

# Current Comments®

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## Carl Djerassi Receives 1992 Priestley Award: Prolific Scientist Publishes Autobiography Depicting Journey into Metaphysical Realm

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Several months ago, I received a pre-publication copy of Carl Djerassi's new autobiography. Even before I had a chance to finish it, the publisher issued the book ahead of schedule. I regretted missing the opportunity to be as timely with a review as *The New York Times* or other similar book review media. But then *Chemical & Engineering News* published Djerassi's acceptance speech in San Francisco acknowledging the American Chemical Society's highest award—the 1992 Priestley Medal—for contributions to chemistry and society.<sup>1</sup> So I felt compelled to expedite this review of *The Pill, Pygmy Chimps, and Degas' Horse*.<sup>2</sup>

This autobiography, sprinkled throughout with many photographs, ranging from family pictures to one in which Djerassi and King Carl XVI Gustaf of Sweden inspect two cockroaches, chronicles his colorful entrepreneurial career as “mother” of the birth control pill, developer of antihistamines and topical corticosteroids, founder of biomedical companies, teacher, novelist, and poet. In between, he has punctuated his life with three marriages, two children, collecting art, purchasing prime California coastal property, trekking in the Himalayas, and surviving a bout with colon cancer—in short, enough adventures for several lifetimes. In addition, as shown in two chapters entitled “The Big Drop” and “Interlude: Peacockery,” he does not take himself too seriously.

Readers of *Current Contents*® will recall that we've often discussed Djerassi's exploits.<sup>3-8</sup> Most recently we drew on his



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Carl Djerassi

autobiography for his knowledge of František Šorm, former president of the Czechoslovak Academy of Sciences.<sup>9</sup>

I first met Djerassi back in 1959. Joshua Lederberg introduced us. The following year Carl joined the editorial advisory board of *Index Chemicus*®. He also encouraged my launch of the *Science Citation Index*® (*SCI*®).

### Prolific Author

Djerassi, who is a professor of chemistry at Stanford University, has been a very prolific scientist. He has published nearly 1,200 scientific papers and eight books. In addition, his expeditions into the realms of

fiction<sup>10,11</sup> include the novel *Cantor's Dilemma*,<sup>12</sup> a tale about a scientist being awarded the Nobel Prize. This work has been translated into German, French, Japanese, and Spanish. And it is now being converted into a screenplay.

In the field of organic mass spectrometry alone, Djerassi and his coworkers have published nearly 300 papers and four books. A pioneer in the collection of data on the fragmentation behavior of organic molecules by using model compounds, Djerassi's coauthored text with H. Budzikiewicz and D.H. Williams, *Mass Spectrometry of Organic Compounds*,<sup>13</sup> is one of the most-cited works in this field. The three authors wrote a *Citation Classic*<sup>®</sup> commentary on this book in 1982.<sup>14</sup> By now, it has been cited more than 3,350 times.

Djerassi published another *Citation Classic* commentary<sup>15</sup> in 1982 on a 1961 paper<sup>16</sup> coauthored with four other scientists. The article discussed the structure and optical rotatory dispersion of saturated ketones. At the time, this paper had already been cited in more than 600 publications. Since then, it has been cited an additional 90 times. Indeed, in our study covering 1961 to 1976, Djerassi was the most-cited author in the world in the category of Organic & Inorganic Chemistry with more than 11,000 citations to 431 papers.<sup>17</sup>

Not surprisingly, Djerassi's other books have been well cited. His *Optical Rotatory Dispersion: Applications in Organic Chemistry*<sup>18</sup> (1960) has been cited in more than 1,250 papers to date.

Interestingly, in his Priestley Medal acceptance address, Djerassi said that he considered his 1970 paper in *Science*, entitled "Birth Control After 1984,"<sup>19</sup> to be his most influential contribution to public policy. This paper only has some 70 explicit citations recorded in the *SCI* and the *Social Sciences Citation Index*<sup>®</sup>. But citations in research journals do not necessarily measure public influence. As Carl noted: "No other paper of mine, chemical or non-technical, received as many reprint requests or was as widely reprinted in other books as this one."

