

The Experimental Pathology of Stress: Hans Selye to Paris Hilton



Paris Hilton (1981–)

Stress is the nonspecific response of the body to any demand. A stressor is an agent that produces stress at any time. The general adaptation syndrome (GAS) represents the chronologic development of the response to stressors when their activation is prolonged. It consists of three phases: the alarm reaction, the stage of resistance, and the state of exhaustion.

Hans Selye, "Forty Years of Stress Research," 1976 (1)

Paris Hilton has stopped eating under the stress of her impending jail sentence.

"Paris Hilton's Stress Starvation," Boston Globe, May 31, 2007 (2)

She walked among the Trial Men

In a suit made by Versace. . .

*But I never saw a girl who looked
So fond of paparazzi.*

The Warden said that Law was Law

And Paris no exception

And all the day she phoned her friends

And missed their soft caress

And all her faithful flock proclaimed

"She must be under stress"

"Verses on the incarceration of Paris Hilton," D. J. Taylor
(after Oscar Wilde), *The Independent*, June 2007 (3)



Hans Selye (1907–1982)

Sergeant Padilla, 28, could not ward off memories of the people he had killed with a machine gun perched on his Bradley fighting vehicle. On April 1, according to the authorities and friends, he withdrew to the shadows of his Colorado Springs home, pressed the muzzle of his Glock pistol to his temple and squeezed the trigger. Sergeant Padilla had been diagnosed with post-traumatic stress disorder at Fort Carson Army base.

"Fighting the Terror of Battles In Soldiers' Heads"

D. Frosch, *New York Times*, May 13, 2007 (4)

THE LIBERATION OF PARIS

The day after Paris Hilton was released from the Los Angeles County jail she confessed to Larry King on CNN that "I've been through a lot and it was a pretty traumatic experience." Recounting traumas that included bad food and nightmares, the tabloid princess told millions of her subjects that "I just want to let people know what I went through (5)." Even before Ms.

Image Credits. Paris Hilton photo by Frederick M. Brown/Getty Images. Hans Selye photo courtesy of the American Institute of Stress.

Hilton was jailed for violating a court order, she had stopped eating “under the stress” of her impending stay in the hoosegow. Since her stress preceded the trauma, Paris Hilton may be the first well-documented case of “Pre-Traumatic Stress Disorder.” Not to worry though; after 23 days in the jug, the heiress was whisked away to the family mansion, followed by brigades of paparazzi. The shutterbugs were stopped at the gates of the compound, which were then opened wide for a balloon-decorated SUV bearing a “Welcome Home” cake in pink frosting and a van from Dream Catchers Hair Extensions (6). The Dream Catchers craft was much in evidence on CNN as Ms. Hilton recounted the ritual tale of celebrity stress and redemption. In keeping with the customs of the Larry Kingdom, she owned that she had found her “spirituality” in prison and that she will continue to confide in her therapist: “I talk with someone about my problems.” As had Britney, and Anna Nicole, and Lindsay before her, she committed herself to rehab, or counseling—and God (5).

It’s a different story entirely for those who suffer from a far heavier burden, post-traumatic stress disorder (PTSD). Almost two out of every 10 U.S. combat troops who return from action in Iraq show serious symptoms of depression, anxiety, or post-traumatic stress disorder. Sad to say, less than 40 percent of those afflicted by PTSD will seek help for *their* recurrent nightmares (7). Indeed, suicide rates due to PTSD after service in Iraq have mounted, while VA facilities for psychiatric care have proven inadequate, according to Congressional testimony (8, 9). This treatment gap carries a toll: “Ex-GI diagnosed with PTSD dies in 2-car collision on I-25” headlined the *Denver Post* earlier this year.

Jessica Rich, who was driving the wrong way, couldn’t shake some of the memories of the Iraq war, including witnessing a suicide. Rich 24, who served in the Army Reserve, was killed at 10:25 p.m. Thursday when her 1996 Volkswagen Jetta smashed head-on into a 2003 Chevy Suburban . . . Makayla Crenshaw, 24, a friend who had known Rich for six years and was in the same unit when they served in Iraq, said that when she talked to her friend two months ago, Rich said she was waiting to enter a treatment facility for PTSD (10).

Mental science has made some progress in defining the stresses of wartime trauma. The diagnosis of PTSD has been rigorously defined and quantified in the psychiatric literature (11), and attention has now turned to its roots in basic biology (12). The same cannot be said for the aches and pains in Larry Kingdom.

