

## Remembering Jeanette Snyder Brown (1925–2014)

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**Abstract** Jeanette Snyder Brown (universally called Jan) was associated with the Department of Plant Biology, Carnegie Institution for Science (until recently Carnegie Institution of Washington) over a period of 37 years. Jan has left a scientific legacy of extensive publications concerned with photosynthetic pigments and their organization, and a historic collection of portraits of scientists who were prominent during her long tenure in the Department of Plant Biology. This legacy will stand for many years to come.

**Keywords** Photographs of scientists · Photosynthetic pigments · Spectral forms of Chlorophyll a · Stacy French

Jeanette Snyder Brown was born in Rochester New York, on March 6, 1925; she was the only daughter of James and Lottie Snyder. She received a bachelor's degree from Cornell University (Ithaca, NY, USA) in 1945 (with bacteriology as her major). After a brief stint at the University of Wisconsin as a graduate student and a

research assistant, she returned to Cornell for a master's degree in 1947. Thanks to a Cornell professor (Otto Rahn), she obtained a position with a firm exploring the biological effects of low-level radiation. That venture failed, but she had already started working for a PhD at Stanford with Professor Arthur Giese. There she completed her PhD on the effects of visible light in reversing the deleterious effects of ultraviolet-induced cell damage in 1952. Her first association with Carnegie Institution for Science was as a research assistant for a few months in 1954. She became a full member of the research staff in 1960, and she worked for almost 30 years before she officially retired. Figure 1 shows 4 portraits of Jan Brown at different times of her life.

Married to Walter Brown in 1950, she waited until the youngest of their three children was three and, in 1958, returned full time to the Carnegie Department of Plant Biology. She worked once again as a research assistant with C. Stacy French for 2 years before he appointed her as a regular staff member—the Carnegie equivalent of a faculty member. For a biography of Stacy French, see Govindjee and Fork (2006).

Jan's research centered on the physiology of algae, with a sharp focus on their photosynthetic pigments. She has published about 50 research papers. When her husband made frequent trips to the Philippines to collaborate with a herpetology colleague there, she joined him and collected a variety of tropical algae with unusual photosynthetic pigment systems. In the process, she pioneered techniques and developed a facility at Carnegie for the culture of unusual algal species. She also collaborated with the then director C. Stacy French in carrying out spectroscopic investigations of photosynthetic pigments using a remarkable set of home-made spectrophotometers that Stacy had built. One of these would measure the first

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**Fig. 1** A panel of four photographs of Jan Brown. **(a, Top left)** a portrait of young Jan Brown **(b, Top right)** a portrait of Jan Brown, used at a web site (<https://dpb.carnegiescience.edu/article/jan-brown-passes-away-august-16th>). **(c, Bottom left)** Jan holding a birthday cake


decorated with absorption spectra of algae. **(d, Bottom right)** a portrait in 2014. **a, b** and **c** are from the archives of the Department of Plant Biology, Carnegie Institution for Science; and **d** was taken by one of the authors, Govindjee


derivative of an absorption spectrum mechanically by means of a vibrating slit arrangement, enabling them to detect subtle features of these spectra that would be missed by conventional spectroscopy (preceding by many years the ability to do derivatives of spectra by computer).

Indeed, besides Stacy, she was the only person at Carnegie who could operate this instrument! It was with this very special instrumentation that they were able to demonstrate that living photosynthetic cells contain several spectrally

distinguishable forms of chlorophyll—a discovery made long before molecular and biochemical techniques started to characterize the basis for the different forms. We refer the readers to, as examples of her research, three of her early papers: Brown and French (1959, 1961) and French et al. (1972). In addition, she has published extensively on spectroscopy (both absorption and fluorescence) of photosynthetic systems (see e.g., Brown 1967, 1969, 1972, 1973, 1977a, b, 1980, 1983a, b, 1987, 1988; Brown and Schoch 1981, 1982, and Bialekbylka and Brown 1986).

