from
Black Women Scientists in the United States
by Wini Warren
(Bloomington, IN: Indiana University Press, 1999)

JEWEL PLUMMER COBB

World-Renowned Scientist and Path-Breaker

Born in Chicago, Illinois, in 1924, cell biologist/physiologist Jewel Plummer Cobb was, like her colleague and sometime collaborator, Jane Cooke Wright, a product of America's "Black elite." Her father, Frank V. Plummer, was a physician and her mother, Carribel (Cole) Plummer, was a physical education teacher. Her mother's sister was also a physical education teacher, and her paternal grandfather was a graduate pharmacist.[1] In the Plummer home, there was always great emphasis on the concerns and accomplishments of Black Americans. Frank Plummer, who according to Cobb, "specialized in dermatology to the degree that Black doctors could in the 1920s," was on the staff at Provident Hospital, which was affiliated with the University of Chicago and had been established just before the turn of the century:

> [Provident Hospital handled] Black patients . . . the hospital where Black medical students and interns from the University of Chicago Medical School and other medical schools could be sent to care for and observe patients. It was unthinkable then that a Black medic would touch a white patient, especially a Black male medic.[2]

According to Dona Irvin, "from her earliest memory [Cobb] heard discussions of racial matters—the hopes and frustrations of her family and their associates. She became familiar with the aspirations, successes, and talents of black people."[3] Cobb recalled that the lack of recognition given to the accomplishments of Black Americans like Daniel Hale Williams, who had performed the first open-heart surgery in 1893, was a prominent topic of conversation.[4] Cobb's mother was a friend of historian Carter G. Woodson and writer Arna Bontemps. Allison Davis, the famous Black anthropologist, and Alpha White, the director of the YWCA, lived in their apartment building; other important black American artists and professionals lived in the vicinity, although the neighborhood was predominantly white.[5] According to Irvin, Cobb also had the advantage of her father's home library, which contained "a comprehensive collection of material about black Americans, scientific journals and magazines, and periodicals of current events."[6]

Cobb began her schooling at the predominantly white Sexton Elementary School. However, in 1929–1930, the Chicago Board of Education gerrymandered the school districts so that fewer Black children were eligible to attend Sexton; Cobb was transferred to the "overcrowded, old and dilapidated Betsy Ross

Elementary School."[7] During this time, Martin Jenkins, then a graduate student at Northwestern University, began his research project "A Study of 100 Gifted Negro Children"—and Cobb was one of those designated as gifted and talented. As Cobb recalls,

> The research format involved selecting 100 Black gifted children in grammar school and giving us a battery of standard intelligence tests for several days. The tests were followed by an in-depth study of the social, intellectual, personal and family environment of each child tested. These same 100 children, from all over Chicago and in different grammar schools, were again tested four to six years later when attending high school.[8]

By the time Cobb had entered Englewood High School, the Chicago Board of Education had developed a new gerrymandering scheme "for purely racial reasons," to place the high schools on double shifts: "So I began Englewood High under a double shift scheme, starting at 11:45 A.M. and ending at 5:15 P.M, often walking home in the dark in the winter months."[9]

Englewood High had a special honors track which, among other aspects, allowed selected students take five years of science, which Cobb did:

> It was in Ms. Hyman's sophomore year biology class that I was given a microscope to view an entirely new world beyond my normal viewing capacity. . . . Having been inspired by that sophomore year biology class, I then signed up for a second year of biology. . . . Again I remember my teacher, Ms. Mardoff, and the classes in botany. We learned how to identify a tree's genus and [its] common name using only a winter twig without its leaves. Following my two years of biology, I decided then and there that I would be a biology teacher. . . . I also had lectures and labs in physics, algebra, geometry and chemistry, but biology was my favorite subject. . . . As I became a senior with advanced honors classes in English and five years of science, I naturally decided to major in biology in college.[10]

By this time, she had also amassed an insect collection "mounted on Bohemian steel needles in mothproof boxes,"[11] and been further inspired by reading Paul DeKruif's *The Microbe Hunters*.[12] Both her schoolwork and her interest in science were strongly encouraged by her parents, as well as by family friends. There was never any question but that she would attend college.