## The Early Years

Djerassi is best known to the public for his synthesis and development of the first oral contraceptive—commonly known as The Pill. This milestone was reached through his intense interest in steroids.

Born to a Bulgarian father and an Austrian mother in Vienna in 1923, he lived for awhile in Bulgaria after Hitler's annexation of Austria, attending the American school in Sofia where he learned English. In 1939, he emigrated to the US with his mother. Both his parents were physicians and Carl initially expected to follow in their footsteps.

Djerassi clearly was a wunderkind. After first attending Newark Junior College, New Jersey, then Tarkio College in Missouri, he graduated from Kenyon College in Ohio in 1942 at the age of 19. Following a year working in industry with CIBA in Summit, NJ, he received a PhD in chemistry from the University of Wisconsin, Madison, in 1945, after only two years of study.

He describes his dissertation theme in *Steroids Made It Possible*,<sup>20</sup> a brief autobiography published in 1990. This is part of the American Chemical Society's *Profiles, Pathways, and Dreams* series. And, contrary to the present autobiography, it is primarily addressed to chemical readers. In it, he relates how he and Alfred L. Wilds, his PhD adviser, solved the problem of converting androgenic steroids to estrogens through a partial aromatization reaction—a process which led them to study and name the "dienone-phenol rearrangement."

In a *Chemical & Engineering News* profile last year, editor Rudy M. Baum wrote: "Djerassi believes that his most significant scientific contributions have been in the development of new methodologies for characterizing organic molecules. In his case, the techniques were usually first tested on steroid models, but the research was generally applicable to other organic compounds. Djerassi is largely recognized as having introduced modern chiroptical methods such as optical rotatory dispersion and circular dichroism into organic chemistry. The oc-

tant rule, which provides a rapid method for establishing absolute configurations of ketones without resorting to standards of known absolute configuration, evolved from these studies of steroids."<sup>21</sup> Baum, head of *Chemical & Engineering News'* West Coast Bureau, recently reviewed Djerassi's autobiography.<sup>22</sup>

### The Lederberg Connection

In 1958, Lederberg, now president emeritus of Rockefeller University, became chairman of Stanford University's genetics department. That same year, he was awarded the Nobel Prize in physiology or medicine, along with George W. Beadle and Edward L. Tatum, for his work in genetics.<sup>23</sup> The paths of Djerassi and Lederberg converged in the arena of artificial intelligence, in which Lederberg is still engaged as director of a small research team at Rockefeller. As Djerassi recounts in his autobiography:

"We were well advanced in our mass spectrometry research when, one day in the mid-1960s, Joshua Lederberg approached me with a proposal for collaboration. His interest in exobiology (evidence for life in outer space) had prompted him to establish an instrumentation facility in the genetics department of Stanford's school of medicine, in preparation for an eventual unmanned mission to Mars. Like other investigators in the field, he felt that placing a rugged mass spectrometer with a remote-control sampling device on the space vehicle might be the most effective method for screening molecules indicative of organic life, such as amino acids, the building blocks for proteins, and porphyrins, which are substances related to chlorophyll. Would I join him and Edward Feigenbaum, a professor in the computer science department and one of the pioneers of artificial intelligence, in determining whether AI could be used to derive chemical structures from a single mass spectrum sent back from outer space by telemetry? Over a dozen years, our three research groups collaborated to lay some of the cornerstones for the imposing edifice that computer-aided

knowledge engineering now represents in chemistry. As Lederberg put it in an interview, 'We are trying to teach a computer how Djerassi thinks about mass spectrometry.' "<sup>24</sup> (p. 101-2)

In a recent interview in the *San Francisco Chronicle*,<sup>24</sup> Djerassi, now 68, was labeled a "feminist." And well he might be. He now teaches only two courses at Stanford for undergraduates, one of them under two titles—"Feminist Perspectives on Birth Control" and "Gender-Specific Perspectives on Birth Control." The course is offered through the feminist studies program and the human biology program. His wife, Diane Wood Middlebrook, whose biography of the poet Anne Sexton we recently discussed,<sup>25</sup> for five years headed the feminist studies program at Stanford, in addition to serving as professor of English.

