Zootaxa 3599 (6): 549–563
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3599.6.4
http://zoobank.org/urn:lsid:zoobank.org:pub:6DD8A639-A9A4-422A-A2A5-C3354B0DC295

Harry Beal Torrey (1873–1970) of California, USA, and his research on hydroids and other coelenterates

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Abstract

Harry Beal Torrey was born on 22 May 1873 in Boston, Massachusetts. Two years later his family moved to Oakland, California. Torrey earned B.S. and M.S. degrees in zoology from the University of California, Berkeley, in 1895 and 1898 respectively, a Ph.D. in zoology from Columbia University in 1903, and an M.D. from the Medical College of Cornell University in 1927. He began his academic career as a marine biologist, investigating taxonomy, reproduction, morphology, development, regeneration, and behaviour of cnidarians of the west coast of the United States, but his research interests soon shifted to experimental biology and endocrinology. He eventually entered the field of medicine, specializing in public health, and served as a physician and hospital administrator. Torrey held academic positions at the University of California, Berkeley (1895–1912), the Marine Biological Association of San Diego (1903–1912), Reed College (1912–1920), the University of Oregon (1920–1926), and Stanford University (1928–1938). Following retirement from academia, he served as Director of the Children's Hospital of the East Bay, Oakland, California, from 1938 to 1942. In retirement, he continued an association with the University of California at Berkeley, near his home. Of 84 publications by him listed herein, 31 dealt with coelenterates. This paper focuses on his early research on coelenterate biology, and especially his contributions to taxonomy of hydroids. He was author or coauthor of six genera and 48 species-group taxa of Cnidaria, and he also described one new species each of Ctenophora and Phoronida. Although he abandoned systematic work early in his career, his most widely cited publication is a taxonomic monograph on hydroids of the west coast of North America, published in 1902. He died, at age 97, on 9 September 1970.

Key Words: Anthozoa, bibliography, biography, Cnidaria, hydroids, Hydrozoa, marine biology, natural history, taxonomy, zoology

Introduction

Research on hydroids of the Pacific coast of North America commenced in mid-nineteenth century, when four species from the San Francisco Bay area, California, were described by Trask (1857). Subsequent accounts of hydroids from the region prior to 1900 include those of Murray (1860a, b, 1863), A. Agassiz (1865), Clark (1876, 1877), Mereschkowsky (1878), Kirchenpauer (1884), Allman (1885), Fewkes (1889), Marktanner-Turneretscher (1890), Calkins (1899), and Nutting (1899). Yet knowledge of the west coast hydroid fauna remained meagre until early in the twentieth century, when advances were made through investigations of Harry Beal Torrey (1873–1970), Charles Cleveland Nutting (1858–1927), and Charles McLean Fraser (1872–1946).

Biographic accounts of Nutting and Fraser, and their contributions to hydroid taxonomy, have appeared earlier (Schmitt 1948; Arai 1992, 2004; Calder 2004; Calder *et al*. 2009). An overview is given here of the life, varied professional career, and publications of Torrey, an American naturalist and physician whose studies early in his career added materially to knowledge of cnidarians, and especially hydroids, of the west coast of the United States.

Methods

Publications by H.B. Torrey were compiled from citations listed in *Zoological Record* (Vols. 27–110), relevant

Accepted by A. Collins: 27 Dec. 2012; published: 10 Jan. 2013

volumes of the *Matériaux* series by Bedot (1918, 1925), the leptolid bibliography of Vervoort (1995), and *Google Scholar*, as well as from the *Harry Beal Torrey Papers* at the University of California, Berkeley[1]. Chronology of works by Torrey adopted here is based on stated dates of publication, noted in brackets following each reference cited below. Those with no specific publication date other than the year were treated as though published at the end of that year. Articles written by Torrey for various newspapers, especially the *San Francisco Examiner*, and for *Bambino*, a paper of the Children's Hospital of the East Bay (Oakland, California), have been excluded. Names of taxa established by Torrey (Table 1) were taken from his publications and from generic names included in *Nomenclator Zoologicus*. Incorrect subsequent spellings of available names, such as *Campularia* for *Campanularia* Lamarck, 1816 (Torrey 1902d: 53), were not included. A Cited Reference Search of Torrey's publications, conducted using Web of Science, ISI Web of Knowledge, Thomson Reuters Corporation, http://www.isiwebofknowledge.com, was undertaken on 09 October 2011.