80 **Gijs van Ginkel, of The Netherlands, wrote**

81 “It is about 40 years ago that I first met Jan Brown. I do not  
 82 remember when and where exactly it was: either when she  
 83 visited the Utrecht Biophysics group, or during a photo-  
 84 synthesis conference in Stresa, Italy (1971) or at the  
 85 Weizmann Institute in Israel (1974). It was then that Jan  
 86 asked me if I was interested to work with her as a  
 87 postdoc at the Plant Biology Department of the Car-  
 88 negie Institution of Washington in Stanford (now Carnegie  
 89 Institution for Science). In view of the enthusiastic  
 90 stories from my Utrecht colleagues about the institute,  
 91 the long lasting exchange relation between the Utrecht  
 92 Biophysics group and the Carnegie Institution group,  
 93 and Jan’s scientific reputation and charming personality,  
 94 it was a very welcome invitation which materialized  
 95 during 1977–1979. The research time at Carnegie and  
 96 the contact with Jan and all her colleagues at Carnegie  
 97 have left sweet memories both for myself as well as for  
 98 my family. Upon arrival in Stanford, we started exper-  
 99 iments on reconstitution of isolated Photosystem  particles in lipid vesicles, using different methods. Ini-  
 100 tially the data looked promising, but chlorophyll played  
 101 its own game with us, and started to make oxygen  
 102 radicals, which spoiled our expectations, but neverthe-  
 103 less these experiments yielded interesting data about the  
 104 radicals formed during interaction of light with chloro-  
 105 phyll in a lipid (or detergent) environment and about  
 106 the mechanism how the photosynthetic system coped  
 107 with it. This led to a report in the Carnegie Yearbook  
 108 (Brown and van Ginkel 1978) and two papers (van  
 109 Ginkel and Brown 1978; van Ginkel 1979); this  
 110 research was continued on a different track: the phase  
 111 behavior of photosynthetic membranes and model  
 112 membranes, consisting of lipids from different plants  
 113 and algae.

115 During my time in Stanford, I had, of course, a lot of  
 116 contact with Jan either about work or about personal  
 117 matters. One thing we remember well was her invitation  
 118 to join the folkdance classes she and her husband Walter  
 119 followed. When I think about Jan, I see her sitting behind  
 120 her desk, walking through the corridor of the Carnegie  
 121 building, standing behind her lab table, drinking hot water  
 122 in the coffee room (Jan did not drink tea or coffee, but  
 123 only hot water), at ease when eating lunch in the small  
 124 open place between shrubs next to the Carnegie building  (the first place where I saw a California quail strolling  
 125 around), going together to Plant Physiology meetings like  
 126 the one in 1978 in Washington, and joining her on a visit  
 127 to one of her friends. When I look back on the contact and  
 128 cooperation with Jan, I cherish the sweet memories she  
 129



**Fig. 2** Left to right Frank Nicholson, Jan Brown and Dick (Richard) Hart. Photo taken in 1978. Source Gijs van Ginkel

has given us, and the wonderful time she gave us when we 130  
 worked together.” 131

Figure 2 shows a photograph of Jan Brown, during those 132  
 early days, 1970s–1980s, with two members of the Car- 133  
 negie staff. 134