The choice of which college Cobb would attend was made for social as well as academic reasons. The Plummer family had always spent the summer months at Idlewild, a resort in northern Michigan where wealthy Blacks maintained homes around a lake: "Year after year, [Cobb] met friends there, peers who were sons and daughters of the privileged class of black Americans. These friends were typical of the young people who were her friends in public school and in college."[13] Cobb recalled the importance of those summers in her choosing the University of Michigan:

> This decision was based on the long relationships I'd had with my teen-age friends . . . while spending summers in Idlewild, a community of vacation homes owned by Black folks from the Middle West, including Ohio, Pennsylvania, Indiana, and Illinois.

> The choice of Michigan socially . . . was also a good one. . . . at that time over 200 Black students (over half of whom were graduate students) attended the university. Many were from the South where they could not, as Black students, be admitted to their state university or study for a professional degree. So those southern states paid the tuition and other fees for these students to study in the North.[14]

Cobb entered the University of Michigan in the fall of 1941, and it was an excellent academic choice, particularly in terms of the science courses she took there. However, in terms of how the Black students were treated, it was not what she and her parents had expected—in fact, it was a tremendous disappointment:

> The choice of the University of Michigan . . . was a disaster for Black students . . . in terms of dormitory living arrangements. [When I was] a Black incoming freshman student, the Dean of Women at the University of Michigan wrote my parents in January 1941 saying that as a mid-year freshman, "your daughter has been assigned to Benjamin House at 1102 East Ann Street, Ann Arbor." This assignment to a League House (a Black "official" residence) was given only to Black students because we were not allowed to live in the dormitories! Also the popular grills and the famous Pretzel Bell Tavern did not welcome Black students. And so I was never allowed in the mainstream of social life on campus. No Black students belonged to the big fraternities or sororities. This situation prompted my parents and me to consider leaving Michigan.[15]

In addition to feeling excluded from the mainstream of campus social life, Cobb also felt somewhat isolated academically, as none of her Black friends were science majors.

As luck would have it, Hilda Davis, then Dean of Women at Talladega College, a historically Black college in Alabama, was doing graduate study at the University of Chicago during the summer of 1942. Apparently Davis was a Plummer family friend, and convinced Cobb and her parents that she should transfer to Talladega, which had a strong science program.[16] Talladega did not accept transfer credits, but it did allow selected students to take qualifying examinations to satisfy requirements without actually enrolling in a course. Cobb entered an accelerated program in which she took a certain number of these examinations, attended summer courses, and took private courses in addition to her regular semester work.[17]

Although there were no lab assistants at Talladega, and students prepared their own media and plates, Cobb thrived there: "My friend and mentor . . . was my bacteriology professor, known affectionately as 'Captain Jack,' [who] suggested that I apply to New York University's Graduate School of Arts and Sciences in biology."[18] Because of World War II, the student body at Talladega was predominantly female during Cobb's time there.[19] Despite not having transferred in any credits, she completed her course work in two years, and graduated in 1944 with a major in biology. She was accepted at New York University, and entered in the fall of 1944. Although she was initially turned down for a teaching fellowship, Cobb requested a review of the decision soon after her arrival; the faculty reconsidered and she was later awarded funding, which she held for the next five years.[20]

Cobb's original plan had been to earn a master's degree and become a high school biology teacher, but she abandoned the idea when, as a substitute teacher, she "discovered that I didn't like the discipline problems I encountered in the classroom at New York City's Julia Richmond Girls High School."[21] As in the case of so many of the women, a mentor's support proved crucial:

> Gradually, I became involved in my graduate courses and after being offered a teaching fellowship in my own department by the chair, Harry Charipper, I decided I would continue past the master's and go on to a Ph.D. My second mentor was M. J. Kopac, professor of biochemistry and involved in micrurgy (microsurgery) research. He was my advisor and supporter throughout graduate school. I never experienced a time when he was not willing to talk about science and share many ideas.[22]

Cobb worked toward the master's degree in cell physiology for three years (1944–1947). Her thesis work, an "original laboratory project using the intricate Warburg respirometer apparatus," dealt with a series of organic molecules, aromatic amidines, and their effect on the respiration of yeast cells.[23] She completed the master of science degree in 1947; her thesis was "The Effect of Several Aromatic Amidines on the Respiration and Aerobic Metabolism of Yeast Cells."

