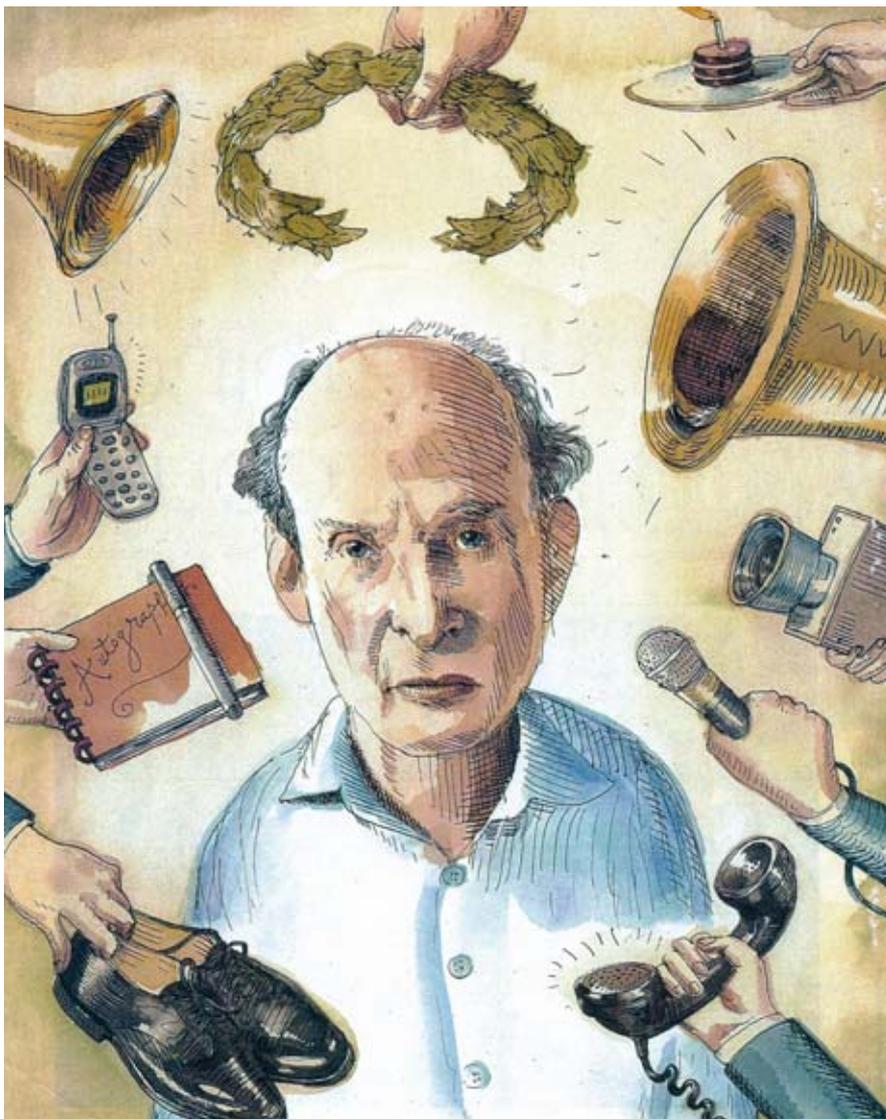
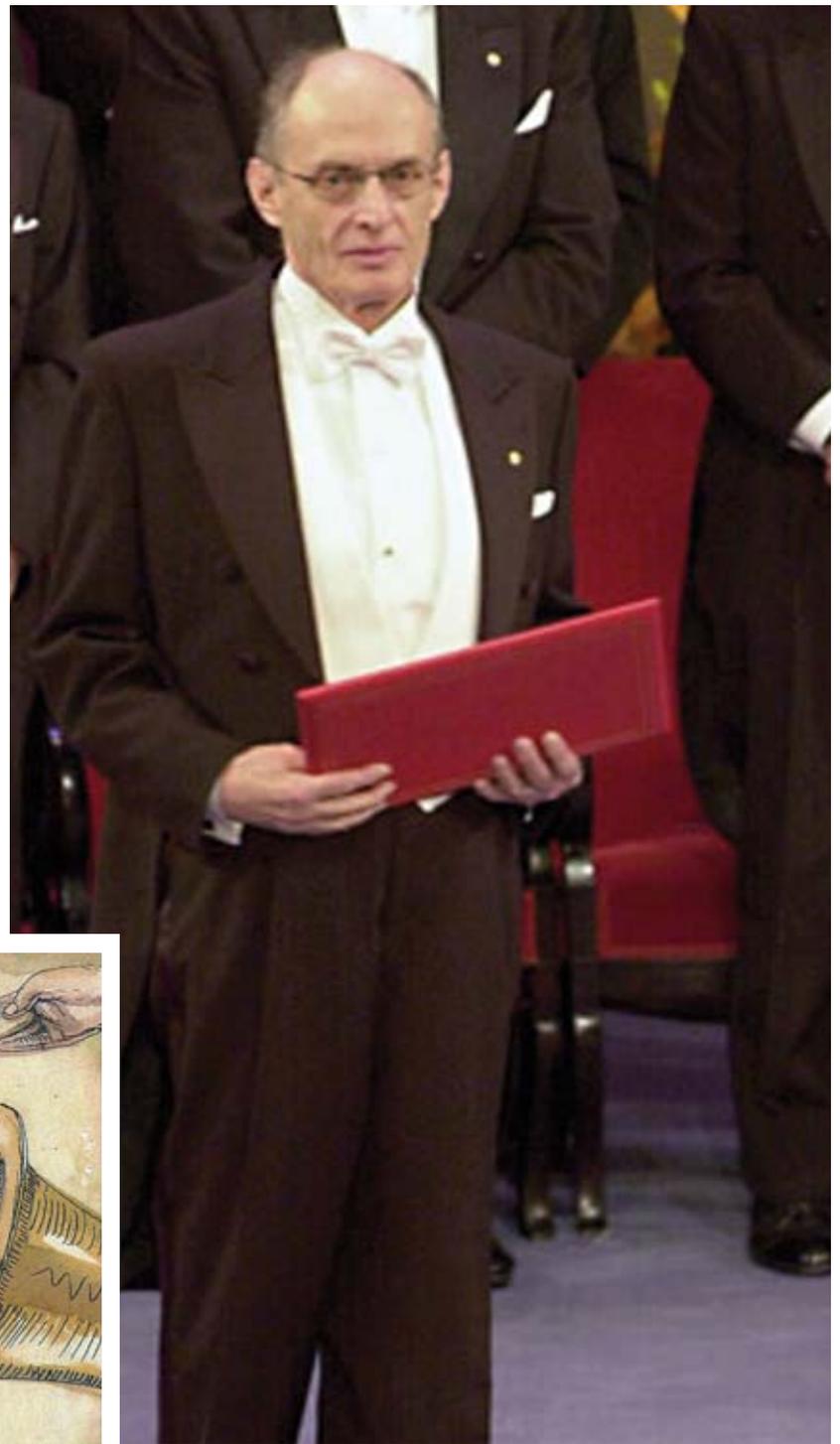

