concentrate on the side dishes. I'm definitely seeing more acceptance of food prepared off site now than I did five years ago."

But, Brennet points out, sous vide is not a magic wand. "It became very clear to me that you only get out as good as you put it. If you don't start with the best ingredients you can find and handle them properly it can ruin food."

In September of 2000, Cuisine Solutions launched FiveLeaf, a brand of frozen, fully prepared items for home consumption. The culinary brain trust behind the creations consists of Daniel Boulud, Thomas Keller, Charlie Trotter, Mark Miller and France's Pierre Hermé, Reine Sammut (Auberge La Feniere in Lourmarin) and Antoine Westermann (Restaurant Buerehiesel in Strasbourg). Currently, the brand is available on-line (www.fiveleaf.com), but there are plans to distribute the product on a retail level and possibly make it available to Cuisine Solutions on-board clients.

But *sous vide* is not just for the big players anymore. There is a rise in single-portion uses of the technique in independent restaurants. Chef Shea Gallante, of the recently opened Cru restaurant in Manhattan felt so strongly about including *sous vide* in his repertoire that he made other kitchen equipment sacrifices to get it. (Don't feel too badly for Gallante, though, he still gets to hang on to his Montague cooking suite, Rational Combi-Oven and convection ovens.)

Cru's menu, "modern European cooking," according to Gallante, will feature many items cooked using sous vide, all of which will be prepared in individual portions in water with very accurately controlled temperature. Steady temperature is guaranteed not by the latest breakthrough in cooking equipment, but with a device borrowed from the medical field: an immersion circulator which, when immersed in liquid, both circulates the liquid and controls the temperature to within 1/10 degree Celsius. For example, the shrimp for Cru's chick pea soup

with wilted Bibb lettuce and shrimp will be seasoned with olive oil, salt, and pepper, vacuum sealed, then cooked exactly 4 minutes, before being added to the soup. “I wouldn’t do this just for the sake of doing it. I honestly believe the flavor of these dishes is the best. Developing the menu for Cru we cooked over 20 items using sous vide and traditional methods like roasting. Whenever the results were better with sous vide, we stuck with it.” Chef Gallante determines doneness by either time or temperature: Because the temperature of the cooking liquid is so constant, certain items at certain weights will always cook in exactly the same amount of time. If temperature is the means, Gallante applies a length of ordinary weather stripping (the kind used around home windows) to the bag and inserts a probe through the stripping into the center of the item in the bag. The stripping prevents leaks during cooking. (Items prepared sous vide may also be cooked or reheated in a regular or combi-oven.) Chef Dufresne, a pioneer in the craft of small-restaurant sous vide cooking, also cooks using an immersion blender, one that he bought on Ebay. “In many cases, sous vide cooking makes a better product,” states Dufresne. “I save stove space, and me and my crew don’t have to pull pots on and off the stove.

A second piece of equipment that cooks by means of very accurately controlled temperature is Cru’s Swiss-made Hold-o-Mat oven, which maintains temperatures to within 1 degree Celsius by means of heating mechanisms contained within its solid stainless steel walls. (Cru is one of two restaurants in the US using the oven.) Gallante cooks both vacuum-sealed and non-sealed items in the Hold-o-Mat. Vacuum-sealed items are simply placed on a rack set over a half-sheet pan.

It is not likely that all of this new equipment, although it will change the way people cook, will lead to a generation of cooks more comfortable with a wrench than with a chef’s knife. “A big part of our philosophy is asking ourselves, ‘What can we teach people?’” says Gallante. “We look for people who are eager to learn. Most of the techniques are very easy to master; what is difficult is maintaining them day to day.” Gallante, whose menu includes items cooked by

all the classical methods as well as the newer ones, feels that fundamental cooking and knife skills will continue to be as important as ever.

"The more you look into it the more you discover," says Dufresne. "Chefs all over the world that are using technology and science that has existed for years in the field of R&D. But I'm not leaving traditional methods behind. I think we're contributing to the future body of cooking techniques. I'd like to think that if I keep it up, I'll come up with one technique that will become part of the canon."

Kitchen design — Stech-Novak's forte — will most likely be affected as well. "I can see where this interest in food science will lead to kitchens that are a place of calm, peace, perfect temperature control," Stech-Novak notes. Chefs will be better able to experiment, to create in a space that isn't a bustling kitchen." Chef Andres' near-future plans, in fact include building a "food think tank" into his apartment, complete with library and a video set-up that connects him with his mentor Adria, so they can work together in real time, even when they're an ocean apart.

Stech-Novak puts this take on Andres' dream of a separate think tank: "Trickling that down to the real world, where we live, that means giving the butcher a place to butcher, the fish cutter a place to cut fish in order to create uncluttered space."

There are other happy consequences when the lines blur between technology, science and the culinary arts: more hospitable work environments and design innovations, to name just two. As grueling as a restaurant kitchen can be, it can't hold a candle to the rigors involved in traditional, pit-style barbecue. Mike Mills, currently owner/operator of 5 restaurants including the three Las Vegas-based Memphis Championship Barbecue locations, knows this better than anybody. "For the last 30 years, maybe even 50, traditional barbecue, as it is practiced in the south and in Texas, hasn't changed a bit," Mills states. The method of lighting a fire, then raking the coals under what is being barbecued is only the beginning: sticking around to keep an even heat for the hours it takes to barbecue is the hard part.

Mills has turned to gas or electric-assisted barbecue pits. (His are manufactured by Ole Hickory in Cape Girardeau, MO; other manufacturers exist.) The principle — also employed by manufacturers of stone-hearth ovens like WoodStone — is this: Employ a gas or electric heating element combined with a thermostat to regulate the temperature in the pit. In other words, what was once done by painstaking attention to regulating the temperature of the pit is now almost effortless. These pits, which can burn wood, coal or a combination of the two, make the life of a modern-day barbecuer a heck of a lot easier. There is no sacrifice in the quality of the finished product either. “They work just like a regular pit,” Mills asserts,” with flavor coming from the juices that fall from the food onto the hot wood or coals. Barbecue is low-and-slow -- long cooking with low heat. 210 F is my magic number. I won’t vary more than 5 degrees.”

Most importantly, to Mills, this new technology has a direct impact on his crews in two fundamental ways: “As time goes on, it’s harder to find people who are as patient and dedicated as the old-time pit masters. Most owners of these legendary barbecue places have kids who aren’t interested in that kind of life, or are parents who want a better life for their kids.” It makes finding, hiring, and training people to run the pits easier as well. To Mills, this makes opening more stores more of a reality. “At each resturant I have one person who is mostly in control, but I have backup people as well.”

Mills wouldn’t even consider one of these new-fangled pits if there was a difference in the finished product. “Gas and electric-assisted pits are real pits, if you use them the right way.” He goes on to make a point that is important to remember before embracing any new technology: “If you use these the wrong way — for example, load them up with too much food, or crank the heat up and cook too fast, you won’t get the same results as with true-blue barbecue.” Something to keep in mind whether your product is traditional Memphis barbecue or desiccated wild mushrooms.

Regardless of their approach, chefs from all segments of the food industry find the melding of science, technology, and cooking exciting and energizing. And all agree that we’ve seen only the tip of the iceberg. “Twelve years ago my

friends said, ‘You’re selling out, making space food,’” Steve Schimoler jokes. “All of a sudden these techniques are being discovered by celebrity chefs. It’s come full circle, for all the grief I’ve taken for the last 12 years, they’re all seeing the value in this kind of work.”