SCIENCE 101

BY

THOMAS C. BENET

PRESENTED TO THE CHIT CHAT CLUB

SAN FRANCISCO, CALIFORNIA

SEPTEMBER 8, 2008

Chit Chat Talk - "Science 101"

Having presumed on the patience of this distinguished gathering with a number of rather vaporous screeds involving such nebulous subjects as the importance of poetry or the fading glory of journalism, I thought it might be a good idea to tackle a subject that is hard and bright - and brooks neither shilly-shallying in presentation - nor vagueness. Yes, my subject will be "science." And if I sense a shudder around this table from those knowledgeable in this field, and I know there are many, I just ask you to stick with me and perhaps the ride may be at the very least a diverting one.

First, a minor note of caution: this "scientific" treatise comes from one who might be politely described as inexpert in that demanding field. A case in point: At the proudly rigorous prep school I attended in my teens, it was the practice to add ominous root numbers to the letter grades. Thus, if you failed a course. you could get an E-minus. But if you and the teacher had what might be called "differences", (yes, they were all he's at that school) or you were suspected of lack of effort, the grade was listed as an E-minus-squared. And that set off plenty of repercussions parent-wise. I attained a brief moment of notoriety in the school by receiving the heretofore unheard-of distinction of an E-minus-CUBED in physics.

So you can see my background may not be the most scintillating,

and that perhaps I am being just a tad disingenuous in my approach.

Now, with these preliminary matters disposed of, and with more than a passing salute to Marc Cruciger's delightful essay on the "biochemistry of romantic love ": here goes. My thesis is this:
that art particularly literature, often anticipates science - and that the writer can have a more insightful vision (call it diagnosis) into the mysteries of the way the human body works than the most revered scientist, or a physician with an office

placarded in advanced degrees.

I had always sensed that this might be the case, but confirmation was provided me in a fascinating, recently-published volume by Jonah Lehrer entitled "Proust Was a Neuroscientist." It has many elegant insights, and I plan to use it as a springboard and poach liberally from it.

But first a word about Marcel Proust himself. Yes, he was a pushy little guy, full of all kinds of idiosyncrasies and physical complaints. But he was also, to my mind, a man of great courage and humanity. As his body failed, he lay in bed in a cork-lined room in Paris, penning the long lines of his great work, "Remembrance of Things Past" onto long scrolls of paper, barely eating and sleeping - occasionally sending out for a special brand of iced beer from The Ritz, where he was well-known. His mise-en-scene was generally upper-to- middle class France around the turn of the last century: the aristocrats, the artists, the would-be salonistes, the demimondaines. A limited palette, you say. Perhaps. But Proust infuses his characters with such warmth and verisimilitude that they rarely fail to become compellingly real.

Now for the science part. The title of Proust's work is better translated "in Search of Lost Time"; recapturing the past and showing it to us with extraordinary immediacy is the narrator's challenging task. And what is the "open sesame" to past time? Merely a piece of (now famous) sweet cake dipped in herbal tea.

About fifty pages into the first book, the narrator (Proust himself) returns home, cold and tired after a depressing day, and his mother suggests a spot of tea to buck him up. I'll let him speak for himself: "I refused at first and then, I do not know

why, changed my mind. She sent for one of those squat, plump cakes called "petites madeleines" that look as though they have been molded in the grooved valve of a scallop shell. And, soon, mechanically, oppressed by the gloomy day and the prospect of another sad day to follow, I carried to my lips a spoonful of the tea in which I had let soften a bit of the madeleine. But at the very instant when the mouthful of tea mixed with cake crumbs, I quivered, attentive to the extraordinary thing that was happening inside me. A delicious pleasure had invaded me, isolated me, without my having any notion as to its cause. It had immediately rendered the vicissitudes of life unimportant to me, its disasters innocuous, its brevity illusory, acting the same way love acts, by filling me with a precious essence: or rather this essence was not merely inside me, it was me. Where could it have come to me - this powerful joy?"

The narrator tries more tea and cake, but gets only diminishing returns. At last, he realizes the tea and cake have evoked the past - his aunt had served just such a mixture to him on long-gone Sunday mornings after Mass..."when nothing subsists of an old past, after the death of people, after the destruction of things, alone, frailer, but more enduring, more immaterial, more persistent, , more faithful, smell and taste remain for a long time, like souls, remembering, waiting upon the ruins of all the rest, bearing without giving way, on their almost impalpable droplet, the immense edifice of memory."

He compares the process to a "game in which the Japanese amuse themselves by filling a porcelain bowl with water and steeping it in little pieces of paper until then undifferentiated which, the moment they are immersed in it, stretch and bend,

take color and distinctive shape, turn into flowers, houses, human figures, firm and recognizable, so now all the flowers in our garden, in M. Swann's park, and the water lilies on the Vivonne, and the good people of the village and their little dwellings and the church and all of Combray and its surroundings, all of this, acquiring form and solidity, emerged, town and gardens alike, from my cup of tea.