IN MEMORIA DI...

PAUL GREENGARD

Diario di un premio Nobel



OBITUARY

PAUL GREENGARD

The Nobel Diary

Fabio Benfenati,
Flavia Valtorta

Conferimento del Premio Nobel a Stoccolma (dicembre 2000) e ritratto di Paul Greengard nei giorni seguenti la notizia del premio Nobel apparso sul Washington Post Magazine (2001).

Paul Greengard at the Nobel Award ceremony in Stockholm on December 2000 and drawing of him during the days immediately following the communication of the 2000 Nobel Prize winners, published in the Washington Post Magazine (2001).

Vincere un premio Nobel rappresenta il massimo coronamento di una carriera scientifica eccezionale. Alfred Nobel voleva essere ricordato non per l'invenzione della dinamite, ma perché il suo nome fosse indissolubilmente legato alle più grandi personalità che, in tutti i campi dello scibile, avessero apportato "i maggiori benefici all'umanità" per le loro ricerche, scoperte e invenzioni. Il testamento (consultabile a Villa Nobel a San Remo) non ha solo legato il nome di Alfred Nobel alla Storia, ma dal 1901 ha disegnato l'emozionante e profondo percorso della conoscenza, della creatività e del progresso (figura 1). Nel campo della Fisiologia o Medicina, tra i premi Nobel assegnati che possono essere ritenuti veramente memorabili vi è quello del 2000, attribuito ad Arvid Carlsson, Eric Kandel e Paul Greengard per le loro scoperte sulla trasduzione dei segnali nel sistema nervoso, scoperte che hanno avuto un profondo impatto sul modo di concepire il funzionamento del cervello. Il conferimento del Premio Nobel aumenta la notorietà e la fama dello scienziato che lo riceve. Meno ovvio, ma forse ancora più eclatante, è il cambiamento che determina nelle relazioni del ricercatore con l'ambiente scientifico ed extrascientifico.

To be awarded with the Nobel Prize represents the greatest achievement for an exceptional scientific career. Alfred Nobel wanted his legacy to be linked not to the invention of dynamite, but rather to the leading personalities in the fields of science, technology and humanities who had provided major benefits to mankind for their discoveries. Alfred Nobel's testament (written and still kept as a copy in Villa Nobel, San Remo) not only has linked his name to the History of Mankind, but has outlined, since 1901, the long and exciting path of knowledge, creativity and progress (figure 1). In the field of Physiology or Medicine, one of the most celebrated Nobel Prizes was awarded to Arvid Carlsson, Eric Kandel and Paul Greengard in 2000 for their cornerstone discoveries of signal transduction in the brain that had a profound impact in neuroscience. Needless to say, the Nobel laureate experiences a sudden increase in reputation and celebrity. Less obvious, but possibly even more striking, is the change that the No-

Paul Greengard, con cui i due autori hanno condiviso lunghi anni di attività, collaborazione e amicizia, ha dato una descrizione esilarante della sua vita dopo il conferimento sotto forma di un diario, condito dalla sua proverbiale ironia e umorismo *yiddish*. *The Nobel Diary*, un vero quadro *bottom-up* di come un tale premio può cambiare la vita di tutti i giorni, è stato pubblicato sul Washington Post Magazine dopo circa un anno dal conferimento. Prima di proporle la lettura, vale la pena spendere due parole sulla figura di Paul, recentemente scomparso all'età di 93 anni, per comunicare, oltre alla grandezza scientifica, la leggerezza e la profonda umanità della sua personalità e per apprezzare lo spirito vitale che lo animava (figura 2). La leggerezza di non prendersi mai troppo sul serio ma che, come dice Italo Calvino (*Lezioni Americane*, 1988), "si associa alla precisione e alla determinazione, non con la vaghezza e l'abbandono al caso". Come sottolineato da Paul Valéry: "*Il faut être léger comme l'oiseau, et non comme la plume*".

