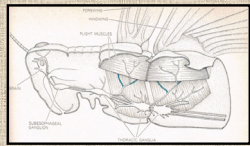


THE SHORT INTENSE LIFE OF DON WILSON: NEUROETHOLOGY PIONEER, ELITE ROCK CLIMBER, ACTIVIST AND ADVENTURER.

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Warren Harding, Jerry Gallwas, Royal Robbins and Don Wilson (1957) – after ascending NW Face of Half-Dome (Jerry Gallwas Collection)

Classics in Neuroethology

Central pattern generation in the control of insect flight.

Donald Melvin Wilson was an extremely influential figure in the nascent field of neuroethology in the late 1950s through 1960s. He remains especially well known for his classic locust-flight studies that conclusively demonstrated the existence of an oscillatory central pattern generating network (CPG) that controlled wing-muscles during flight (*J. Exp. Biol.*, 1961, 39: 643-67), at a time when the “chained reflex” hypothesis for motor pattern generation was still widely favored. The importance of this single paper and his subsequent work in firmly establishing the CPG concept has recently been reviewed in two excellent articles (Edwards, *JEB* 2006, 209: 441-113; Mulloney and Smarandache, 2010, *Front. Behav. Neurosci.* 4: article 45).

Early training: Wilson was born in Seattle on Oct. 6, 1932 and spent most of his life in southern California, receiving his BS in biology from USC and his Ph.D. in zoology from Theodore Bullock's laboratory at UCLA. His 1959 thesis was entitled “Nervous control of muscle in Annelids and Cephalopods” and helped to earn his reputation as an outstanding comparative neurobiologist when it was published as three articles (*JEB*, 1960, 37: 46-56; *JEB*, 1960, 37: 57-72; *Comp. Biochem. Physiol.*, 1961, 3: 274-84.) During this same period in Bullock's lab, he also published one of the very earliest papers to correlate Mauthner axon activity with fish startle behavior, using the African lungfish, *Protoperus* because of the huge size of its Mauthner axons (*Science*, 1959, 129: 841-2). On each of these papers, Wilson was sole author, reflecting Ted Bullock's generosity and principles.

Locust and beyond: After finishing his Ph.D., Wilson moved to Torkel Weis-Fogh's lab in Copenhagen for post-doctoral work (Sept. 1959- Oct. 60), where he began his locust flight experiments. He used an ingenious setup (Fig. 1) which permitted the synchronization of wing muscle or nerve recordings with stroboscopic photographic records of wing position during flight. The insects flew in place, suspended at the end of a pendulum in front of a wind-tunnel. The other end of the pendulum acted as the arm of a double-throw switch that controlled the wind velocity via a servo-mechanism, so that the strength of the animal's forward flight controlled wind speed.

The essential result of Wilson's 1961 JEB paper was the finding that the basic flight motor pattern remained intact following partial complete deafferentation of the wings, showing that movement-related sensory feedback was not necessary for the construction of normal motor patterns, and indicating the existence of a “central nervous pattern generator” (CPG) for neurogenic flight in the locust.

After returning from Copenhagen, faculty appointments followed at Yale (Oct. 1960 – Aug. 61), UC Berkeley (Sept. 1961 – June 68), and Stanford (July 1968 – June 70). The term “central nervous pattern generator” was coined in another significant paper written with one of Wilson's first graduate students at UC Berkeley, Robert Wyman (Wilson and Wyman, 1965, *Bioophys. J.* 5: 121-43.). The period at UC Berkeley also resulted in some of the earliest computational and analog electronic models of pattern generating neural networks (Wilson, 1966, *SEB Symposia*, vol. 20; Wilson and Waldron, 1968, *Proc. IEEE* 56: 1058-64.)

Acknowledgements: Grateful thanks to many gracious people in and around academia who shared their recollections of Don Wilson, including his wife, Nancy, Donald Kennedy (Stanford Univ., Emeritus), Robert Wyman (Yale Univ.), W. Jackson Davis (UC Santa Cruz, Emeritus), Brian Mulloney (UC Davis) and Ingrid Waldron (Univ. of Penn.). Sincere thanks also to Frank Hoover (who was Don's close friend and climbing / rafting partner), Jerry Gallwas (who made many important climbs with Don in the 1950s) Steve Roper, Ken Boche and Don Lauria, luminaries of the rock-climbing Diaspora, for permission to use their photographs and tapes, and to Gail Wilts (daughter of renowned climber and Wilson-friend, Chuck Wilts).