In 1949, Cobb spent the summer as an independent investigator at the Marine Biological Laboratory at Woods Hole, Massachusetts, and the following year (1950) she earned her Ph.D. in cell physiology.[24] Her dissertation, "Mechanisms of Pigment Formation," was done under the supervision of biochemist M. J. Kopak.[25] In it, she examined the way melanin pigment granules could be formed in vitro using the enzyme tyrosinase, which is needed for melanin pigment synthesis. Various substrates of the enzyme were also tested as model systems for pigment formations.[26] According to Cobb,

> My advisor and I worked together for months so that we both were satisfied that I had a "perfect" dissertation, capable of passing muster by the severest critic. Then finally, it was scrutinized by several readers and I came before the committee for my oral defense. I was, of course, extremely nervous. Despite that, I was comforted deep down inside with the awareness that I knew much more about my subject, "Mechanisms of Pigment Granule Formation," than anyone else in the world.[27]

In July of 1950, Cobb began a two-year postdoctoral fellowship to study various factors influencing normal and abnormal pigment cell growth. Her studies, sponsored by the National Cancer Institute of the National Institute of Health, were based at the Harlem Hospital Cancer Research Foundation, headed by chief of surgery Louis Tompkins Wright.[28] With this work she embarked on the type of research that would become her specialty: the factors influencing the growth, morphology, and genetic expression of normal and neoplastic pigment cells, the in vitro growth of mammalian neoplastic cells, and the changes produced in vitro by cancer chemotherapeutic agents, hormones, and other agents known to disrupt cell division.[29]

Cobb designed new experiments for growing human tumor tissue in vitro, using specimens acquired from autopsies and from patients undergoing surgery.

These experiments were designed to complement the in vivo studies being conducted by Jane Cooke Wright:[30]

> As part of the cancer research team at Harlem Hospital, I undertook tissue culture (in vitro) studies of the tumors of cancer patients. Clinical studies in human patients treated (in vivo) with (a) the newly synthesized agent, triethylene melamine (TEM), as a radiomimetic compound, or (b) aureomycin, an antibiotic, or (c) some 4-amino derivatives of folic acid (folic acid is part of a molecule needed in cellular growth) were also done.[31]

In addition to working independently and with the Wrights, Cobb also worked in conjunction with another young investigator, Grace Antikajian, to find the modes of action of the various compounds on cancer cells in vitro and to discover which compounds had the most damaging effects on which types of cells:

> We described, in 1951, certain cytotoxic changes. TEM [triethylene melamine] in vitro at lower doses prevented human tumor cells from migrating along the flask surfaces. Amethopterin at significantly low doses caused cell nuclei to enlarge while aureomycin at similar concentrations had no effect.[32]

She participated in further studies that compared the in vivo effects of other chemotherapeutic agents with the in vitro effects of the same tissue obtained from a patient.[33] According to Cobb,

> A preliminary study of 18 cases revealed a meaningful relationship between the effect of a chemotherapeutic agent used clinically in the same patient with advanced neoplastic disease. I then continued extensive research identifying a spectrum of in vitro cellular changes in tissue culture from a variety of sources. They included human tumors of various types, and also fetal mouse and chick embryo tissue.[34]

Between 1950 and 1952, Cobb also spent time in Margaret Murray's tissue culture laboratory at Columbia University's College of Physicians and Surgeons, where she learned new techniques for growing and analyzing nerve cells in vitro.[35]

In 1952, the National Cancer Institute (of the National Institutes of Health) awarded Cobb her first grant as an independent investigator.[36] She moved to the University of Illinois Medical School, where she was named an instructor in the anatomy department. More importantly, she established the first tissue culture research laboratory at the medical school (an accomplishment she would repeat at other institutions throughout her career).[37] At Illinois, Cobb developed a new research program that was an extension of her graduate research: cytological studies of normal and malignant pigment cells.[38] During her time at Illinois she also published data on human bladder cancer cell growth in tissue culture.[39] Except for her two years at Harlem Hospital (1950–1952), a major portion of Cobb's research has focused on pigment cell research—the role of melanin in skin cancers, as well as its potential for shielding human skin from cancer-causing ultraviolet rays.