Paul Greengard, nato a New York nel 1925, ha iniziato i suoi studi come *graduate student* in biofisica alla Johns Hopkins University nel 1949. Dopo avere seguito un seminario di Alan Hodgkin e Andrew Huxley pensò che i meccanismi dell'eccitabilità neuronale fossero in gran parte risolti per le tecniche del tempo e decise di perseguire un

bel Award brings about in the relationships of the winner with the scientific and social environment.

Paul Greengard, who recently passed away at the age of 93 and with whom the two authors shared many years of scientific activity, collaboration and friendship, provided a hilarious and exhilarating description of his daily life immediately after the award, blended with his proverbial irony and *yiddish* humor. This "*Nobel Diary*" was published in the Washington Post Magazine about one year after the Nobel award. Before going through this truly bottom-up picture of how such an award can completely change the scientist's daily life, it is worth spending a few words on Paul's human and scientific profile, to depict, in addition to his scientific stature, the lightness and profound humanity of his unique personality, so to fully enjoy the spirit of life that inspired him (figure 2). The lightness of never taking oneself too seriously but that, as Italo Calvino mentioned in his Eliot Norton Poetry Lectures (*Six Memos for the Next Millennium*, 1996), "is associated

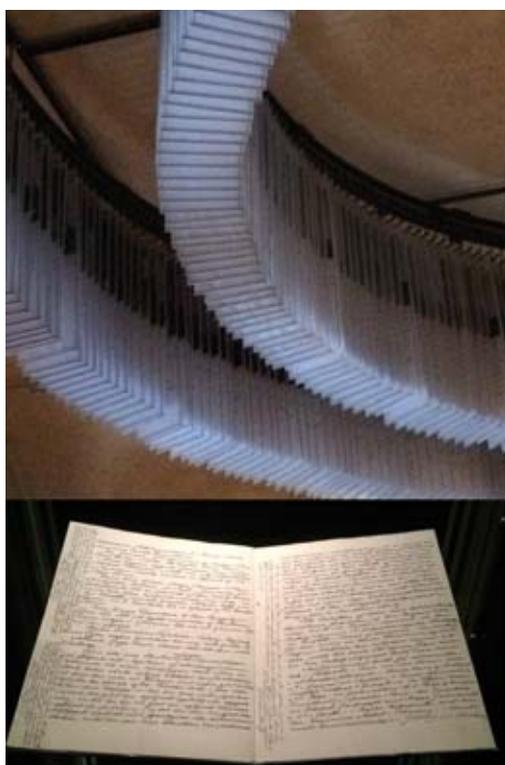


Figura 1

Nobel Prize Museum di Stoccolma. Il percorso della Scienza costellato dalla lunga lista dei conferimenti dei Premi Nobel dal 1901 a oggi e, in basso, il testamento di Alfred Nobel vergato nella Villa Nobel di San Remo (foto: F. Benfenati).

Figure 1

Nobel Prize Museum in Stockholm. The long and winding road of Science is depicted by the long list of Nobel laureates awarded since 1901 (top) and Alfred Nobel's testament written in his villa in San Remo (bottom) (photo by F. Benfenati).

nuovo approccio allo studio del cervello, la biochimica funzionale del tessuto nervoso, un territorio fino allora completamente inesplorato. Questa ricerca completamente nuova culminò in un anno sabbatico alla Vanderbilt University, dove collaborò con Earl Sutherland, premio Nobel nel 1971 per la scoperta dell'AMP ciclico e del suo ruolo di messaggero intracellulare nel meccanismo d'azione degli ormoni. Paul Greengard realizzò la potenziale importanza di queste osservazioni e formulò due ipotesi che si rivelarono delle vere pietre angolari delle neuroscienze contemporanee. La pri-

ma, che i neurotrasmettitori cerebrali potessero agire regolando la produzione di messaggeri intracellulari; la seconda, che la fosforilazione fosse un meccanismo universale mediante il quale i messaggeri intracellulari provocavano i loro effetti biologici. Queste ipotesi, all'inizio non condivise dalla comunità scientifica dell'epoca, furono pienamente confermate negli anni successivi, prima presso la Yale University e, in seguito, alla Rockefeller University di New York. Nel corso della sua lunghissima carriera, iniziata con il suo primo lavoro pubblicato come unico autore su *Nature* nel 1956, Paul ha dimostrato che le "Greengard cascades" cerebrali di proteinchinasi e fosfatasi intervengono nella regolazione di tutte le fondamentali attività neuronali, come biosintesi e liberazione di neurotrasmettitore, generazione dei potenziali sinaptici, conduttanza dei canali ionici, formazione di nuove sinapsi, processi di memoria a breve e lungo termine. Grazie a Paul, oggi sappiamo che anomalie nella segnalazione tra i neuroni sono alla base di molti disturbi neurologici e psichiatrici tra cui la malattia di Parkinson, la schizofrenia, la depressione, l'ADHD e le tossicodipendenze.