The "immense edifice" evoked was the great, sprawling construct of his series of superb novels in which Proust does, indeed, stop time and bring back the past. Not to trivialize the process, and just as an aside, it is amusing that the New Yorker writer, A. J. Liebling, a noted gourmand, once commented: "In light of what Proust wrote with so mild a stimulus (the quantity of brandy in a madeleine would not furnish a gnat with an alcohol rub), it is the world's loss that he did not have a heartier appetite."

It turns out, though, that little Marcel Proust was well ahead of the laboratory chaps in white coats who sent rats scurrying down mazes in search of a bit of tasty kibble. Until a few years ago, author Lehrer (who had worked in a lab prior to writing his book) tells us "neuroscience had no explanation for Proust's "moments bienheureux" (fortunate moments), those shattering epiphanies when recollection appears like an apparition. The standard scientific model for memory revolved around enzymes and genes and required lots of reinforcement in order to be activated. The poor animals used for these experiments had to be trained again and again, their neurons bullied into altering their synaptic connections. Senseless repetition seemed to be the secret of memory."

But then Lehrer adds "what makes science so wonderful is its propensity to fix

itself." And he cites a theory published in 2003 in the journal "Cell" by Dr. Kausik Si, a former postdoc in the lab of Nobel Laureate Eric Kandell. Dr. Si believes he has found nothing less than the "synaptic mark" of memory, the potent grain that persists in the far electrical reaches of the neurons - and in a structure mighty like the one sensed by Proust so many years before.

Here's a plodding physics student's short version of the discovery. Playing around with frogs eggs and purple sea slugs, Si discovered an elusive molecule to be present in the hippocampus, the brain's memory center, This molecule, called for short, CPEB, was precisely where a synaptic marker should be, skulking in the dendritic branches.

After this molecule is activated, it marks a specific dendritic branch as a memory. It will patiently wait, "quietly loitering in your synapses. "

"One could never eat another madeleine, and Combray would still be there, lost in time. It is only when the cookie is dipped into the tea, when the memory is summoned to the shimmering surface that CPEB becomes alive again. The taste of the cookie triggers a rush of new neurotransmitters to the neurons representing Combray, and, if a certain tipping point is reached, the activated CPEB infects its neighboring dendrites. From this cellular shudder, the memory is born.

It is why Proust's Combray can exist silently below the surface, just behind the curtain of consciousness. As Proust said: so presciently in the early part of the last century: "The past is hidden...in some material object of which we have no inkling." But, by gosh, this esthete of esthetes had the science down pat. He knew the past is never past, and he showed us the secret of getting there.

Let's move on to another word-smith with incisive scientific insight, and this one actually was on her way to medical school before deciding on a different career: none other than our own Oakland's perhaps least-favorite and certainly most distant daughter Gertrude Stein. Here is a lady who always appears larger than life. Solid, imperious, possessed with enough chutzpah to write about her own life in "The Autobiography of Alice B. Toklas", by using the voice of her long-time companion.

Indeed, as Janet Malcolm notes in a recent book about the pair, while a student at Radcliffe in the late 1890s, faced with an examination in William James's philosophy course for which she has not studied, Stein writes on the examination paper: "Dear Professor James, I am so sorry but really I do not feel like an examination paper today," and leaves the classroom. The next day she receives a postcard from James: "Dear Miss Stein, I understand perfectly how you feel, I often feel like that myself" - and he gives her the highest grade in the course. Malcolm adds:"her whole life is like that. Picasso is going to paint her portrait, but after eighty or ninety sittings, he says, "I can't see you any longer when I look," irritably paints out the face and goes to Spain for a vacation. On his return, he paints in the face from memory and presents Stein with the famous masklike portrait.

A good deal of Stein's writing: the repetitions, the "rose is a rose is a rose" stuff, the seemingly disjointed ragouts of unconnected words may strike the reader as pure nonsense. Take the opening of "Tender Buttons" titled, "A Carafe that is a Blind Glass". "A kind in glass and a cousin, a spectacle and nothing strange in a single hurt color and arrangement in a system to pointing. All this and not ordinary, not

unordered in not resembling."

What's that all about? Stein is trying to remind us, Lehrer points out, that our nouns, adjectives and verbs are not real. "They are just arbitrary signifiers, random conglomerations of syllables and sound. A"rose" is, after all, not really a rose. Its letters don't have perfumed petals,or thorns."

Stein's revelation was that everything we say is "enclosed by arrangement in a system." This linguistic system (call it basic grammar, if you will), keeps words from being "not unordered in not resembling."Because we instinctively 'arrange' language, it seems like 'nothing' strange." Stein wanted us to acknowledge these hidden grammars that give language its meaning and use. By ripping it apart, she exposed language's basic bones.

Many, many years later, a rising linguist named Noam Chomsky announced that Stein was right: our words are bound by an invisible grammar, which is embedded in the brain.These deep structures are the secret sources of our sentences; their abstract rules order everything we say. By allowing us to combine words into meaningful sequences, they trigger the infinite possibilities of language.