"The Pill is a four-letter word," Djerassi told the *Chronicle*. "But it's both a pejorative word and complimentary. In the beginning an explosion of litigation went on for 10 years while women concerned about side effects demanded, 'Why do you use us as guinea pigs?' But then when women saw that it empowered them, it was a quantum jump—from diaphragms and condoms to the Pill—with nothing at all in between."

Brenda Maddox, a biographer who has written on contraception issues, commented in *The New York Times* Book Review section<sup>26</sup>: "One is tempted to tiptoe away before he starts telling about the day he first achieved the aromatization of ring A of testosterone into the aromatic benzene ring A of estradiol. But that is exactly where one should sit down and listen. Mr. Djerassi has a great deal to be immodest about. He changed the world for women with his synthesis of a steroid oral contraceptive. He is the very model of the scientist-businessman who knows how to turn his discoveries into commercially useful and profitable enterprises without jeopardizing his academic standing. He has not rested content with his discovery but has led the way into thinking about its social consequences. His failure to persuade the international band

of scientists attending the influential Pugwash Conferences on Science and World Affairs to direct some sustained attention from arms control to population control is a sorry measure of how much more comfortable most scientists are with hard subjects, like bombs and rockets, than with soft problems like cultural obstacles to contraception."

The full extent of Djerassi's activities are too numerous to list here. But I would be remiss in not mentioning briefly two other chapters in Carl's life. One is his pygmy chimps project in Africa in the 1970s that figures in the title of the autobiography. He had proposed the establishment of a pygmy chimp breeding colony on an island in Lake Tumba, Zaire (formerly the Belgian Congo), in order to conduct biomedical studies as well as provide a protected habitat for the endangered species. Three of these adult animals were captured in the wild in Zaire early in 1975 for return to the Yerkes Regional Primate Research Center at Emory University, Atlanta, Georgia, for further studies. This event drew considerable attention in the press and criticism from some conservation groups. Yet one of their offspring has become an important subject for human language studies as reported in the March 1992 issue of *National Geographic*.<sup>27</sup>

Another episode in his life, entitled in the autobiography "How Do You Get a Cockroach to Take the Pill?," deals with Carl's approaches to pest control while leading research at the company Zoecon in the years after his Syntex tenure. Djerassi's interest in research on cockroaches was covered in our two-part series on these fascinating creatures.<sup>8</sup>

What comes across in the autobiography is the diverse scope of Carl's endeavors. Since our 1982 profile,<sup>3</sup> it is apparent that he has changed the direction of his life to some extent. The creative chemist entrepreneur is metamorphosing into a creative artist/philosopher.

This is evident in the following passage from the introduction of his autobiography: "In the autumn of 1981, I spent some weeks

trekking in western Bhutan near the Tibetan border. As we crossed ever higher passes on the way to Chomo Lhari, Bhutan's highest and holiest Himalayan peak, I experienced an unforeseen clearing of my mind. For many hours, I walked in total solitude in a majestic and humbling setting. The only man-made sound was my labored breathing and the crunch of my boot against the loose rock. For once in my life, I had time for day-long reflections, from which chemistry had virtually vanished. This experience was so powerful that four years later I was ready to embark on another period of physical exertion and psychic housecleaning, this time to cross from Tibet into Nepal. But on the day of my intended departure for Asia, I was hospitalized for cancer surgery. Instead of waking up on a Himalayan mountain, I found myself coming out of anesthesia with tubes in my nose, arms, and belly. The weeks in the hospital provided another type of journey—one of uncompromised self-exploration—which, though originating in the depth of depression, caused me to write some memoirs that eventually grew into a full-fledged autobiography."<sup>2</sup> (p. 1)

### **From Collector, to Patron, to Artist**

In the autobiography, Djerassi builds the social and scientific reflections on his accomplishments as a chemist to the point of his transition as a journeyman into the world of art. In a sense, the autobiography has afforded him the means to trek across the high peaks of his life into a more nebulous, private terrain. The reader learns that the 1978 suicide of his daughter Pamela, an artist, certainly had a great effect on his life. From that point, it is almost as if he were attempting to personally atone for the loss of her creativity to the world. Any parent who has lost a child will understand and relate to these feelings.