Climbing

Wilson became an extremely skilled outdoorsman and world-class rock climber, beginning in the early 1950s, while an undergraduate biology major at USC. He is still well known amongst the older rock-climbing cognoscenti for a number of perilous 1st ascents, with teams made up of the early elite of the sport (Royal Robbins, Jerry Gallwas, Mark Powell, “Doh” (Bill Feuerer), Chuck Wilts, Frank Hoover, Warren Harding).

Left to right: Royal Robbins, park ranger, Don Wilson (sitting in driver's seat), Jerry Gallwas and Warren Harding signing out for a climb in Yosemite National Park. Note Half-Dome in background. This photo was staged for an article in the Saturday Evening Post, Feb. 25, 1956, but ended up not appearing in the article. (Article titled “They risk their lives for fun.” – his talker, Jack Burton.)

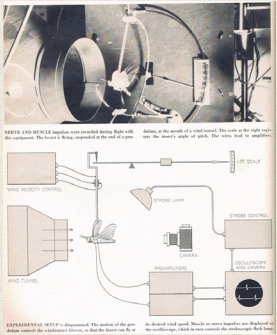
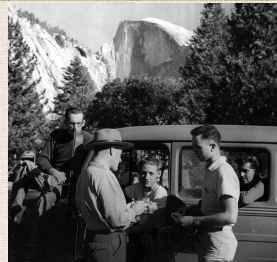


FIGURE 1. Experimental apparatus used by Wilson to record wing position along with nerve and muscle impulses during tethered locust flight. Wing muscle action potentials triggered a strobe lamp, which captured wing position via a camera with an open shutter and permitted synchronization of wing-position with nerve/muscle activity (from Wilson, *Sci. Amer.*, 1968, 218 (5): 83-90.)

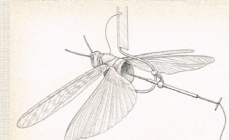


FIGURE 2. Surgically reduced locust preparations, with viscera and varying amounts of their body walls removed, still exhibited wind-induced flight motor patterns, even after movement-related sensory feedback from the wings was reduced or completely abolished (from Wilson, *Sci. Amer.*, 1968, 218 (5): 83-90.)

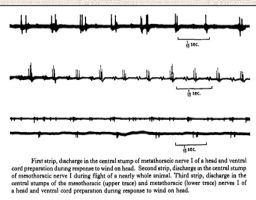


FIGURE 3. Rhythmic flight motor patterns recorded from the central stumps of the metathoracic and mesothoracic nerves in highly reduced locust preparations in which all sensory feedback from the wings had been eliminated (from Wilson, *JEB*, 1961, 39: 643-67.)

Climbing

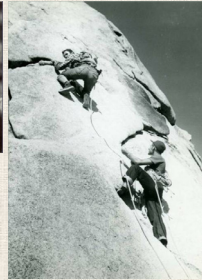
Wilson is best known for his 1st ascents of several sandstone desert towers in the “Four Corners” region of the southwest. These included “Spider Rock” (1956) in Canyon de Chelly, Arizona, “Cleopatra's Needle” (1956) in New Mexico, and “Totem Pole” (1957) in Monument Valley, Utah. He also made several important Yosemite climbs in the early 1950s and devised the YDS (Yosemite Decimal System) with Royal Robbins and Chuck Wilts, which permitted the accurate gauging of difficulty levels for expert climbs on a 5.0-5.9 scale.

FA = First Ascent; FFA = First Free Ascent

- 1952 FFA Open Book 5.9, Tahquitz, with Royal Robbins
- 1952 FA Super Pooper, Tahquitz, with Chuck Wilts, John & Ruth Mendelhall
- 1953 2nd ascent of Sentinel North Face, with Royal Robbins, Jerry Gallwas (2 days)
- 1955 attempted Half Dome NW Face, with Jerry Gallwas, Royal Robbins, Warren Harding (reached 4500 in 3 days)
- 3/1956 FA Spider Rock, with Mark Powell, Jerry Gallwas
- 6/1956 FA Lower Cathedral Rock East Buttress, with Mark Powell, Jerry Gallwas
- 9/1956 FA Cleopatra's Needle, with Jerry Gallwas and Mark Powell
- 12/1956 FA Kat Pinnacle NW Corner, with Mark Powell
- 1957 FA Finger Rock (aka Chimney Rock, now Bill Williams Memorial, 80' tower), with Mark Powell, William Feuerer
- 6/1957 FA Totem Pole (Monument Valley), with Mark Powell, Jerry Gallwas, William Feuerer



Don Wilson, 1956. (Ascent Collection, courtesy of Steve Roper.) At the time, Wilson was a grad student in Ted Bullock's lab at UCLA.



