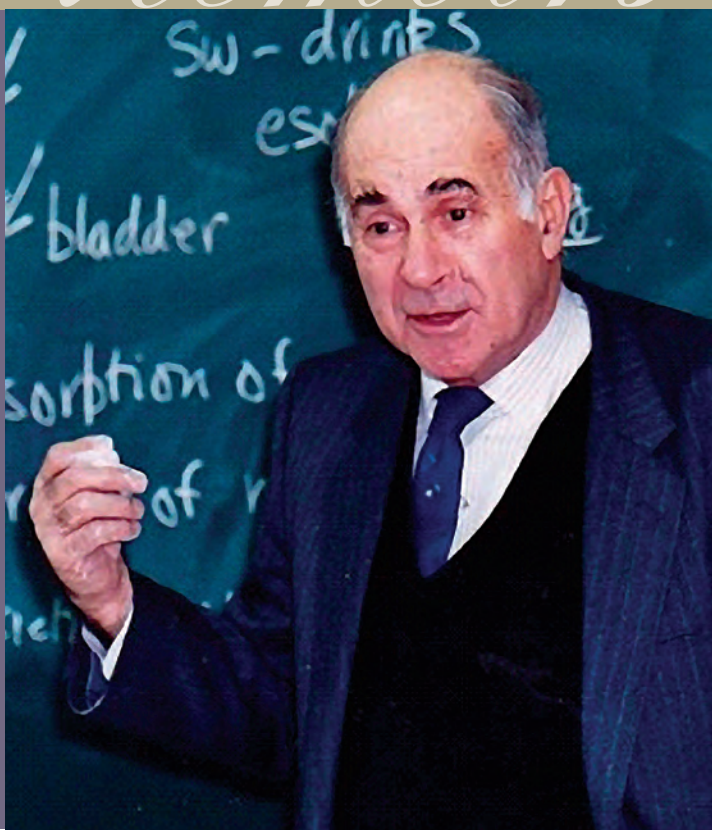
Howard A. Bern

1920-2012

BIOGRAPHICAL *Memoirs*



A Biographical Memoir by
Lynn M. Riddiford

NATIONAL ACADEMY OF SCIENCES

HOWARD ALAN **BERN**

January 30, 1920-January 3, 2012

Elected to the NAS, 1973

Photograph courtesy of Alan Bern

By Lynn M. Riddiford

I first talked with Howard Bern, one of the founding fathers of comparative endocrinology, at the Sixth International Comparative Endocrinology Symposium in Banff, Alberta, Canada in 1971. I had been working in insect endocrinology for six years and had just begun to teach an undergraduate course in comparative endocrinology at Harvard University. Although I belonged to the Comparative Endocrinology Division of the American Society of Zoologists and regularly attended their annual meetings, this international meeting promised to be an excellent place to get up to speed in the vertebrate endocrine field. It was an exhilarating experience. In particular, I found Howard's talk,[1] his questions and comments on the talks, and his willingness to discuss topics with me and other junior colleagues extremely helpful in deepening my understanding of the field. In 1973, I joined the faculty of the Department of Zoology at the University of Washington, where another founding father of comparative endocrinology, Aubrey Gorbman, was located. Not only did he and Howard help organize the International Symposia on Comparative Endocrinology about every four years, but they also organized what became the Western Regional Conference on Comparative Endocrinology. These annual meetings were always attended by Howard and Aubrey and the laboratory heads and were great for enabling our graduate students, postdocs, and ourselves to maintain a broad perspective in comparative endocrinology as well as have an opportunity to present our research with the founders of the field.

Even though Howard was primarily a fish and mammalian endocrinologist, I always appreciated his interest and insights into invertebrate and insect endocrinology. Even when the papers in these areas were not integrated into the program by the type of physiological process being studied, he would come to the invertebrate sessions and ask pertinent questions and often offer novel insights. He had an inquiring mind that knew no boundaries.

I took on the task of writing this memoir for the National Academy of Sciences in 2020 during the pandemic, as I had discovered that somehow one had not been written. I then contacted many of his former students and postdocs as well as colleagues at UC Berkeley and in the Comparative Endocrinology field. Many responded with recollections and photos. What follows is a distillation of that information as well as the result of my digging.