La grandezza di Paul andava di pari passo con il suo spessore umano.

In laboratorio Paul era un maestro insuperabile, sempre disponibile a discutere nuove idee, sempre aperto alle no-

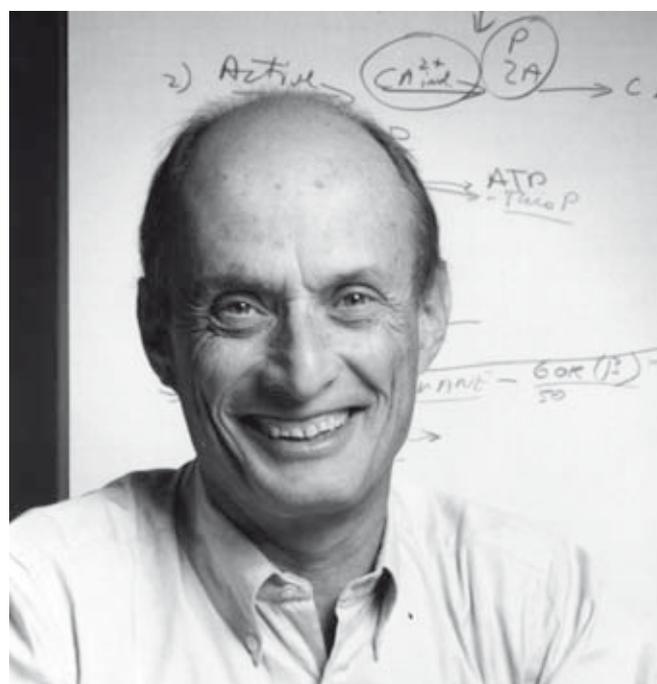


Figura 2

Uno dei più bei ritratti di Paul Greengard (1925-2019).

Figure 2

One of the best portraits of Paul Greengard (1925-2019).

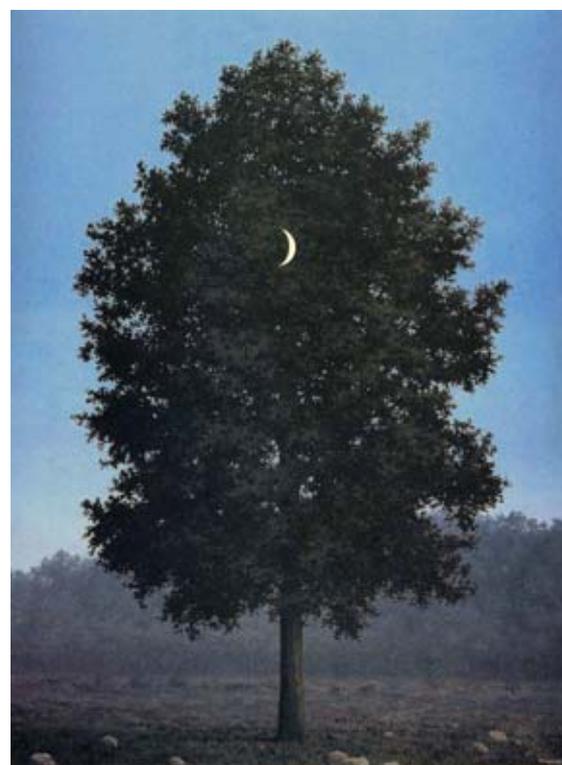
Figura 3

René Magritte, *Le Seize Septembre* (1956)
(©René Magritte, by SIAE 2020).

Figure 3

René Magritte, *Le Seize Septembre* (1956)
(©René Magritte, by SIAE 2020).

vità e ai punti di vista diversi dal suo, capace di saper guardare ai problemi sotto diverse prospettive con grande larghezza di vedute, eccitato come un bambino da ogni nuova scoperta, piccola o grande che fosse. René Magritte ha scritto: “*All I desire is to be enriched by exciting new thoughts*” e ancora: “*I love to see leaves hiding the moon, but to see them behind the moon, well, that would be amazing. Life would at last have a meaning*” (figura 3). Questo è il ritratto di Paul, della sua ricerca del senso della vita, con la sua genuina e insaziabile curiosità per la scienza e il suo talento creativo capace di cogliere legami invisibili tra le cose. Questo è l’atteggiamento che fa della ricerca vera Scienza, come ha detto Albert Einstein: “*To raise new questions, new possibilities, to regard old problems from a new angle requires creative imagination and marks real advances in Science*”. Senza apparente distacco tra scienza e vita, Paul è stato un mentore socratico, un vero padre adottivo per i suoi collaboratori, creando una grande scuola, le cui radici connettono generazioni di ricercatori ora sparsi per il mondo, che hanno condiviso l’esperienza irripetibile di fare parte del suo laboratorio e che rimangono uniti, attraverso il tempo e la distanza, da un legame pressoché indissolubile. Paul ha sempre mantenuto un sincero e profondo entusiasmo per la ricerca. Fino agli ultimi giorni



della sua vita ha continuato a guidare il più grande e prolifico laboratorio della Rockefeller University con oltre sessanta ricercatori e a seguire la ricerca su base quotidiana, sempre attivo, sempre pronto a fare domande, fino alla sera prima della sua scomparsa.