TOP BANANA

Ever since Hans Selye transformed “stress” into a force of nature called “STRESS” (his caps) over half a century ago (13), the term has been applied to almost every sling and arrow endured by sentient creatures. At the Paris Hilton level, stress results from paparazzi at the door or hair in need of extension. It’s perhaps too easy to poke fun at these talk-show notions of stress and its

ramifications. But it’s no laughing matter: Angela Patmore’s recent *The Truth About Stress* (2006) estimates that the stress-management industry in the US eats up about \$18 billion each year (14). Since the American Institute of Stress, which Hans Selye inspired, defines stress loosely as “The rate of wear and tear on the body (15)” it’s no wonder that “stress” has been tossed into the word-salad of psychobabble with such other ingredients as “anger-management,” “self-esteem,” “insecurity,” and “closure.” But stress is top banana: the Institute claims that stress is “America’s #1 Health Problem.” In the 1940s, Selye had formulated the notion that we owe each of our “specific” ills to a habitual, nonspecific response to stress in general (15); by the 1950s, stress was blamed for bringing on dropsy and scurvy, herpes and whooping cough, cancer, and the common cold (15). In *Guys and Dolls*, (1950) Frank Loesser gave us Adelaide, an “unmarried, female, basically insecure” who develops the sniffles because she can’t get hitched:

In other words, just from waiting around for that plain little band of gold a person can develop a cold (16).

Colds for Loesser, cancer for others. Woody Allen explains to Diane Keaton in *Manhattan* (1979):

I don’t get angry, okay? I mean, I have a tendency to internalize. I can’t express anger . . . I grow a tumor instead (17).

We read in Patmore’s book that in the 1990s the World Health Organization called the stress of everyday life “a worldwide epidemic.” Twenty-nine percent of Americans admit to having “yelled” because of stress, while 26 percent have been “driven to eat chocolate.” Stress at this level is truly international: British stress-management gurus offer dolphin click noises, aroma pillows, and “squeezy water knobbled key-rings;” the country has a National Stress Awareness Day and offers a “stress bus tour” of central London (14). In Spain, on July 3, 2007, a hotel planning renovations in Madrid offered thirty “highly stressed out people selected by a team of psychologists,” the chance to take up sledge hammers and battering rams and smash through its rooms (18). In France, a tour operator offers to “Reduce Stress!” by having clients choose the “most reliable and high quality supplier” of a

2-hour World War II Walk [that] will take you back to Paris’ darkest hours—the Nazi occupation. Explore subjects such as the invasion of France, the Resistance, life in Paris during the occupation, the D-Day invasion and of course the Liberation itself.

Ironically, this stress-reduced *recherche du temps perdu* will take tourists to

Hotel Meurice, the hotel that housed the Nazi headquarters during the occupation that still has a bullet hole in the door crest (19).

That stress-free walk by the Hotel Meurice recalls the Liberation of Paris (France, not Hilton). The Nazi commanders at the Hotel Meurice had turned over their most valuable captives to the Gestapo for torture at 84 Avenue Foch, the Abu Ghraib of its day. When the Allies arrived at Avenue Foch, they freed, among oth-

ers, American servicemen and women who had been working for the OSS, the forerunner of our CIA. Fifty years later, follow-up interviews with American OSS veterans who had been tortured by the Gestapo showed that 3 of 12 still suffered from well-defined symptoms of PTSD (20).

When larger populations are studied, the percentage of those permanently scarred by PTSD, whether acquired in Nazi camps, Vietnam, Afghanistan, or Iraq, varies widely (from about 15% after service in Afghanistan to more than 40% in survivors of the camps). The incidence has been related to the severity of trauma, to population demographics, to social constraints—any number of factors. However, nowadays, any discussion of the basic biology of PTSD begins with the work of Hans Selye (21, 22).

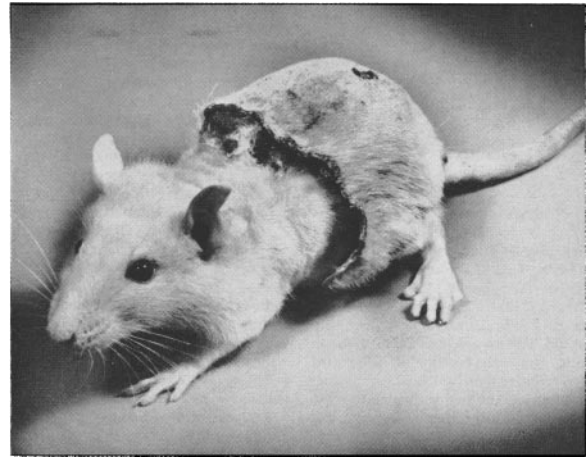
FROM PATHOLOGY TO PUBLICITY

Hans Selye, who introduced the world to STRESS and to the general adaptation syndrome, pursued two careers, experimental pathology and public relations. He was a success at both. As we learn from his autobiography, a genre not generally chosen by the diffident, he was born in Vienna to a respected Imperial Army surgeon and spent his formative years in an Austro-Hungarian cocoon of comfort, learning, and conceit (23). He received his medical degree in 1931 from the German University in Prague—"I was the best student in my class"—and earned his doctorate in organic chemistry two years later. He moved on to do postdoctoral work at Johns Hopkins and then migrated to Montreal, where endocrinology was in its heyday. After the first of his three marriages, Selye pursued a productive career in experimental pathology and endocrinology, beginning at McGill and then at the University of Montreal, where his Institute of Experimental Medicine became a major center of experimental science.