Early Years

Howard A. Bern was born in Montreal, Canada, on January 30, 1920. He grew up in Montreal going to the Protestant English-speaking schools. He described himself as "a very ardent young intellectualized Jewish kid without a hell of a lot of identity beyond the fact that I really enjoyed studying history and the history of the Bible, which we analyzed in great detail.…I got the rabbi's cup for being the best little boy of the year. And the next year after my confirmation I dropped religion completely and I am totally areligious. That applies to all religions. It's part of my own attitude as a scientist."[2] In 1933, Howard and his mother and sister moved to Los Angeles "in the depths of the Depression—we really were essentially Canadian Okies, to use that term, because we couldn't have survived another winter in the cold."[2] His father and half-brother joined them a few years later. His mother went into the real estate business and Howard helped support the family by delivering newspapers and working for a time at Larry's Poultry Farm sales booth selling chickens and eggs (Figure 1).

Figure 1. Larry's Poultry Market in Los Angeles where Howard worked as a teenager. (Picture provided by Alan Bern.)

Howard attended Los Angeles High School, where he had an English teacher, Alma Gunning, who "was marvelous. She taught me English literature, but also supported my desire to be a biologist, pointing out quite incorrectly that I would have of course to be medically trained to be a biologist, which I discovered was incorrect after I had been at UCLA [University of California, Los Angeles] for about three weeks, and that was the end of my pre-med career." His high school chemistry teacher, Mr. Waldrop, was "a member of the Hollywood Anti-Nazi League…a philosophical antifascist… and was

just an intellectually tough guy. He impressed me. Then when I went off to university, I would go to peace rallies…."[2] At UCLA, Howard majored in zoology, receiving his bachelor of arts and master's degrees in 1941 and 1942, respectively.

Figure 2. Howard working while he was in the Army in the South Pacific during World War II. (Picture provided by Alan Bern.)

He then served in the Army during World War II from 1942 to1946 as a parasitologist in the medical support unit of the 5th Air Force in the Pacific theater. The unit was originally organized to combat malaria.[3] According to his son Alan, he was "…in the Philippines, Borneo, and maybe somewhere else though I don't exactly remember what they were studying, tropical diseases I think. Here's a good story: they tended to get a lotta good diseases themselves while in combat—for example, he got some skin problem that never quite went away. And the mosquitoes were fabulous so they sprayed themselves over their entire bodies as much as they could with DDT, all the time. Oh no! That was not a great idea."[4] He published at least one paper during this time concerned with the roundworm problem in the Philippines near their base in Leyte.[5] He also helped a Filipino family financially during this time and sponsored them for a long time after the war. (Figure 2)

After the war, he returned to UCLA for graduate work with Boris Krichesky, a mammalian reproductive endocrinologist.[6] His doctoral dissertation was entitled "The experimental production of sex accessory gland pathologies in the male Dutch rabbit and their relation to urinary phosphatase levels."[7] Richard Eakin of the Department of Zoology at UC Berkeley met Howard in Krichesky's laboratory and "determined there and then that we should have him here at Berkeley."[8] The department hired him immediately after he completed his graduate degree.

Academic Career—Research

In 1948, Howard joined the Department of Zoology at UC Berkeley (it became the Department of Integrative Biology in 1988) as an instructor, rising to professor in 1960. He was also a research endocrinologist in the UC Berkeley Cancer Research Laboratory. From 1962–90, he was chair of the group in endocrinology. At his retirement in 1990,

he was honored with the Berkeley Citation, the campus' highest honor for a faculty member awarded to individuals whose contributions to UC Berkeley go beyond the call of duty and whose achievements exceed the standards of excellence in their fields. He was also commended at this time by the California Legislature in Assembly Members Resolution No. 966.

Howard Bern was both a mammalian reproductive endocrinologist and a comparative endocrinologist par excellence. During his long career, he published more than 600 scientific papers and co-edited seven books. He supervised more than forty-six Ph.D. students, thirty-six master's degree candidates, and thousands of undergraduates and mentored more than ninety postdoctoral fellows and visiting professors in his two laboratories at Berkeley.