Paul ha sempre avuto rispetto e ammirazione per le competenze diverse dalle sue, mantenendo la curiosità per ogni aspetto della cultura. Non è un caso che sua moglie Ursula von Rydingsvard, artista di grandissima sensibilità, sia una delle più importanti scultrici contemporanee (figura 4).

with precision and determination, and not with vagueness and abandonment to chance”. According to Paul Valery: “*Il faut être léger comme l’oiseau, et non comme la plume*”.

Born in New York in 1925, Paul Greengard started out as a graduate student in biophysics at Johns Hopkins University in 1949. After listening to a seminar by Alan Hodgkin and Andrew Huxley, Paul thought that the mechanisms of neuronal excitability were mostly uncovered for the techniques of the time, and decided to pursue a totally new approach to the study of the brain, i.e. to explore the role of the functional biochemistry of the nervous tissue, a completely uncharted territory at that time. This totally new research culminated in a sabbatical at Vanderbilt University, where he collaborated with Earl Sutherland, Nobel laureate in 1971 for the discovery of cyclic AMP and its role of intracellular messenger mediating the effects of hormones on target tissues. Paul Greengard realized the potential disruptive importance of these observations

and made two hypotheses that turned out to be two cornerstones of modern neuroscience. He thought that brain neurotransmitters could act by regulating the intracellular levels of second messengers and that protein phosphorylation could represent a universal mechanism by which second messengers elicit their biological effects. Initially, the hypothesis of the central role of protein phosphorylation was received with some skepticism in the scientific community. The rest is history: these hypotheses were fully confirmed in the subsequent years first at Yale University and then at the Rockefeller University of New York. During his exceptionally long and successful career started with a first single-author paper in *Nature* in 1956, Paul demonstrated that “Greengard cascades” of protein kinases and phosphatases in the brain play a key role in virtually all neuronal activities, by regulating biosynthesis, release and synaptic actions of many brain’s major neurotransmitters, including dopamine, serotonin, and norepinephrine, which regulate reward, motivation,



Figura 4
Due sculture di Ursula von Rydingsvard: a sinistra, For Paul (cedro e grafite, 1990-1992) e a destra Scientia presso il McGovern Institute for Brain Research, The Massachusetts Institute of Technology, Cambridge, MA (bronzo, 2016). In basso, una recente immagine di Paul e Ursula.

Figure 4
Two sculptures by Ursula von Rydingsvard: For Paul (cedar and graphite, 1990-1992; left) and Scientia in front of the McGovern Institute for Brain Research, The Massachusetts Institute of Technology, Cambridge, MA (bronze, 2016; right). Below, a recent image of Paul and Ursula.

mood, attention and arousal, generation of synaptic potentials, ion channel conductance, formation of synapses, short- and long-term memories. Thanks to Paul, we now know that dysfunctions in neuronal signaling are at the basis of many neuropsychiatric disorders, including Parkinson disease, schizophrenia, depression, ADHD and addiction.

In the lab, Paul was a unique mentor. He was always ready to listen, curious as a child, open to new ideas, with the exceptional ability of watching results from diverse angles and making creative connections among them. Paul inspired us with his passion for knowledge and his excitement for every new discovery, small or big. The famous surrealist painter René Magritte said: “All I desire is to be enriched by exciting new thoughts” and “I, too, love to see leaves hiding the moon, but to see them behind the moon, well, that would be amazing. Life would at last have a meaning” (figure 3). This is the

very portrait of Paul, of his search for a sense of life, of his genuine and unsatisfied curiosity toward science, his creative ability to pick up invisible links among things... This is what changes daily research into real Science, as underlined by Albert Einstein: “To raise new questions, new possibilities, to regard old problems from a new angle requires creative imagination and marks real advances in Science”. With no apparent distance between life and science, Paul has been a “Socratic” mentor, a real stepfather for the members of his team, thus creating a big school whose roots tightly connect generations of scientists all over the world who shared the unique and unforgettable experience of being in his lab, linked by unbreakable ties across time and space. Paul kept the enthusiasm for science and an exceptionally active role in research until his last days. He headed the largest and most productive lab at Rockefeller University with over 60 members and robust funding: he actively followed

Figura 5

Italo Calvino e i titoli autografi delle sue Lezioni Americane (Eliot Norton Poetry Lectures, 1988).

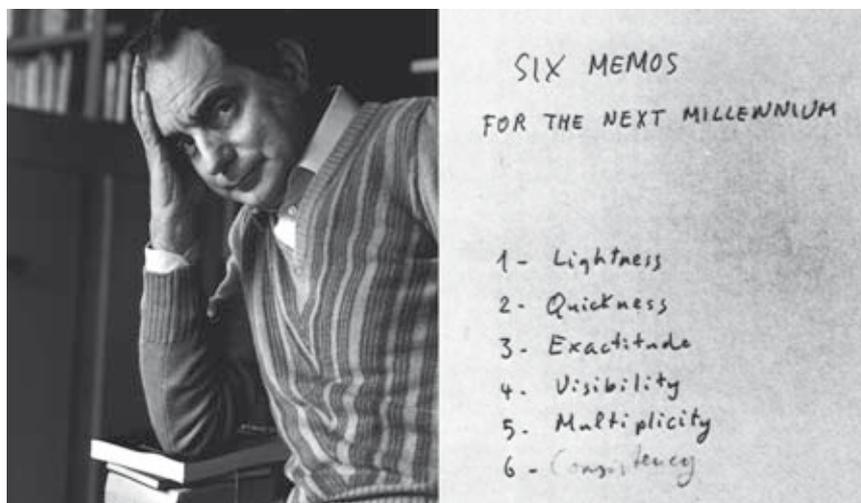


Figure 5

Italo Calvino and his original manuscript with the titles of his Six Memos for the Next Millennium (Eliot Norton Poetry Lectures, 1988).