Cobb was married to Roy Raul Cobb in 1954, and, with another grant from the National Cancer Institute, she returned to the Harlem Hospital Cancer Research Foundation, directed by Jane Cooke Wright.[40] The following year, 1955, the

entire laboratory of the Cancer Research Foundation joined the Fifth Division Surgery of New York University's Post-Graduate Medical School; Cobb was appointed an instructor of research surgery. She was promoted to the level of assistant professor the following year.

At New York University–Bellevue Hospital Medical Center, Cobb designed and established a new tissue culture research laboratory. Here, she "entered a most exciting phase of basic cell research in close coordination with [Wright's] clinical cancer chemotherapy program."[41] She began working with animal models—specifically, with a type of JAX mice bred for a tendency to express Cloudman-S91 tumors.[42] The research on mouse melanomas was designed to discover whether

> the resistance to radium and x-ray therapy observed in patients with melanoma was a function of pigment density. Since human experimentation was not practicable, I attempted to elucidate this resistance phenomenon using tissue slices of densely pigmented and very pale areas of the same mouse tumor specimen. I exposed them to varying doses of x-rays and then implanted them immediately in untreated host mice or *grew* them in vitro. Pale melanoma slices versus pigmented slices exposed to equal x-ray dosages displayed a greater sensitivity to radiation. Pigmented tissue slices survived in vitro radiation at doses that prevented growth of pale tissue when implanted to mice. Microscopic analyses determined that there were quantitatively more pigmented cells per area in the pigmented tissue than in pale tissue slices while the number of mitoses was the same. Melanin protected the cells from x-ray damage.[43]

During her tenure at New York University (1955–1960), Cobb was continually funded by the National Cancer Institute for in vitro work on the production of melanin using tissue cultures of amelanotic and melanotic tumors.

Cobb also produced significant work on the exposure of living cells in vitro to the antibiotic actinomycin D; the resulting paper contained the first published data on the ability of actinomycin D to cause a reduction of nucleoli (a complex nucleotide) in the nucleus of human normal and malignant cells. Her research was reinforced by others, whose later findings explained the changes taking place at the molecular level.[44]

Along with her New York University research assistant and colleague Dorothy Walker Jones,[45] Cobb continued studies on breast and other cancerous tumors treated in vivo and in vitro with nitrogen mustard derivatives,[46] the antibiotic puromycin derivative, and the folic acid antagonist A-methopterin (methotrexate), as well as actinomycin D.[47] By her own account, her most interesting work during this period was an in-depth analysis of Thio-Tepa, a nitrogen mustard derivative; she and Walker conducted a cinematographic analysis of cell division movement behavior, photographed through a special phase contrast microscope. The paper resulting from these experiments was presented in 1962, at the Eighth International Cancer Congress in Moscow.[48]

In 1960, Cobb left New York University to assume a full professorship in the biology department at Sarah Lawrence, a women's college in Bronxville, New York. She continued her tissue culture studies, and once again established and became director of a tissue culture laboratory. Again, with funding from the National Can-

cer Institute, she studied hormonal factors influencing the growth and melanization in vitro and in vivo of the Cloudman-S91 mouse melanoma. She worked to determine the optimal nutritive requirements of Cloudman-S91 melanoma in organ culture, and conducted studies of induced tolerance of melanoma in a foreign mouse strain.[49] With additional funding from the Undergraduate Research Participation Program of the National Science Foundation, Cobb's laboratory at Sarah Lawrence was closely tied to helping students do research with mouse melanomas. Two of her former students from this program now have Ph.D.s and are, according to Cobb, at the forefront of research in their respective fields. During this period, Cobb's work in the lab also involved "perfecting new techniques for organ cultures in sealed chambers placed in the peritoneal cavity of mice or in mini-dishes incubated at 37 degrees Celsius."[50]