Mammalian Reproductive Endocrinology

During the first ten years at UC Berkeley, Howard continued his studies in mammalian reproductive endocrinology but branched out with a few papers on chicken and frog reproductive endocrinology. One of Howard's first graduate students was Louise Arrington (later Boyd), who received her master of arts in zoology in 1951 working on the sources of androgens (the male sex hormones) in chickens (Figure 3).[9] She was reportedly the first African American woman to receive a master's degree in the sciences at UC Berkeley.

Figure 3. Louise Arrington when she was doing a Master's degree with Howard in 1951. (Photo taken by Tyrone Hayes of this picture on one of Howard's Picture Boards that are in the UC Berkeley Bancroft Library Archives.)

Howard is best known for his role in the discovery of the perinatal effects of estrogen causing persistent vaginal estrus in mice and its effects on development of the female reproductive system. In 1952, Noboru Takasugi at the University of Tokyo had first found that giving testosterone to female rats immediately after birth led to abnormal development of the vagina and a state of persistent estrus (sexual receptivity).[10] He then came to Howard's lab in 1960 and began studying the effects of neonatal estrogen treatment on later development of the reproductive system, serendipitously finding that after the initial exposure, the vaginal epithelium retained the "estrus" effects of estrogen in the castrated adult.[11] They also found that these mice showed precancerous lesions in the vagina.[12] At about the same time, another lab had found that

neonatal diethylstilbestrol (a synthetic nonsteroidal estrogen mimic) could cause vaginal cancer.[13] Then in 1970, Herbst and coworkers found that daughters of women given diethylstilbestrol during pregnancy to prevent miscarriages developed vaginal cancer and other vaginal pathologies,[14] leading to the banning of the use of diethylstilbestrol for this purpose in the United States in 1971.[15] This was the beginning of studies on the effects of endocrine disruptors found in the environment on humans as well as on other animals.

Comparative Endocrinology

Although Howard began his career in mammalian reproductive endocrinology, he became fascinated in the 1950s by neurosecretion that was being touted by Ernst and Berta Scharrer as a critically important aspect of endocrine control of reproduction and homeostasis in animals.[16,17] I will highlight a few major themes that ran through his comparative endocrinological studies.

Fish endocrinology. From the 1960s on, Howard's laboratory was best known for its studies of nearly all aspects of fish endocrinology, ranging from osmoregulation to growth control. Throughout this time until he retired in 1990, Howard was aided greatly by coworker and collaborator Richard Nishioka. The paper by Nandi and Bern on corticosteroids in several fish,[18] including tilapia, marked the first of at least 210 papers on fish endocrinology from Howard's laboratory that centered on the tilapia *Oreochromis mossambicus* (previously *Sarotherodan* and earlier *Tilapia*), the long-jawed mudsucker (*Gillichthys mirabilis*), and salmonids.[19,20,21,23] Not all these papers included Howard as an author because he believed strongly in letting his students and postdocs publish on their own as they progressed to independence as researchers.

Urotensin II. Howard is best known for his seminal papers on urotensin and prolactin. Early on in his career, Ernst Scharrer, the "father" of vertebrate neuroendocrinology, sent him a monograph by C. C. Speidel discussing giant secretory neurons in the spinal cords of skates, which Howard later recounted in a retrospective paper.[22,23] Howard later encountered the papers of Masashi Enami of Gunma University in Japan, who was the "first to link the neurosecretory neurons at the posterior end of the teleost spinal cord with the lobular neurohemal organ, the urophysis, and thus define the caudal neurosecretory system of fishes—a remarkable analog of the hypothalamic-neurohypophysial system at the cephalic end of the central nervous system: the cranial neurosecretory system."[23] Unfortunately, Enami died while on his way to give a talk at the 2nd International Symposium on Comparative Endocrinology in Cold Spring Harbor in 1958. As

chair of Enami's session, Howard gave a brief summary of his work and his paper was published.[24] His son Jumpei became a doctoral student of Howard's at the Cancer Lab and encouraged Howard to continue work on the urohypophysial system, which he did starting in 1958–59.[25] Howard and Karl Lederis (then at the University of Bristol and later at the University of Calgary in Canada) became intrigued by the different effects of urohypophysial extracts on smooth muscle contraction and isolated two effectors, the vasodilator Urotensin I and the smooth muscle stimulator Urotensin II.[26] Urotensin I was later shown to be a homolog of CRH (corticotropin releasing hormone). Urotensin II was isolated, sequenced, and synthesized at the Bern laboratory and was shown to be an analog of the mammalian somatostatin.[27] Hubert Vaudry of the University of Rouen, who works on somatostatin and its receptors in various animals from amphibians to mammals, noted:[28]