Carl devotes a moving chapter entitled "A Scattering of Ashes" to this tragedy. The British Broadcasting Company (BBC) recently filmed a 30-minute segment that included a sequence shot at Djerassi's ranch

based on this chapter. This segment, describing the first synthesis of the steroid Pill in the context of the element carbon, is part of a six-episode BBC science series based on Primo Levi's memoir *The Periodic Table*,<sup>28</sup> scheduled for release this June.

Djerassi has amassed a large art collection over the years that includes more than 100 works by Paul Klee. The Klee collection has been promised to the San Francisco Museum of Modern Art where it is housed in a special gallery.

There is an interesting, if not amusing, chapter in the autobiography devoted to the purchase, in London, of Edgar Degas' bronze horse, *Cheval au Trot*, and Djerassi's experience in getting this work of art past customs in the US. But, it was Klee who inspired some of Carl's first poems in 1985. Thus, on Super Bowl Sunday, Djerassi began his imaginary dialogue, called "The Twins," between the poet Wallace Stevens and Klee, which consisted largely of titles of the two artists' work in particular years. Three stanzas are cited as examples:

1919

*Stevens writes, "Life is Motion."*

*Klee agrees. He paints, "Up, Away, and Out."*

1922

*Stevens complains: "Such 'A High-toned Old Christian Woman!'"*

*Klee nods: "I'll paint her a 'Morality Wagon.'"*

1938

*"Poetry is a Destructive Force," warns Stevens.*

*"Not if you paint 'A Light and Dry Poem,'" grins Klee.*

In 1976, following his second divorce—described as a "watershed event"<sup>2</sup> (p. 282)—Djerassi turned from being a serious art collector to being an art patron. His purchase, in the mid-1960s, of 1,200 acres of coastal range about a half-hour's drive from the Stanford campus made an ideal site for an

artist's colony, with its open hills overlooking the Pacific Ocean and its deep redwood canyons. Djerassi calls the property the SMIP Ranch. SMIP originally stood for "Syntex Made It Possible." But, Felix Bloch is credited with giving the acronym another meaning—*sic manebimus in pace*, thus we'll remain in peace. The Djerassi Foundation supports the complex of buildings that comprise the artist's colony. Numerous works by resident artists are located among the redwood forests and on the open hills of SMIP. Nobel laureate Roald Hoffmann,<sup>29</sup> also a poet/chemist, has been in residence three times at the colony, which has housed nearly 600 artists, working in literature, music, and the visual arts, as well as in dance and the performing arts.

Since the 1989 publication of his first novel, *Cantor's Dilemma*,<sup>12</sup> Djerassi has completed two more. The second is entitled *The Bourbaki Gambit*, dealing with problems faced by aging academic scientists internationally as well as the problems posed by peer recognition in science. His third novel is provisionally entitled *The Other Marx*, a study of writers and critics.

While winding down his science laboratory activities at Stanford, Djerassi nevertheless has been heavily engaged in two areas. He is participating in a major Stanford comparative study of US and Japanese health care. He is, of course, focusing on birth control in the two countries. And, for the last two decades, Djerassi and his coworkers have studied novel marine sterols that have no counterpart in terrestrial organisms. This work has also led to the isolation and description of novel marine sponge phospholipids<sup>30</sup> that play a role in biological membrane structure and function. These interests aside, he plans to continue his excursions into the metaphysical realm. We wish him well.

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