Don Wilson (lower) belaying Frank Hoover in Hidden Valley Campground, Joshua Tree National Park, c.1954-55. Photo by Niles Werner, Barbara Lill Collection, Sierra Club Angeles Chapter Archives.

Spider Rock

800 feet
First ascent made by Wilson, Powell & Gallwas in March 1956. Spider Rock, in Canyon de Chelly, AZ, is the tallest free-standing spire in the world (approx. 2/3 the height of the Empire State Building.)



From Wilson (1957) *The first ascent of Spider Rock*, *Sierra Club Bulletin*, 20(1): 44-49.
“In Canyon de Chelly National Monument in northeastern Arizona is a great sandstone spire. According to the Navajos, who call it Spider Rock, its summit is the home of the Spider Lady. Navajo girls are told that Speaking Rock across the valley informs the Spider Lady of her misdeeds and that she will take them to her home and devour them. The bleached rubble on the summit is supposed to be the bones of bad children. Since the truth of this last statement is testable, it was possible to disprove the legend of Spider Rock by examining the rubble at close range.”

Cleopatra's Needle

250 feet



First ascent made by Wilson, Powell & Gallwas in Sept. 1956. Cleopatra's Needle is located in the “Valley of Thundering Water” in Navajo, NM, on the reservation. The shortest of the 3 major spires, the Needle was the most dangerous because of the extreme softness and friability of the sandstone. The ascent took 4 days, mainly because pitons kept loosening and pulling out.

Totem Pole

465 feet (“800-foot” below incorrect)

From: *Desert magazine* (Sept 1957), pg. 33.

Four Climb Totem Pole Peak . . .

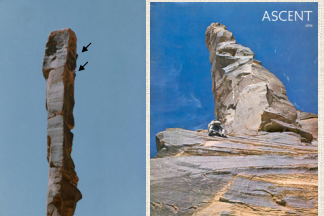
MONUMENT VALLEY — Four expert rock climbers, after four days of grueling and superhuman effort, became the first to reach the 2525-foot summit of the Totem Pole, a slender 800-foot high sandstone monolith. The four were William Feuerer, Mark Powell, Jerry C. Gallwas, and Don M. Wilson of the rock climbing section of the Sierra Club of California. The final assault was made most hazardous when a strong wind swept the desert, swiveling the climbers on their slender lines more than 20 feet out from the sheer wall, and hanging them back again time after time.—*Salt Lake Tribune*



Except from Wilson (1958) *The Totem Pole*, *Sierra Club Bulletin*, vol. 43 (4): 72.

“Several years of effort came to an end last June when Bill Feuerer joined Jerry Gallwas, Mark Powell and me to complete the first ascent of the Totem Pole in Monument Valley. This effort began with an agreement between the three to try to climb what they considered to be the three most important of the Southwest's desert spires: Spider Rock, Cleopatra's Needle, and the Totem Pole. At that time none of the desert's great sandstone spires had been attempted. Both of the first two were climbed on the first try. Spider Rock was highest, Cleopatra's Needle the softest and therefore least safe, but the last turned out to be the most difficult.”

Following this final climb, the group went their separate ways. Wilson completed his Ph.D. at UCLA with Ted Bullock, then moved to Copenhagen to post-doc with Torkel Weis-Fogh and began his seminal locust flight studies.



Left to right: Powell, Gallwas, Doh. Wilson. The puddle was apparently not rain water. From the Doh Collection, courtesy of Jerry Gallwas.