> *From my point of view, one of the major discoveries Howard made was the identification of Urotensin II. Long thought to be a mere peculiarity of the Teleost Urophysis, Urotensin II was later characterized in the frog brain[29] before being identified in the spinal cord of mammals, including humans.[30]...Urotensin II and its receptor is currently raising the interest of several pharmaceutical companies.[31,32] Urotensin II is, I believe, one of the most remarkable illustrations of the contribution of comparative endocrinology to the discovery of mammalian neuroendocrine systems.*

Prolactin. Prolactin is a peptide hormone secreted by the anterior pituitary (adenohypophysis) that has osmoregulatory action in fish, causes the "water drive" behavior in salamanders, and is necessary for "crop milk" production in pigeons and mammary gland milk production in mammals, along with the regulation of a myriad of other physiological processes. Howard's comparative approach to the study of the action of fish prolactin showed that it could substitute for mammalian prolactin in many but not all of its actions. As he concluded, "In this case [prolactin], it is clear that 'the hormone and the uses to which it is put' have undergone evolutionary change during vertebrate phylogeny."[33] In their memoriam,[34] Grau *et al*. said,

> *...prolactin held a special place in Professor Bern's scholarly life... Notably, 'Prolactin Lunch' seminars, so named because it seemed to many that a week could not pass without considering one or many of the 300 actions that the hormone had been shown to possess. Prolactin Lunch was hosted by Howard along with Professors Paul Licht and Karl Nicoll and was a Friday tradition that stimulated new ideas*

and discussion, and prepared participants to speak to larger audiences. These are remembered with nostalgia by all who were lucky enough to participate and they were not to be missed.

Neurosecretion. Howard's fascination with neurosecretory control of homeostasis and reproduction extended beyond fishes not only to amphibia, birds, and mammals but also to a large number of invertebrates ranging from *Nereis*, a polychaete worm, to insects and to molluscs.[35] With Nishioka and several different collaborators, he explored the ultrastructure of many of the putative neuroglandular organs in these various animals and sometimes found that they were not neurosecretory but rather sensory structures.[54] One such case was the epistellar organ in octopus discovered by J. Z. Young,[36,37] who thought that it was neurosecretory. Nishioka et al. showed that its ultrastructure was typical of a photoreceptor, however.[38]

The Japan Connection

Beginning with his Guggenheim Fellowship in 1951 at the Concarneau Marine Station of the Musèum Naturelle Histoire in Paris and at the University of Cambridge in England, Howard took most of his sabbaticals and shorter research visits abroad. Among the places that he worked were the University of Bristol, England, and the Stazione Zoologica Napoli in Italy (1965–66); University of Kerala, India (1967); Ocean Research Institute, University of Tokyo (1971, 1986); University of Puerto Rico (1973–74); University of Tel Aviv (1975); National Museum of Natural History, Paris (1981); Toho University, Funabashi, Japan (many short visits between 1982 and 1989); University of Hawaii (1958–59, 1986, 1991–93); University of Florida (1991–92); and Hokkaido University (1992, 1994).

Figure 4. Howard and some of his former Japanese students and postdocs. From left to right, M. Nakamura, H.A. Bern, M. Shimizu, T. Iguchi, J. Enami, and Y. Nagahama. (Picture from Yoshi Nagahama.)

His main love was Japan. He first went there in 1961 for the 3rd International Symposium on Comparative Endocrinology at Oiso.[39] The first Japanese colleague to spend time in Howard's laboratory was Hideshi Kobayashi from the University of Tokyo, the start of a stream of thirty-five Japanese endocrinologists at all stages of their career who came to study in his lab. Howard also spent much time in Japan, especially at the Marine Physiology Laboratory of the University of Tokyo, the National Institute for Basic Biology in Okazaki, Hokkaido University, and Toho University. Starting in the late 1980s, he became an informal advisor to the Central Research Laboratory of the Zenyaku Kogyo Company, which was then directed by Hideshi Kobayashi after his retirements from the University of Tokyo and later from Toho University.[40] Not only did Howard enjoy research and discussions with his scientific colleagues throughout Japan for more than forty-five years (Figure 4), but he also enjoyed both Japanese cuisine and collecting Japanese pottery (Figure 5).