La grandezza di Paul come uomo, oltre che come scienziato, emerge anche dalla scelta di utilizzare il finanziamento della *Nobel Foundation* per istituire il Premio *Pearl Meister Greengard*, intitolato a sua madre che morì dandolo alla luce, per premiare ricercatrici di eccellenza nel campo della ricerca biomedica, valorizzando così il ruolo della donna nella scienza.

Nella sua vita, Paul ha impersonificato le sei virtù che Italo Calvino, nelle sue *Lezioni Americane* (figura 5), vedeva nell'uomo del prossimo millennio: *Leggerezza*, per la sua libertà di pensiero, senso dello humor e ironia verso la vita; *Rapidità*, per la sua mente intuitiva e creativa; *Esattezza*, per la sua precisione scientifica e attenzione ai dettagli fondamentali; *Visibilità*, per le sue fondamentali scoperte; *Molteplicità* dei suoi interessi e dei suoi punti di vista; *Consistenza*, per l'altissimo profilo scientifico che ha mantenuto fino agli ultimissimi giorni della sua vita. Paul, ineguagliabile maestro e amico, è sempre stato un uomo del futuro.

Non solo ci mancherà come testimone della scienza di oggi e come ponte proteso verso la scienza di domani, ma rimarrà sempre nel nostro ricordo per la sua intelligenza, leggerezza e ironia, che emerge dal suo *The Nobel Diary* che abbiamo il piacere di condividere con i lettori (per gentile concessione di Ursula Von Rydingsvard).

Fabio Benfenati

Center for Synaptic Neuroscience and Technology
Istituto Italiano di Tecnologia & University of Genoa
fabio.benfenati@iit.it

Flavia Valtorta

Division of Neuroscience
"Vita-Salute" University and San Raffaele Scientific Institute,
Milano
valtorta.flavia@hsr.it

research on a daily basis until the evening before he passed away.

The eagerness of Paul for learning and understanding new things extended beyond science. He followed with interest and sharp insight current events. With his marriage to artist Ursula von Rydingsvard, his beloved spouse of the past 33 years and internationally renowned sculptress he became close to the world of the arts, and embraced this world with fresh curiosity and passion (figure 4). Paul's greatness as a human being and as a scientist, is confirmed by his decision to donate the proceeds of his Nobel award to the Rockefeller University to endow the Pearl Meister Greengard Prize, named after his mother who died giving birth to him. The prize is awarded to woman scientists who made exceptional contributions in biology, testifying Paul's strong advocacy and support for a central role of women in science.

In his life, Paul has personified the six virtues of the man of the new millennium identified by Italo Calvino (*Six Memos for the Next Millennium*, 1996) (figure 5): *Lightness*, for his freedom of thought, sense of humor and irony towards life; *Quickness* of his intuitive and creative mind; *Precision* in the evaluation of the results and in the attention to fundamental details; *Visibility* in science for his cornerstone discoveries; *Multiplicity* of interests and views; *Consistency* of the scientific excellence that he preserved until the very last days of his life. Paul, unique mentor and friend, has always been a man of the future. We will not only miss him as a witness of the science of today and a bridge towards the science of the future, but he will remain in our heart and our mind for his brightness, lightness and irony emerging from "*The Nobel Diary*" that we are pleased to share with the readers (by courtesy of Ursula Von Rydingsvard).

PLUS: DIARY OF A NOBEL WINNER;
WITNESSING LIFE AND DEATH IN THE STREETS

NOVEMBER 25, 2001

The Washington Post Magazine

The Nobel Diary

The good news about winning a Nobel Prize
is that you can get your dog on Animal Planet.
The bad news: patent leather shoes
By Paul Greengard

Monday, October 9, 2000

5:15 a.m.: Telephone rings. I grope in the dark for the receiver, which is off its base. I say to my wife, Ursula, "Who is the idiot calling at 5 a.m.?" Daughter, Ursie, in another bedroom, answers the phone before I find mine. As I pick up, I hear:

"May I speak to Dr. Greengard?"

Ursie: "It's the middle of the night. He is asleep. Do you really want me to wake him up?"

"My name is Hans Jornvall. I am secretary of the Nobel Assembly."

Me, quickly: "It's okay. I am awake. Don't hang up."

"I am happy to inform you that the Nobel Assembly of the Karolinska Institute has awarded you this year's Nobel Prize in medicine for your research work on communication between nerve cells in the brain."

"Oh, that's very nice. I am pleased to hear that."

Inexplicably, I remain calm, detached. Even in retrospect, I find it impossible to recall experiencing any emotion – ecstasy, relief, satisfaction. The human brain cannot accommodate sudden dramatic changes. I believe that most people react to extremely good or extremely bad news as I did, with a sense of detachment that is similar whether one wins the sweepstakes or hears of the death of a loved one.

5:19 a.m.: I call various children, grandchildren, sisters and a few very close friends.