While Lehrer notes there is continuing controversy over Chomskian linguistics, it is now generally accepted that the deep structure of language is an a priori instinct. And he cites "the best evidence" for this universal language as coming from studies of the deaf in Nicaragua.

Until the early 1980s, the deaf citizens of Nicaragua remained tragically isolated. The country didn't have a sign language and deaf children were

confined to overcrowded orphanages. However, when the first school for the deaf was founded in 1981, the situation began to improve. The children were never taught sign language (there were no teachers), but they suddenly began to speak with their own hands. A makeshift vocabulary evolved spontaneously.

The real transformation occurred when younger deaf students were introduced to this newly-invented sign language. While older students were forced to converse in relatively imprecise terms, the second-generation speakers began to give their language structure. No one had taught them grammar, but they didn't have to be taught. Confirming Chomsky's theory, the younger children imposed their innate knowledge onto the vocabulary. Verbs became inflected, adjectives became distinct from nouns. Although these kids had never known language, they invented their own. Its grammar looks like any other human grammar. "Stein was right: 'There is only one language."

Virginia Woolf, whose own mental breakdowns gave her acute insight into the way the brain works, wanted to trace "the flight of the mind" as it unfolded in time. "Only thoughts and feelings," she wrote Katherine Mansfield, "no cups and tables."

This modernist style constituted a huge shift in perspective. "Mr. Wells, Mr. Bennett and Mr. Galsworthy" Woolf said ignored the mind's interiors. "They have looked. " at factories, at Utopias, even at the decoration of the upholstery of a carriage; but never at life, never at human nature."

And she captured the fractured nature of the mind's processes beautifully. For instance, in the dinner scene of "To the Lighthouse", the matriarch, Mrs. Ramsay's, mind drifts into reverie, settling in that still space that lies at the center of things." She has stopped listening to the

dull, dinner conversation and looks at a bowl of fruit in the center of the table. With a "sudden exhilaration" her mind becomes "like a light stealing under water," piercing through the "flowing, the fleeting, the spectral." What began as an unconscious urge - she stares at the fruit without knowing why - becomes a conscious thought. "No", Mrs Ramsay thinks to herself, "she did not want a pear." That's the way the mind works - not in a cohesive stream, but bumpily; sometimes sputtering, stuttering, making associations, skirting the point until random input coheres and solidifies.

No wonder Noam Chomsky has been recorded as saying: "It is quite possible - overwhelmingly probable, one might guess -that we will always learn more about human life from novels than from scientific psychology."

Lehrer cites other examples of artistic pioneers in the realm of science, including a rather curious one, the gastronome and chef Auguste Escoffier - well , cooks ARE artists, who found the key to achieving a superbly tasty dish is the process of "deglazing," or producing chemically something close to Monosodium Glutamate. Besides, Escoffier emphasized that what we taste is ultimately an idea. "Even horsemeat," Escoffier argued, "can be delicious when one is in the right circumstances to appreciate it."

That most American of poets, Walt Whitman, is credited with countering the eighteenth-century, Cartesian propensity to worship the brain and dismiss the flesh as "clocklike", just a machine that bleeds. Phrenologists, popular at the time, believed that the shape of the skull revealed the mind inside.. The rest of the body was irrelevant. Not so, for the all-embracing Whitman.

"Was somebody asking to see the soul," the great, singing bard queries in

Leaves of Grass, "See your own shape and countenance.../Behold, the body includes and is the meaning, the main/ Concern, and includes and is the soul."

Whitman - "broad-shouldered, rough-fleshed, Bacchus-browed, bearded like a satyr, and rank," served as a volunteer nurse consoling wounded and dying soldiers during the Civil War; he heard the "hiss of the the surgeon's knife," and saw "the gnawing teeth of his saw/ wheeze, cluck, swash of falling blood."

At the same time, a distinguished "doctor of nerves" at Turner's Lane Hospital in Philadelphia named Silas Weir Mitchell was investigating soldiers' stories that once a limb was amputated, they would continue to"feel" a missing arm or leg. Medical science at the time generally ignored the syndrome - after all the limb and its nerves were gone.Mitchell published a special bulletin on the phenomenon, which was distributed by by the surgeon general's office to hospitals. But it was couched in dry, clinical language.

Actually, Dr. Mitchell, who knew and admired Whitman, believed that the soldiers' illusory sensations had profound philosophical implications and were proof of Whitman's poetry; that our matter was entangled with our spirit. The doctor went on to write an anonymous short story for the Atlantic Monthly, called "The Case of George Dedlow," in which a soldier wounded at Chickamauga, awakens to find he has lost both arms and both legs. But he still "feels" his limbs. Nonetheless, Dedlow realizes to his horror that "I was less conscious of myself, of my own existence than used to be the case."

Whitman had made the same point in his verse: "Of physiology from top to toe I sing/not physiognomy alone nor brain alone is worthy for the/ I say the form

Muse

complete is worthier by far."

IN CONCLUSION, I want to emphasize that I am NOT saying that poets should be pressed into service in labs to poke around petri dishes filled with microbes. But attention must be paid. It's impressive how far a sweet cookie mixed in herbal tea can take one.