Figure 5. Howard at a pottery in Okazaki, Japan, November 12, 1986. (Picture from Yoshi Nagahama.)

Research Honors

Howard was elected a member of the National Academy of Sciences in 1973 and a Fellow of the American Academy of Arts and Sciences in 1985. He also was a Fellow of the American Association for the Advancement of Sciences; California Academy of Sciences; Indian Academy of Sciences; National Society of Science, Arts, and Letters of Naples, Italy; and Accademia Nazionale dei Lincei in Italy. He received numerous honorary doctorates from universities around the world: Doctor of Laws (honorary), University of Hokkaido, Japan (1994); Doctor (honorary), University of Rouen, France (1996); Doctor of Philosophy (honorary), Yokohama City University (1997); Doctor of Science (honorary), Toho University, Japan (2001).

Howard was invited for many visiting lectureships and professorships: Nieuwland Lecturer, University of Notre Dame (1972); Eli Lilly Lecturer, Endocrine Society (1975); Walker-Ames Professor, University of Washington (1977); Transatlantic Lecturer, British Society for Endocrinology (1980); Distinguished Visitor, University of Alberta, Edmonton, Canada (1981); John W. Cowper Distinguished Visiting Lecturer, State University of New York, Buffalo (1984); Watkins Visiting Professor, Wichita State

University, Kansas (1984); the James Visiting Professor, St. Francis Xavier University, Antigonish, Nova Scotia (1986); Visiting Scholar, Meiji University, Tokyo (1986); International Guest Professor, Yokohama City University, Japan (1988, 1995).

Teaching Career

In addition to his prowess in research, Howard was known for both his undergraduate teaching and for his rigorous and compassionate mentoring of undergraduate research students, graduate students, and postdoctoral researchers. As Grau *et al*. wrote in their 2012 memoriam,[41]

> *...every one of his students and associates developed a special kinship that sprang from Professor Bern's genuine caring and support. He was 'Howard' to all. In fact, if one addressed him as Professor Bern, he would reply that if you did not call him Howard, people would think that you didn't like him." He received UC Berkeley's Distinguished Teaching Award in 1972 and was nominated for a National Science Foundation Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring in 2005. Although he did not receive this award, he considered this nomination as a major tribute, according to his son Alan.*

In 1962, Howard coauthored, with Aubrey Gorbman, *A Textbook of Comparative Endocrinology,* the first textbook in this relatively new field.[42] It covered endocrine systems from invertebrates through the lower vertebrates up to mammals. In the preface, the authors write:

> *As the field [comparative endocrinology] has grown in breadth, it has gradually become possible to distinguish the differences and similarities between the endocrine mechanisms of mammals and those of other vertebrates, and even of invertebrates. One may now recognize broad trends of adaptation and evolution in endocrine systems, as well as the role of hormonal mechanisms in ecologic adaptation and in the evolution of species....Endocrinological information now may be applied to the elucidation of general biologic problems as they arise in comparative physiology, in embryology, and in the study of evolution....In this, the first textbook of comparative endocrinology, we hope that he student will recognize the important biologic problems whose solutions may be approached through endocrinologic investigation.*

As Wilhelmi 1962 said in his review,[43] "There are numerous well-chosen illustrations, and the diagrams are simple and clear. It is a pleasure to read a book, intended for students, which takes pains to show how many problems still await solution." This text has remained the fundamental cornerstone of the field of comparative endocrinology despite never being updated. I and my students found the book very readable and useful in the undergraduate endocrinology course I taught at Harvard University in the early 1970s. Selected current papers in the field brought the students up to date on certain topics. Even with the permeation of molecular biology into field in the 1970s and 1980s, this text continued to serve as a foundation for comparative endocrinologists. Later textbooks mainly emphasized comparative vertebrate or invertebrate endocrinology but never both.