5:30 a.m.: A press conference is held in Stockholm announcing the recipients of this

year's prize in medicine, news of which goes out simultaneously over the Internet. Within moments, the phone begins ringing and doesn't stop for about 10 days.

5:40 a.m.: Somehow the public relations office at Rockefeller University in New York City, where I work, reaches me through the barrage of telephone calls. In each major research university, there is one person assigned to monitor the Internet on the day of the announcement of Nobel Prize winners. If the individual who monitors the Internet learns that someone in the university has been included among the anointed, he or she immediately notifies five people, each of whom notifies another five people, so that by 5:34 a.m., 31 people know the news. In this way, within a few minutes the entire organization is braced for an onslaught from the outside world. In addition, within hours, it seems that every organization with which a Nobel laureate has ever been affiliated stakes a claim. My prize co-recipient Eric Kandel informs me that Austria, from which he and his parents fled in 1938 following the Anschluss, is proud to claim Eric as one of its own.

9:30 a.m.: A mini-parade walks from my house to RU, including my wife, children and grandchildren. As we reach the university gates, the security guards break into applause. Apparently, the number of the informed has increased exponentially. Ursula cries.

10:20 a.m.: The parade proceeds across the campus. As we walk, a phalanx of TV camera people and reporters holding microphones in our faces walk backward, matching us step for step.

10:30 a.m.: Press conference at Caspary Auditorium. The president of the university introduces me to the news media. Since Gunter Blobel won the prize last year, and since Gunter and I are the only two professors who bring our dogs to work, I advise the president that he should order all professors to buy dogs and bring them to work. A member of the press asks me the breed and name of our dog. I inform him that he is a Bernese mountain dog named Meesh, a response that will have consequences a few days later.

Noon: The parade returns to my office, which has taken on the combined appearance of a funeral parlor, with every type of flower known to man, and a liquor store that specializes in champagne. My only memory of the subsequent several hours is Nicholas Wade of the New York Times on one phone, Gov. George Pataki on the second, and instructions to stand by for President Clinton on the third. (I am still waiting, and he is not even president anymore).

Wednesday, October 11 All three phones are still ringing off the hook, and an army of suitors awaits in the outer office. I announce that I have an important commitment out of town. I confide to Leyla, my administrative assistant, that the important commitment is a soccer game in Chappaqua starring our grandson Bijan. At last I believe I shall find a little peace and quiet. But instead of watching the soccer game, in which Bijan as usual stars, I spend my time trying to escape doting soccer moms, seeking my autograph for their juvenile Peles.

Friday, October 13 Interview on NPR "Science Friday." Ira Flatow greets me with: "How are you surviving?"

"What do you mean?" I have been doing this program for many years. Each year, on the Friday following the Nobel announcements, I invite the laureates to this program. They are usually 90 percent dead."

That makes me feel a little better, since I feel only about 80 percent dead.

Sunday, October 15 I'm reading my Sunday New York Times over breakfast at a little inn where Ursula and I fled for the weekend, seeking anonymity. Everyone else in the breakfast room is reading the Times, too. As I get to page four of the Week in Review, I see a large photograph of myself looking at me, accompanied by an article headlined: "My Brother, the Genius – Now I Know What He Does," with the byline of my sister Chris Chase. I am beginning to feel like Princess Diana. Ursula tries to protect me from a potentially crazed mob by hastily grabbing the

Week in Review, folding it up and putting it away. Barely an hour later, Ursula is no longer able to bear the anonymity that she once thought we sought.

The following conversation occurs at the checkout desk.

Clerk: "Would you like someone to carry your luggage to the car?"

Ursula: "We were so glad to get away for the weekend. You see, my husband just won the Nobel Prize.

"Clerk: "Yes. Would you like someone to carry your luggage to the car?"

Monday, October 16 Phone call from Animal Planet/Discovery Channel. The producers would like to do a television program on Bernese mountain dogs, starring Meesh. I am told it will take about a day to do the filming. At this point, one week into my new life, things have become so hectic that were this a program featuring my wife, children, grandchildren, close colleagues or best friends, I would say no. It is Meesh, so I say yes, yes.

Tuesday, October 17 A Swedish colleague telephones from Stockholm to inform me informally that I must wear shiny black patent leather shoes for the formal activities, a bit of advice that I choose to ignore.

Wednesday, November 29 Visit to Washington. Each year, in late November, the Swedish Embassy invites that year's American laureates to Washington. The agenda includes a press conference, a visit to the White House and a memorable banquet at the embassy. We meet the other winners. Jack Kilby is a giant Texan who has been awarded the Nobel for his advances in microcircuits. His discoveries have made possible the miniaturization of electronics. He is wearing two gigantic hearing aids, each of which looks as if it weighs 50 pounds, and it is not clear how his ears can support them. I try, diplomatically, to explain to him that, thanks to his pioneering work, we can now purchase hearing aids so small that they are virtually invisible – but I don't think he hears me.

The laureates and their significant others wait in a bus, just inside the White House gates, for security clearance, which takes half an hour. We are finally taken into the Roosevelt Room, where we wait for the appearance of El Presidente. Our crowd, expecting beluga caviar, pate de fois gras de Strasbourg and Dom Perignon, is offered Pepperidge Farm cookies, Coca-Cola, Pepsi-Cola and Sprite in cans. About an hour later, we are ushered into the Oval Office. Half an hour in the Oval Office with Bill. He is very bright, but I find myself thinking very un-Nobel thoughts about interns and the Oval Office layout.