Between February and September of 1967, Cobb took a seven-month leave from Sarah Lawrence to accept a research fellowship from the National Institutes of Health to study cancer polyoma viruses at the Laboratorio Internazionale di Genetica e Biofisica in Naples, Italy.[51]

Cobb left Sarah Lawrence in 1969 to become dean of Connecticut College, and a professor in the zoology department. At Connecticut College, Cobb built a new laboratory. With the help of assistants, and with grants from the American Cancer Society and the National Cancer Institute, she studied hormone action on human and mouse melanoma in tissue culture (1971–1973). She again developed melanotic and amelanotic strains of the Cloudman-S91 mouse melanoma in cell culture, and published a series of papers detailing the changes in the morphology and behavior of malignant pigment cells when they are exposed to the female hormone 17B estradiol, and the male hormone testosterone. According to Cobb,

> The changes in such a model melanoma cell system permit examination of the direct effect of added agents thought to cause pigment changes in vivo. Changes in pigment granule density, their distribution and relationships to cell division provide changes that can give us useful clues in cell biology. For example, the pituitary hormone melanocyte-stimulating hormone (MSH) causes increased pigment production. Our work described significant changes in melanin intensity while reducing cell division in MSH-treated cells. When combined with cytochalasin B, giant multi-nucleated pigment cells formed. These data gave me new insight into the dynamics of the pigment cell division cycle and the relationship of that cycle to the time of pigment formation.[52]

During her tenure at Connecticut College, Cobb's administrative duties began to encroach steadily on her laboratory time, so she devised a strategy of spending early morning hours in the laboratory and acquired a staff of talented assistants. In her position as dean at Connecticut College, Cobb also developed other interests—specifically, creating opportunities for minorities in science. With funding from the Van Ameringen and the Macy foundations, she established a new program, the Postgraduate Premedical and Predental Program for Minority Students. The program enrolled recent minority college graduates who had demonstrated high levels of learning skills but had decided too late in their

undergraduate schooling that they wanted to enter graduate school in a health field. Under the program, such students would attend Connecticut College for one year to complete concentrated studies in the sciences—biology, physics, and organic and inorganic chemistry—with an eye toward making them more viable applicants for graduate school.[53]

In 1974, Cobb became a member of the National Science Board, the policy body of the National Science Foundation, the governmental agency involved in guiding science policy by shaping the direction of basic science research in the United States. She became involved in the original formation of the NSF's Committee on Women and Minorities in Science.[54] In 1976, Cobb left Connecticut College to become the dean at Douglass College, the women's division of Rutgers University. Although she was also a professor of biological sciences, at this point she ceased being an active researcher. During Cobb's more than twenty-five years in research, her work had been continuously supported by grants from the National Cancer Institute, the Damon Runyon Cancer Fund, and the American Cancer Society.

Cobb remained at Douglass College until 1981, then left to become president of California State University at Fullerton, a position she held until her retirement in 1990. She continues to serve as head of the NSF's Committee on Women and Minorities in Science.