Tyrone Hayes and Marvalee Wake wrote in their "In Memoriam"[44] for the UC Berkeley Faculty Senate: "Bern's greatest commitment was to his students and their development. His laboratories embraced diversity in all respects beginning in the late 1940s, long before our current view of diversity was formed. Cultural diversity was never an area of controversy for Bern, as it was a fundamental premise of the inquiring environment. It extended to his supporting students arrested for their political actions as in the case of the Free Speech Movement, which he also supported strongly. Many students report that he bailed them out of jail as part of his support. Students from every U.S. ethnic group and from many parts of the world worked in his labs. Bern's primary teaching responsibility was the course in comparative endocrinology that he inaugurated and maintained with constant updates. He also taught or co-taught a diversity of seminars in endocrinology and cancer biology. He had a direct, well-informed manner of lecturing, coupled with a wry sense of humor."As Bern wrote about creative teaching,

> *I consider creative teaching to lie primarily in the area of individual contact....A one-to-one relationship is indeed of value to the less motivated students, encouraging those of diverse backgrounds to identify with the idea of independent study and to enter domains (academic, professional) that they may have originally considered not open to them. These students often become indistinguishable from those who are initially certain of the paths they wish to follow. In both instances, professor and student learn from each other; it is a two-way interaction. An association becomes a friendship, often lasting far beyond the student's tenure in the professor's laboratory. The differences between professor and student that derive from age, gender, economic status, ethnicity, experience, philosophy, etc., assure that both will be exposed to new ideas.*

Randy Nelson, now a professor at the University of West Virginia, was an undergraduate who took Howard's comparative endocrinology class, then later became a graduate student at UC Berkeley in another laboratory but had Howard on his doctoral committee. He recalls, "Howard was one of the most inspirational professors who I ever met. I first encountered him as an undergraduate student in his Comparative Endocrinology class. His lectures were sufficiently flamboyant to keep us awake and informative to keep us engaged. He wore an ascot and taught us about APUD [Amine Precursor Uptake Decarboxylase] cells. He really loved talking about APUD cells, as well as salmon smoltification, and his class was the first that I had encountered exams that required me to think and synthesize the information that he taught us, as well as design experiments. In short, his exams in both undergrad and graduate courses were designed for students to demonstrate what they knew—not show them what they didn't know. A super great human being and a wonderful mentor, advisor, and friend."[45]

Ernie Chang, now Professor Emeritus at the Bodega Marine Laboratory of the University of California at Davis, spent his senior year doing research in Howard's laboratory. In an e-mail message on August 28, 2020 (personal communication), Ernie says, "I learned 6 critical life-altering guideposts during the years that I was privileged to have known Howard:

1. Be punctual for meetings, especially lab meetings.
2. Be receptive for that serendipitous moment where pure chance may generate a spark of inspiration and creativity. You never know when it will strike.
3. Get to know really smart people. If you are lucky, some of their genius might rub off on you.
4. Work on an experimental animal that is both amenable to manipulation and tastes good to eat.
5. Don't reveal the complete extent of your knowledge.
6. Be sure to follow guidepost 5."

Howard's first graduate student, Raymond Kahn, came to his laboratory in 1948 in his first year as a faculty member. Kahn, then associate director of the Scripps Research Institute in La Jolla, reminisces in his introduction to the American Society of Zoologists symposium in honor of Howard Bern—"Evolving Concepts of Chemical Mediation"—in December 1988:[46]

In retrospect, those five years with Howard…were a critical time in my development….I, like the others who followed under Howard's tutelage, can point to that period in our life where we learned the experimental method, as well as the pain and the glory of writing clearly. How vividly I remember the annotation "rewrite" which appeared frequently across my dissertation—and that was before the convenience of word processing. From Howard, I discovered the joy of discovery and the frustration of getting there; the reality of grantsmanship and the importance of one's colleagues and friends in this arena we call academia.