In 1936, while at McGill working on ovarian extracts injected into mice, he came up with his seminal observation:

We consider the first stage to be the expression of a general alarm of the organism when suddenly confronted with a critical situation and therefore term it the "general alarm reaction." Since the syndrome as a whole seems to represent a generalized effort of the organism to adapt itself to new conditions, it might be termed the "general adaptation syndrome." It might be compared to other general defense actions such as inflammation or the formation of immune bodies (24).

He found that experimental animals responded in a stereotypic, reproducible fashion to widely diverse insults—cold, hunger, physical trauma, noxious chemicals. In rodents, either endogenous or exogenous adrenal steroids could reverse these the acute disturbances. He went on to discover that some steroids were potent anesthetics, work that opened up the fertile area of neurosteroid research (25). We also owe to Selye the distinction we draw today between "miner-



Calciphylaxis: From Cutaneous molt induced by calciphylaxis in the rat. Selye, H., Gentile, G., and Prioreshi, P. *Science*. 1961 134,1876–1877. Reprinted with permission from AAAS.

alocorticoids," like DOC, and "glucocorticoids," like cortisone (26). His studies of calciphylaxis, a syndrome of organ-specific calcification produced by excess of parathyroid hormone or vitamin D, not only identified a subset of human disease, but also provided a striking image of experimental pathology at work. The picture of one of Selye's little rodents emerging from its calcium-riddled carapace of skin made the cover of *Science*, and received major notice by the press (26). By 1946, Selye had formulated his general concept of stress and its effects on the organism: "The general adaptation syndrome and the diseases of adaptation." (27) Recognized worldwide as the Selye syndrome, its exploitation by Selye in the popular media turned an experimental pathologist into a celebrity scientist.

Nowhere in this paper, nor in his many writings, does Selye mention that stress had been introduced into experimental biology by Harvard's Walter B. Cannon in "Stresses and strains of homeostasis," (28) a summary that preceded Selye's syndrome of noxious agents by a year. Indeed, Cannon in 1924 (29) had already implicated adrenal secretions as mediators of stress:

Evidence points to the sympatho-adrenal system as the chief agency in resisting alterations of our internal environment for when that system is not functioning the same stresses—cold, lack of oxygen, low blood sugar, loss of blood—which had no considerable influence on normal animals, become ominous for continued existence (28).

Be that as it may, by mid-century Selye had ventured into psychosomatics (30), and throughout the following decades he promoted the notion of STRESS as the major cause, mode of transmission and treatment of most human ills, be they mental or physical.

These quotes from the new OED (31) follow Selye's word "stress" from experimental pathology to psychobabble:

Stress. *Psychol. and Biol.* An adverse circumstance that disturbs, or is likely to disturb, the normal physiological or psychological functioning of an individual; such circumstances collectively. Also, the disturbed state that results.

1953 *Fruton & Simmonds Gen. Biochem.* xxxvii. 843 Similar reduction in the adrenal ascorbic acid and cholesterol is observed when normal animals are subjected to a variety of stress [sic] (injury, cold, heat, drugs, toxins, lack of oxygen, etc.).

1955 *H. Basowitz et al. Anxiety & Stress* i. 7 Anxiety has been defined in terms of an affective response; stress is the stimulus condition likely to arouse such response.

1959 *New Scientist* 12 Nov. 927/1 Some examples of the diseases thought to result from stress are high blood pressure, peptic ulceration and coronary thrombosis.

1968 *Passmore & Robson Compan. Med. Stud.* II. xxxvi. 8/1 Parenthood itself can be a stress for the immature adult.

By the time of his death in 1982, Selye had written more than 1,600 articles—that's about 40 each year—and 33 books! (32). These include published transcripts of his lectures on stress-induced diseases to general practitioners, policy boffins, dentists, and proctologists. In addition to broadcasting his notions of stress, he also belabored his listeners with a "code" of moral behavior. Called "altruistic egotism," his code of behavior was a crude mix of Ayn Rand and Friedrich Nietzsche, with more egotism than altruism.

In a chapter of his autobiography called *Selling the Code* (23), he boasts that he was so well known in Canada in consequence of radio, television, and public speaking engagements that he resorted to traveling about in a wig and reflecting sunglasses "Even I could not recognize myself . . ." he reports, but immediately adds that—of course—he was instantly identified by a fellow passenger: "Oh Dr. Selye, how you have changed!" (23)

That would seem to be a fitting epitaph for a publicist who cleared the runway for Paris Hilton. The experimental pathologist deserves better. When we eventually understand the biology of the stress syndromes, including PTSD, we'll have Hans Selye, the experimental pathologist, to thank.

Gerald Weissmann

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doi: 10.1096/fj.07-0901ufm

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