Notes

1. Jewel Plummer Cobb, personal communications, including curriculum vitae and correspondence. See also Jewel Plummer Cobb, "A Life in Science: Research and Service," *Sage* 6 (fall 1989): 39–43. "Cell Physiologist, Researcher, College Dean," in *Contributions of Black Women to America*, ed. Marianna W. Davis, vol. 2 (Columbia, S.C.: Kenday Press, 1982), pp. 426–428. *Ebony Success Library*, vol. 1 (Chicago: Johnson Publishing, 1973), p. 72. Rosalyn Mitchell Patterson, "Black Women in the Biological Sciences," *Sage* 6 (fall 1989): 3–13. "Shaper of Young Minds," *Ebony*, August 1982, pp. 97–98, 100. *Who's Who among Black Americans*, 4th ed. (Northbrook, Ill.: Who's Who among Black Americans Publishing, 1985), p. 165. Dona L. Irvin, "Jewel Plummer Cobb," in *Notable Black American Women*, ed. Jessie Carney Smith, vol. 1 (Detroit: Gale Research, 1992), pp. 195–198. Gaynelle Evans, "The 'Crown Jewel' of California State University, Fullerton," *Black Issues in Higher Education*, September 1988, p. 5. *American Men and Women of Science: The Physical and Biological Sciences*, 15th ed. (New York: Bowker, 1971–), p. 266. *Who's Who 1985: An Annual Biographical Dictionary*, 136th ed. (London: A. & C. Black, 1985), pp. 165–166. *Who's Who in America* (Chicago: A. N. Marquis, 1986–1987), p. 527. Vivian Ovelton Sammons, *Blacks in Science and Medicine* (New York: Hemisphere, 1990), pp. 56–57. James M. Jay, *Negroes in Science: Natural Science Doctorates, 1876–1969* (Detroit: Belamp, 1971). *Who's Who among Black Americans*, 1980–1981 ed. (Northbrook, Ill.: Who's Who among Black Americans Publishing, 1975–1988), p. 156. James H. Kessler, J. S. Kidd, Renee A. Kidd, and Katherine A. Morin, *Distinguished African American Scientists of the Twentieth Century* (Phoenix, Ariz.: Oryx Press, 1996), pp. 49–53. Margaret W. Rossiter, *Women Scientists in America: Before Affirmative Action, 1940–1972* (Baltimore: Johns Hopkins University Press, 1995), p. 74.

Cobb's father was a graduate of Cornell University and Rush Medical School (1923), in Chicago. Her mother, also an interpretive dancer, attended Sargeants College, a physical education college then affiliated with Harvard University (Cobb, "A Life in Science":

Kessler, *Distinguished African American Scientists*, p. 50; Irvin, "Jewel Plummer Cobb," p. 195).

2. Cobb, "A Life in Science," pp. 39–40.

3. Irvin, "Jewel Plummer Cobb," p. 195.

4. Cobb, "A Life in Science." Daniel Hale Williams (born 1856; graduated Hare's Classical Academy, 1877; received M.D., Chicago Medical College, Northwestern Medical School, 1883) founded the Provident Hospital and Training School for Nurses in 1891, which would later be known as Provident Hospital. Provident is the oldest free-standing Black-owned hospital in the United States. Williams performed the "first open-heart surgery in 1893 by removing a knife from the heart of a stab victim and sewing up the pericardium—the victim recovered and lived several years afterwards" (Sammons, *Blacks in Science and Medicine*, pp. 251–252).

5. Irvin, "Jewel Plummer Cobb," p. 195.

6. Ibid.

7. Cobb, "A Life in Science," p. 39.

8. Ibid. Martin Jenkins later earned his Ph.D. and eventually became president of Morgan State College in Baltimore, Maryland.

9. Ibid. Cobb said that "despite these attempts to redistrict students, the teachers at Englewood High were excellent. The racial mix was approximately 60% to 70% white and 40% to 30% Black."

10. Ibid.

11. Ibid., p. 40.

12. Irvin, "Jewel Plummer Cobb," p. 196. Paul DeKruif, *The Microbe Hunters* (New York: Harcourt, Brace, 1926).

13. Irvin, "Jewel Plummer Cobb," p. 196.

14. Cobb, "A Life in Science," pp. 40–41.

15. Ibid. In the first quoted line, Cobb also included "as well as Illinois and other Big Ten universities."

16. Ibid., p. 41.

17. Ibid. See also Irvin, "Jewel Plummer Cobb," pp. 196–197.

18. Cobb, "A Life in Science," p. 42. "Captain Jack" was James R. Hayden, Ph.D. (Jewel Plummer Cobb, personal communication, 27 June 1996).

19. According to Irvin, of the thirty-two students in Cobb's graduating class only four were males ("Jewel Plummer Cobb," p. 197).