Christopher Loretz (now associate professor of biological sciences at the University at Buffalo) had Howard on his Ph.D. committee as a graduate student in Malcolm Gordon's laboratory at UCLA, then spent several years as a postdoctoral researcher in Howard's laboratory. Chris wrote in an e-mail message:[47]

My years in the Berkeley laboratory were at a time before word proces-sors, electronic communication and digital libraries. Alerts about newly published papers were sent by Howard as photocopies personally initialed for the recipient, and brief handwritten notes were often delivered with spontaneous thoughts and concerns. And sometimes the word came from Howard's secretary (the organizational term being used at that time) that one's presence was requested. An invitation to Howard's office was usually for some serious and focused discussion that was centered sometimes on scientific matters (experimental data, manuscripts, grant proposals) and sometimes on career direction and job search strategies (especially for the senior postdocs). In his office, one always knew that they had Howard's full attention, and vice versa….Howard was a remarkable mentor in ways beyond the usual. He helped to organize regular intramural meetings such as "Prolactin Lunch" on Fridays in the Life Science Building on the Berkeley campus and "Salt and Water Circle" on an evening monthly in a faculty home. Drawing participation from multiple faculty research laboratories, these were both educational and network-building events well before the advent of social media. And there were the occasional evenings at his home where he and Estelle would host a visiting seminar speaker and provide a congenial venue for students to join for informal discussion…With a final note, let me remark that Howard took a keen interest in both the profes-sional and personal development of his students. Whether it was time

invested in listening to practice talks for a scientific meeting or proofreading a job application letter, his approach was always honest and straightforward. But, when needed, Howard could give direct advice, too, as a caring uncle or aunt might do. Howard grew a generation of colleagues who carry his imprint and who can easily be identified by those "in the know."

Professor Yoshi Nagahama wrote in an e-mail message:[48] "Howard visited my lab in Okazaki many times. In most cases, he spent 2-3 days to interview my students and postdocs (20–30 people) one by one for about an hour. He wrote his comments on hotel stationary! and gave to me. Of course, these comments were very important and useful for both students/postdocs and myself. So, this is another example of Howard's interactions with young scientists, in this case Japanese students and postdocs."

Howard was not only intellectually rigorous but also welcoming and personable and kept pictures of all the research students that worked in his lab on his "picture boards." These are now archived in the Bancroft Library of UC Berkeley.

David Norris of the University of Colorado at Boulder, in his Bern Lecture at the Society for Integrative and Comparative Biology (SICB) characterized Howard's influence as follows: "I noted the many influences of Howard Bern both on my career as an environmental comparative endocrinologist and on the field of comparative endocrinology. Howard was an advocate for both invertebrate and vertebrate endocrine systems although the field has been dominated historically by the study of vertebrates. His influence on the field is greatly magnified by the number of researchers who can trace their academic genealogy directly to Howard or to his many graduate students as well as to a host of postdoctoral fellows that frequented Howard's laboratory."[49]

A colleague in Howard's department at UC Berkeley, Marvalee Wake sent the following:[50]

Another anecdote that tells a lot about Howard is the following: when I first chaired Zoology, one of the things that I did was nominate Howard to be the next year's Faculty Research Lecturer, Berkeley's highest form of recognition for research excellence and contribution to the University. I was delighted to learn that he was selected (two each year, a scientist and a non-scientist usually are chosen). Before the day the Lecturers were to be announced at a meeting of the Academic Senate, I went to Howard's office and asked him to accompany me to the meeting because I needed his "support" for "something." I knew that he HATED Academic Senate meetings, and never went if possible.

After much circuitous discussion, he agreed. We went, he was announced, and we smiled. On the way walking back to our offices, I could tell that Howard wasn't happy. He finally turned to me and said that he'd expected to be recognized for his long efforts to bring in graduate students from under-represented groups, and here it was all about his research! Well, he was right to think that his started long before affirmative action was even thought about, and extended for many years certainly deserved recognition, but the award was for research, after all (the work was mentioned in the nomination letter, but not in the citation that accompanied the award or when he gave his lecture). He never did really get the recognition for his efforts that he deserved from the university, but it really influenced the department, and many former students certainly recognize it.