Campus Activism

While at U.C. Berkeley (1962-67), Wilson became one of the major faculty leaders of the Free Speech Movement, the aim of which was to give students the right to organize on campus in support of political causes. He was also close friends with its student-leader, Mario Savio. Wilson named his laboratory the “Sympathetic Ganglion” to indicate solidarity with the FSM (W.J. Davis, pers. com.) and kept a bullhorn in the lab “with which to address student rallies” (Edwards, 2006, *JEB* 209: 4412). Ingrid Waldron, who was one of several Ph.D. students with Wilson at Berkeley, recalled how much she appreciated that he treated male and female students equally, with the same rigor and expectations (I. Waldron, pers. comm.). In 1968, Wilson left U.C. Berkeley for Stanford, following a dispute with his Department Chairman over the use of grades to alter military draft status (Mulloney and Smarandache, 2010, *Front. in Behav. Neurosci.* 4: article 45, footnote 2). He had refused to issue failing grades to students who were in danger of losing their draft deferments. His activism continued at Stanford, where W. Jackson Davis (who had done undergrad research with Wilson at Berkeley, but was then a Postdoctoral Fellow in Don Kennedy's Stanford lab) remembered being “first tear-gassed by a helicopter with Don (Wilson) . . . near the tower.” (W.J. Davis, pers. comm.)



Rafting and the fatal accident

DONALD M. WILSON

On June 23, 1970 Don Wilson drowned in the middle fork of the Salmon River. Don landed his boat on an island and was trying to swim to shore with a rope around his waist. The current swept him to the end of the rope and held him under. His ashes were spread over the middle fork.

During the 1950's Don climbed locally and was DCS Chairman. He co-edited the *Climber's Guide to Tahquitz Rock* (1956). In the late 1950's Don pioneered many routes on the desert towers. The 1970 issue of *ASCENT* (pages 26-32) reviews some of these desert climbs.

Don's first river trip was Glen Canyon, since then he has run many western rivers, usually wearing his own boat.

Mary Wilson and Jim's four children are now living in Stanford, California. Frank Hoover

[Obituary appearing in the rock-climbing newsletter *Mugelinos* (1970-07-15 p.4), written by Wilson's close friend, Frank Hoover, who was also on the fatal trip. Hoover and Wilson had known each other since junior high school.]



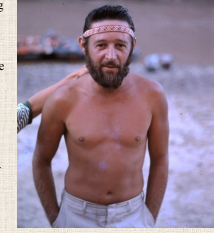
Don Wilson (holding oars) with Marv Stevens and unidentified person, Westwater Canyon, CO, 1969



Don Wilson with captured toad, Colorado River, 1969 (All river photos courtesy of Ken Boche.)

In the 1960s, Wilson developed an interest in white-water rafting. His death came on June 23, 1970 at the age of 37 while rafting the Middle Fork of the Salmon River, in north central Idaho. His partner included Frank Hoover, Marv Stevens, and others. Wilson was at the oars of his raft. Only 2 hours into the trip, they were entering Velvet Falls when one of the rafts flipped over, putting its crew in the water. Seeing this, Wilson ran his raft aground on an island in the middle of the flooded river. He attempted to rescue those who had fallen overboard by swimming to shore from the island. His mistake, which was likely a result of his rock-climbing habits, was to attempt the swim with a rope (the raft's pro-line) tied around his waist. The powerful current drew him down-river and held him under water, taut at the end of the rope. By the time he was pulled to shore, he had drowned (Frank Hoover, pers. com.; Royal Robbins, 2009, *To Be Brave*, pg. 208).

On June 21 (Sunday) of that same week, Tom Brokaw (the NBC News anchor) wrote that same stretch of the Middle Fork (“Mile 82.6 wab-a-k-a. “Redside/Corkscrew”) with another party. Brokaw's closest friend and the tour-guide were both killed when their raft flipped in the fast-running white-water, flooded from recent snow melts. Brokaw wrote about it in *West* magazine, mentioning a “Stanford professor” (Wilson) in this excerpt: “That week the Middle Fork and the main Salmon swallowed six people. On the main Salmon two U.S. Forest Service employees drowned when their pickup truck was forced off the road into the river, and a Detroit teenager was swept away when his kayak capsized. A Stanford professor drowned in the Middle Fork when he attempted to cross the river while attached to a rope. At the time we were unaware of the deaths. When word of our accident spread, two parties behind us which included Sir Edmund Hillary . . . got out of the river at the Flying B Ranch.” (from “That river swallows people. Some it gives up. Some it don't.” (*West*, Nov 1, 1970; pp. 11-18).



Don Wilson, Cataract Canyon, 1969 (Ken Boche)

W. Jackson Davis still has, framed in his home-office, a paper that he discovered on Don Wilson's desk at Stanford shortly after his death was announced. It's an obituary from Franz Kafka, written in Wilson's hand that reads: “From a certain point onward there is no longer any turning back. That is the point that must be reached.”