20. Cobb, curriculum vitae. Cobb taught biology at Washington Square College of NYU.

21. Cobb, "A Life in Science," p. 41.

22. Ibid.

23. Ibid. See also Cobb, curriculum vitae.

24. Cobb, curriculum vitae.

25. Ibid. See also Cobb, "A Life in Science," p. 41.

26. Cobb, "A Life in Science." The Warburg apparatus was again used to study the biochemical reactions. In her dissertation research, Cobb also tested tyrosine and various other substrates as model systems for pigment formation.

27. Ibid.

28. Cobb, curriculum vitae. See the entry for Jane Cooke Wright in this book for more information on Louis T. Wright.

29. Cobb, curriculum vitae.

30. Ibid. See also Cobb, "A Life in Science," p. 41, and "Cell Physiologist," p. 426. See the entry for Jane Cooke Wright in this volume.

31. Cobb, "A Life in Science," p. 41.
32. Ibid.
33. According to Cobb, "The experimental design for an in vitro test of a chemotherapeutic agent on the patients' cells followed by a comparison of the in vivo effect on the same patient was modeled on bacterial sensitivity tests that were used for selecting the antibiotic of choice for clinical use" (ibid.).
34. Ibid., p. 42. See also Cobb, curriculum vitae.
35. Ibid.
36. Between 1955 and 1960 Cobb, as principal investigator, had a series of renewable research grants from the National Cancer Institute of the National Institute of Health to study the production of melanin in vitro using tissue cultures of amelanotic and melanotic tumors (Cobb, curriculum vitae).
37. Cobb, "A Life in Science," pp. 42–43. See also Cobb, curriculum vitae; Irvin, "Jewel Plummer Cobb"; "Cell Physiologist," pp. 426–427; and *Ebony Success Library*.
38. According to Cobb: "Melanin is a pigment found throughout the animal and plant kingdom, including in human skin. In humans, the density of melanin-bearing cells in the skin determines the hue and darkness of the skin as in Negroid skin. Cells which contain melanin . . . may change into fast-growing and fast-spreading tumors called melanomas" (Cobb, "A Life in Science," pp. 41–42).
39. Ibid.
40. The Cobbs were divorced in 1976; they had one son. She has not remarried.
41. Ibid., p. 41.
42. For information on Cloudman-S91 tumors I am indebted to my colleague Karen Rader. According to Rader, the Cloudman-S91 tumor was named after researcher Arthur Cloudman, who worked with C. C. Little at the University of Michigan Cancer Research Lab before becoming one of the founding members of the Jackson Laboratory in Bar Harbor, Maine, where the JAX mice were bred. Cloudman worked on transplantation of mammary tumors in various strains as well as on the diagnosis of multiple spontaneous tumors. The Jackson Laboratory was set up around 1931 (Rader, personal communication, March 1996). See also Karen Rader, "Making Mice: C. C. Little, the Jackson Laboratory, and the Standardization of Mus Musculus for Research," Ph.D. dissertation, Indiana University, March 1995. Cobb's team obtained samples of S91 through the Bar Harbor Laboratory (Cobb, personal communication, 27 June 1996).
43. Cobb, "A Life in Science."
44. Ibid., p. 42. Cobb notes that actinomycin D is now used as a lab tool to inhibit RNA synthesis.
45. Dorothy Walker Jones (Ph.D.) is now a professor of biology in the Graduate School of Arts and Sciences at Howard University. She was mentored by both Cobb and Jane Cooke Wright (Cobb, personal communication, 27 June 1996).
46. Thiotepa and chlorambucil (Leukeran).
47. Cobb, "A Life in Science." According to Cobb, "Direct cytotoxic changes in living cells in vitro were observed in some tumor series but no promising pattern emerged in terms of comparative studies, in vivo versus in vitro."
48. Ibid., p. 42. See also Cobb, curriculum vitae.
49. Cobb, curriculum vitae.
50. Cobb, "A Life in Science," p. 42.
51. Cobb, curriculum vitae. See also "Cell Physiologist," p. 427.
52. Cobb, "A Life in Science," pp. 42–43.
53. Ibid., p. 43.
54. Ibid. See also Cobb, curriculum vitae.