Stacia Sower, professor emerita in the Department of Biochemistry and Molecular Biology at the University of New Hampshire and a comparative endocrinologist, wrote in her 2005 letter of support for the nomination of Howard for the NSF Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring: "There is no one, in my mind, more deserving of this recognition. Professor Bern is the 'mentor of all mentors.'…Dr. Bern mentored students by setting the standard of excellence with his lectures and discussions at scientific meetings…Although I was never a student of Howard Bern's, his deep 50-year-old friendship and collaboration with Dr. Aubrey Gorbman, who was my postdoctoral advisor, allowed me the opportunity of interacting with Howard for many years. Howard as per his usual generosity insisted that I be a co-author with him on the published 'In Memoriam to Aubrey Gorbman.' This was one small example of how Howard encouraged and promoted the activities of women scientists. Howard Bern's contributions to mentoring women and minorities cannot be overstated, both in his direct activities and in his legacy transmitted through younger scientists for whom he established opportunities."[51,52]

Marilyn Ramenofsky (now an adjunct professor in the Department of Neurobiology, Physiology and Behavior at the University of California, Davis) wrote:[53] "I first met Howard in 1972 just after finishing my MS degree in Zoology at UT Austin, working under Robert Barth in insect neuroendocrinology. I was eager to work and hesitantly walked into Howard's office knowing his name from the Comparative Endocrinology text. He was gracious, funny, and with a demeanor that immediately put me at ease—a true 'mensch.' We quickly found common ground and talked of science, research

possibilities and the opportunity to work on the urophysis. Although I didn't take him up on his offer it proved to be a portal to the future as my path led to avian endocrinology. Over the next 30 years at meetings, we would sit and talk on diverse topics and levels always on positive and supportive terms. I can easily say that Howard had a huge impact on my life as he had for so many."

Figure 6. Members of the International Organizing Committee, Fifth International Symposium on Comparative Endocrinology, Delhi, India, November 23-28, 1967. Front Row, left to right: Maurice Fontaine, Peter Karlson, Louis Gallien, L. S. Ramaswamy, Emil Witschi, Hideshi Kobayashi. Back Row, left to right: Ragnar Olsson, Barker Jørgensen, Howard Bern, Aubrey Gorbman, Jan DeWilde, Vladimir J. Novák, M. R. N. Prasad. (From *General and Comparative Endocrinology, Supplement 2* (1969), p. XIX. New York: Academic Press. Used with permission.

Service to the Scientific Community

Howard Bern and Aubrey Gorbman were the founding fathers of the discipline of comparative endocrinology, not only with their textbook but through fostering meetings of the comparative endocrinologists around the world. The first such meeting occurred in 1954 in the United Kingdom, hosted by Ian Chester-Jones. The second was in Cold Spring Harbor, New York, in 1958 and organized primarily by Aubrey with an international organizing committee consisting of Howard and other comparative endocrinologists from around the world. This symposium has been held nearly every four years since then (Figure 6). Howard was also on the Council of the International Society of Neuroendocrinology (1977–80) and of the Society for Experimental Biology and Medicine (1980–83). In addition, he served on the editorial board of *General and Comparative Endocrinology* from its inception in 1960, with Aubrey Gorbman as editor, until his retirement in 1990. He also served on the editorial boards of several other journals, including *Endocrinology* (1962–74), *Neuroendocrinology* (1974–80), *Journal of Experimental Zoology* (1965–69, 1986–89), *International Review of Cytology, Cancer Research* (1975–78), *Journal of Comparative Physiology B* (1977–84), *American Zoologist* (1978–83), *Acta Zoologica* (1982–96), *Zoological Science, Tokyo* (1984–2002), and *Reviews in Fish Biology and Fisheries*.

Howard was a very active member of the American Society of Zoologists (now the Society for Integrative & Comparative Biology, SICB), serving as its president in 1967. In his presidential address, he not only talked about how in studying comparative biology, things are not always as they seem and one needs to use various methods as well as an open mind when investigating phenomena, but also about the importance of teaching and diversity in research among academics.[54] Howard officially retired at the age of 70 in 1990 but continued to be active in research, publishing his final scientific paper in 2008.

In 2001, the Division of Comparative Endocrinology of SICB established the Howard A. Bern Distinguished Lectureship in Comparative Endocrinology, and Howard gave the first lecture at the SICB meeting in January 2002. Ten years later I gave the Bern Lecture on January 5, 2012, two days after he died, having learned about it shortly before my lecture. It was sad to acknowledge the passing of one of the founders of comparative endocrinology but also uplifting to acknowledge the field's debt to his creative oversight and leadership for the first sixty years of its existence. He was survived by his wife Estelle of sixty-five years. They had two children, Lauren and Alan, six grandchildren, and two great grandchildren.

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