**Jan Anderson, of Australia, wrote** 135



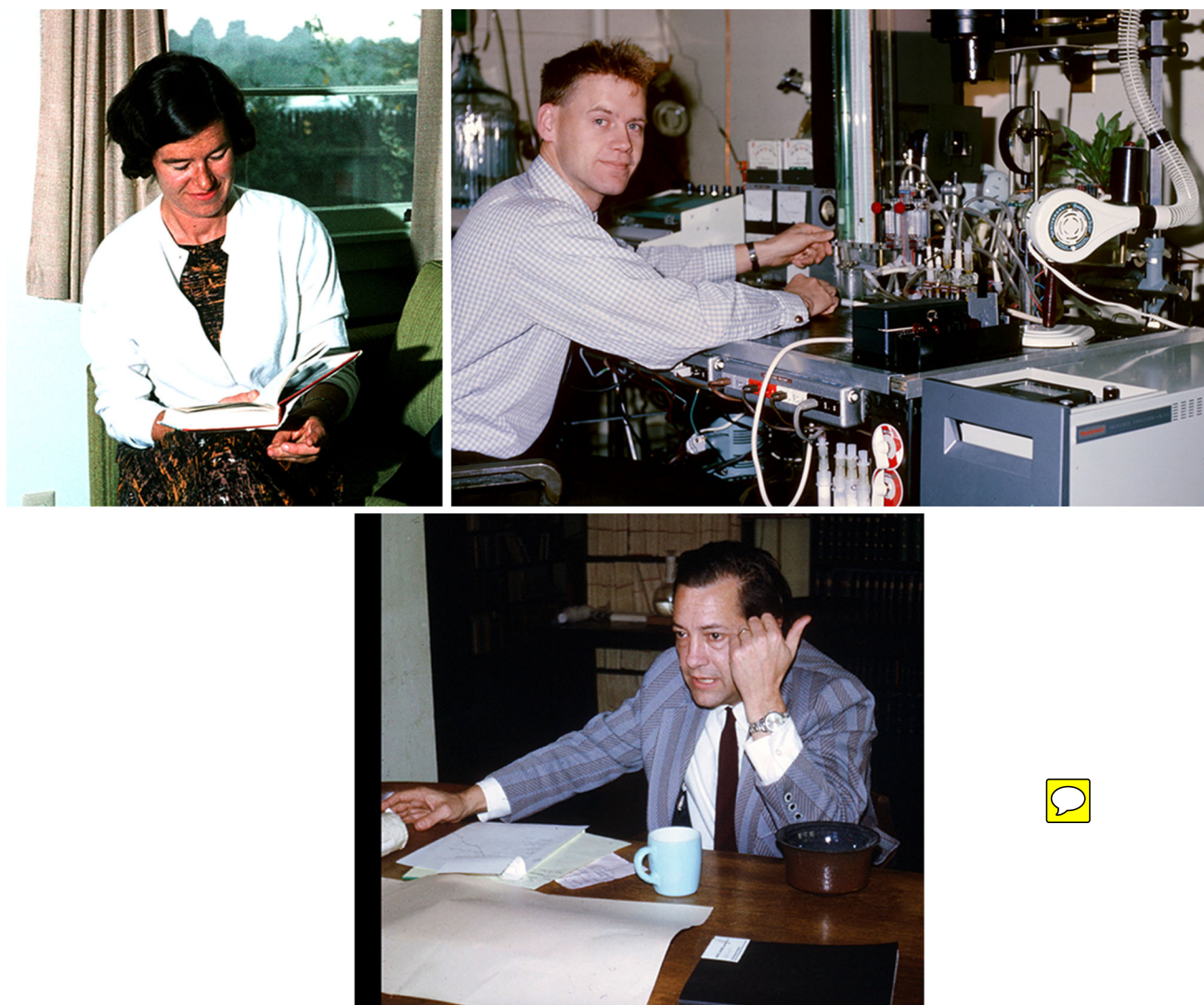
“While Jan B.’s research was mainly concerned with algae 136  
 [and spectral forms of Chl a], she also  look significant 137  
 plant research. She was a wonderful friend in 1966 on my 138  
 Carnegie Fellowship; I was the first Australian/New Zeal- 139  
 and scientist. In 1982, Jan B. came to Canberra on a US 140  
 National Science Foundation (NSF) grant and continued 141  
 her research on the chlorophyll *b*-less barley mutant that 142  
 Jan B. had introduced to Carnegie in 1966 (Brown et al. 143  
 1982). In 1983, on my short sabbatical to visit Dick 144  
 (Richard) Malkin, at the University of California at 145  
 Berkeley, I returned to Carnegie to collaborate with Jan B. 146  
 We showed that chlorophyll *b* was indeed an integral 147  
 component of Photosystem I (Anderson et al. 1983). Jan B. 148  
 also collaborated with Tasso Melis at Carnegie and 149  
 demonstrated for the first time that the photosystem II/ 150  
 photosystem I stoichiometry was not unity, as had been 151  
 assumed before (Melis and Brown 1980).” 152

Figure 3 shows photographs of Jan Anderson, Olle 153  
 Bjorkman (a distinguished scientist at Carnegie), and 154  
 Winslow Briggs (one of the authors). 155

 Following Stacy French’s retirement in 1973, Jan con- 156  
 tinued her studies of photosynthetic pigments and main- 157  
 tained a number of algal species in culture and made them 158  
 available to the photosynthesis world until her retirement in 159  
 1987. She couldn’t stay away from the science, however, 160



**Fig. 3** A panel of three photographs from the collection of Jan Brown, at Carnegie Institution of Science. *Top Left* Jan Anderson; *Top right* Olle Bjorkman in the laboratory; and *bottom* Winslow Briggs

and volunteered at Carnegie's new Department of Global Ecology from 2002 to 2011.