Thursday, November 30 Leyla receives an urgent phone call from the Nobel Foundation: "It is absolutely essential that Professor Greengard wear black patent leather shoes to the ceremonies."

Friday, December 1 I cancel meetings to go shopping for black patent leather shoes. As the shoe salesman is fitting me, he informs me that he knows why I am buying these shoes. Moments later, the manager of the store emerges from a back office and asks me to sign a testimonial that I use their brand of shoes. I demur. He tells me that all of their famous clients have signed such testimonials. He would like me to sign a page next to that of Harrison Ford. I tell him that I am not as well known as Harrison Ford. "Don't be so sure," he tells me. I take the pen in hand.

Tuesday, December 5 Arrival in Stockholm. We are met by Hans Jornvall, the secretary of the Nobel Assembly. We have a Nobelmobil and a uniformed chauffeur assigned to us for the nine days of our stay.

Hans opens the centerfold of a major Swedish newspaper and shows us the seating arrangement for the royal table at the banquet, which will be held following the Nobel ceremony on Sunday. He informs me that I will be the official escort of Princess Madeleine. Princess Madeleine, who turned 18 recently, will be making her first formal public appearance.

Thursday, December 7 Arvid Carlsson, Eric Kandel and I, co-recipients of the medicine prize, are interviewed by the international press corps. I am asked by a beautiful Italian journalist to explain the biochemical basis of the soul. I stutter. I stammer. I feel like I am in a Fellini film.

Sunday, December 10 The anniversary of the death of Alfred Nobel, the inventor of dynamite, an extraordinarily talented individual with a sweeping vision for the betterment of the human race. An eccentric bachelor, he became one of the richest men of his time. The Swedes say, and I see no reason to doubt them, that he developed explosives for the construction of buildings, not for the destruction of mankind.

At 4 p.m., the big event. The ceremony is magnificent. A herd of medieval trumpeters announces each prize recipient. The king makes a 20-second speech to each of the laureates. None of us, including Arvid Carlsson, the Swedish laureate, knows whether it is in Swedish or English. But we all agree that it ends with "congratulations." (Either way, we are floored by the pomp, and astonished when a second dinner – a private one given by their majesties the king and queen at the royal palace with 120 people at a single table – puts the first glittering banquet to shame. The king and queen each has his/her own waiter; the rest of us are forced to share the remaining waiters. This, plus the observation that the king's waiter and the queen's waiter have plumes in their hats about one yard in height, compared with the two-inch plumes of our waiters, generates great, albeit unspoken, plumed-waiter envy in me and the other guests.)

We first meet the royal couple before the banquet, when we are brought to a room in which those to be seated at the royal table are being assembled. His Royal Highness King

Carl XVI Gustaf, Her Royal Highness Queen Silvia, Crown Princess Victoria, Prince Carl Philip and Princess Madeleine greet us, all wearing a framed photograph of the king pinned to his or her chest. Except the king, who is exempted from this ordinance.

All of us, including the king, are told where to stand in the procession. At the appointed hour, the procession is ordered to proceed, accompanied by the music of Mozart, to the banquet hall. I find myself walking down a long slippery staircase, in slippery patent leather shoes, princess in tow, to an enormous room where about 1,350 of the chosen few await us. The following three hours pass rather quickly, since Princess Madeleine, who sits on my right, and Crown Princess Victoria, who sits across from me, are remarkably well trained in the art of conversation.

Madeleine, a delightful young woman, tells me that her dream is to attend Parsons School of Design in New York City, but that her parents are opposed to her going to New York. They think a school in London would be more appropriate. She asks if I will speak to her mom and dad on this issue.

After dinner each laureate-plus-spouse couple meets and talks with the royal family for five to 10 minutes. Ursula and I try to persuade the king and queen to allow Madeleine to go to Parsons in New York, but leave with the impression that we may have hurt her cause.

Following our audience with the royal family, and the official ball, we go to an all-night celebration at the Royal Institute of Technology, hosted by the students. There is a student show, following which I am asked to come up to the stage, where the assembled multitude sing "Happy Birthday" in Swedish and then English. Unbeknownst to me, but unbeknownst to Swedish students, the clock had struck midnight and my 75th birthday had begun. For some reason, I don't feel depressed as one usually does on major birthdays.

Tuesday, January 9, 2001 A university-wide reception to recognize the award. President Arnold Levine: "Paul Greengard is the 21st Nobel Prize winner at Rockefeller. I have asked Paul to say a few words."

Me: "Thank you, Arnie. A Russian scientist who won the 2000 Nobel Prize in physics became Putin's principal science adviser with cabinet-member status. When a Japanese scientist won the 2000 Nobel Prize in chemistry, the Japanese government declared a national holiday. If you are a professor at Rockefeller and win a Nobel Prize, they give you a number."

Epilogue: Paul Greengard donated his share of the nearly \$1 million Nobel Prize money to the Pearl Meister Award, in honor of his mother, who died giving birth to him. The award will be given annually to an outstanding woman scientist, working anywhere in the world, in the field of biomedical research. Otherwise, Greengard is learning to live with the knowledge that he can't win the Nobel Prize every year.