Jan also traveled widely, visiting and carrying out research in photosynthesis laboratories all over the world—England, Denmark, The Netherlands, Germany, France Israel, and Japan. She also regularly participated in and contributed to photosynthesis conferences and symposia all over the world. In the course of these travels, she took on a special research project of her very own: to photograph as many of the prominent (and not so prominent) researchers—largely in photosynthesis but in other plant fields as well. Figure 4 shows a panel of several distinguished, and departed, photosynthesis scientists from the past. It includes: Martin Kamen (1913–2002); C. Stacy French

(1907–1995) and Francis Haxo (1921–2010); Bessel Kok (1918–1979) and Larry Blinks (1900–1989); and Jan Ames (1934–2001).

During her stay with Global Ecology, she culled her vast collection of photographs and put together a remarkable set of portraits, largely informal, of almost every major scientist studying photosynthesis. With support from the department she had the images digitized and this resource, on a CD, is now available without charge to anyone who needs a picture of a particular historic figure.

Jan is survived by her 3 children, Pamela Brown Lanigan, James C. Brown, and Julie Creighton; four grandchildren; one great-grand child; and a brother, Ted Snyder.



**Fig. 4** Four photographs from the Janet Brown Collection at the Carnegie Institution of Science. *Top left* Bessel Kok and Larry Blinks; *top right* Stacy French and Francis Haxo; *bottom left* Martin D. Kamen; *bottom right* Jan Ames, doing experiments in the Carnegie laboratory

## Concluding remarks

We note that Jan never really retired, coming into the lab frequently. In the last several years she helped with the newsletter and interacted most closely with researchers and staff at the Department of Global Ecology, often coming to seminars and asking insightful questions. She was a pioneer in photosynthesis research, working on the arrangement of chlorophyll and other pigments in the chloroplast membranes of plants and algae. She used the

unique derivative spectrophotometers developed by Stacy French to examine the spectral properties of pigment-protein complexes associated with Photosystems I and II and with the help of the famous French Press (that still exists in the Lab), she was able to purify and characterize some of these pigment-protein complexes. This work was fundamental for the development of our current understanding of light harvesting by photosynthetic organisms. The photosynthesis community at large misses her greatly.



**Fig. 5** A photograph of Jan Brown, taken by Govindjee, in her apartment in Palo Alto (June, 2014). From left to right Rajni Govindjee, Janet Brown, Glen Ford, and David Fork

We remember the wonderful person Jan was with a photograph (Fig. 5) with Glen Ford, David Fork (both long time colleagues), and Rajni Govindjee, who had worked at Carnegie in 1963 (see Govindjee and Govindjee 1965).

Govindjee remembers vividly that it was Brown and French (1959) paper on different spectral forms of chlorophyll *a* that played a very important part in his discovery (Govindjee and Rabinowitch 1960) that a short wave-length absorbing form of chlorophyll *a* (Chl *a* 670) was in the same system as chlorophyll *b* (currently, Photosystem II). Further, it was the same paper of Jan (Brown and French 1959) that had played a crucial part in his work that led to direct observation of different spectral forms of chlorophyll *a* (Cederstrand et al. 1966).



**Fig. 6** A 1976 photograph of the authors of this Tribute to Jan Brown: Winslow Briggs (left) and Govindjee (right)

In the spirit of Janet's interest in photography, we end this tribute by showing our own picture (Fig. 6), taken in August, 1976, in Rome, Italy, at the 7th International Congress, on Photobiology.

Additional material on Jan Brown may be found at the following web sites: <https://dpb.carnegiescience.edu/article/jan-brown-passes-away-august-16th> and [http://globalecology.stanford.edu/people/In\\_Memoriam\\_Jeanette\\_Brown.html](http://globalecology.stanford.edu/people/In_Memoriam_Jeanette_Brown.html).

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