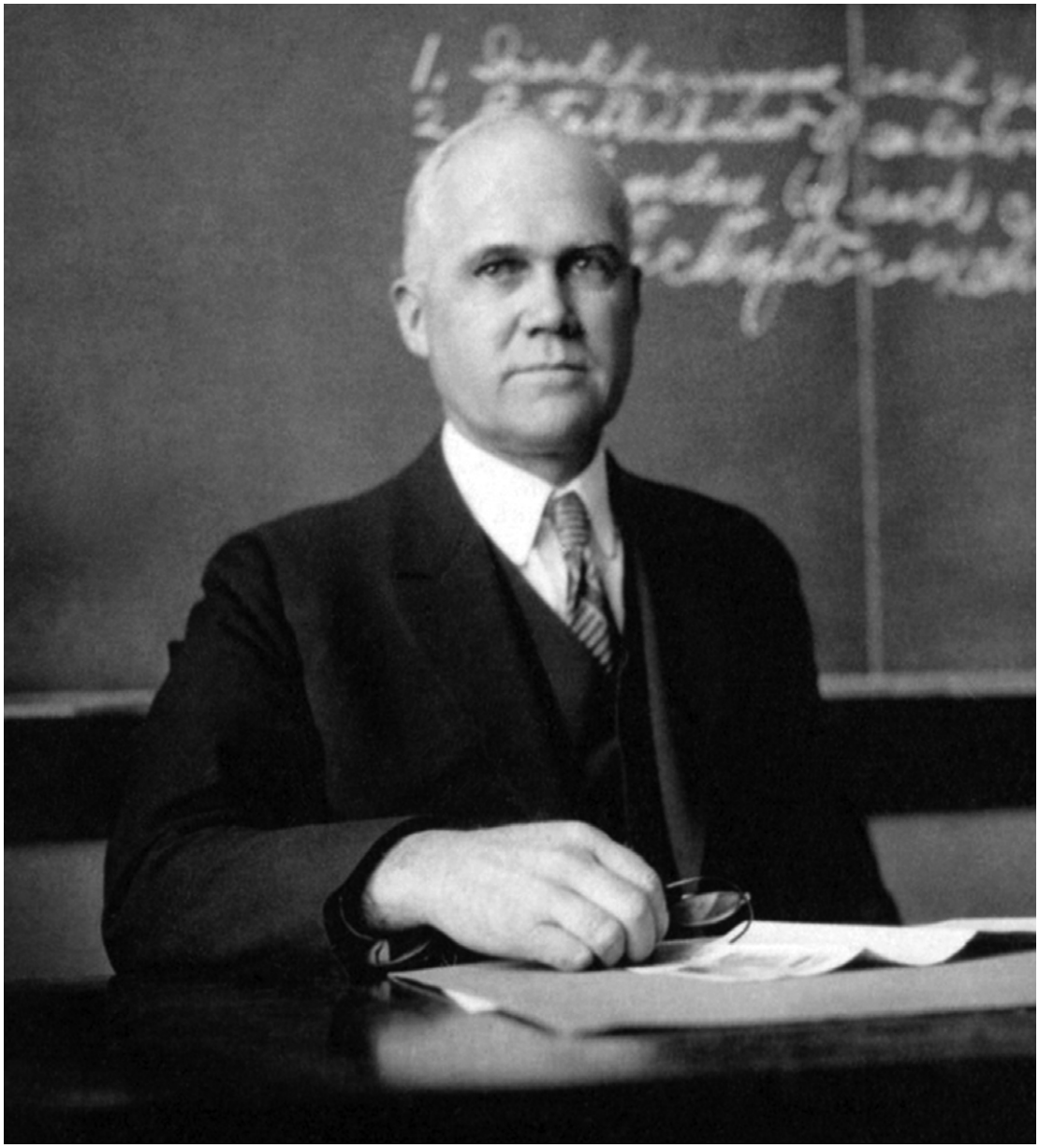

FIGURE 1. Harry Beal Torrey (1873–1970), circa 1924. Photo courtesy of the Marine Biological Laboratory Archives and the Embryo Project, Arizona State University.

1. "Harry Beal Torrey Reprints, 1898–1939": Carton 10, in *Harry Beal Torrey Papers*, 1872–1970, BANC MSS 71/89 c, The Bancroft Library, University of California, Berkeley (hereafter BANC, UCB); *Harry Beal Torrey Collected Papers, Vols. 1, 2*, and *Harry Beal Torrey Papers in Zoology*, Marian Koshland Biosciences and Natural Resources Library, University of California, Berkeley.

TABLE 1. Names established for taxa of Cnidaria and Ctenophora by Harry Beal Torrey. The letter "T" = Torrey. Names with asterisks are currently held to be valid.

CNIDARIA
Anthozoa
Harenactis T, 1902b [type species: *Harenactis attenuata* T, 1902, by monotypy]
Charisea T, 1902b [type species: *Charisea saxicola* T, by monotypy]

**Harenactis attenuata* T, 1902b	California: San Pedro
**Charisea saxicola* T, 1902b	Alaska: Sitka
**Epiactis ritteri* T, 1902b	Alaska: Popof Island
Sagartia davisi T, 1904a	California: San Pedro; San Diego Bay
**Cerianthus aestuari* T & Kleeberger, 1909	California: False Bay, near San Diego
**Cerianthus benedeni* T & Kleeberger, 1909	California: San Diego Bay
**Cerianthus johnsoni* T & Kleeberger, 1909	California: San Pedro Harbor

Hydrozoa
Campalecium T, 1902d [type species: *Campalecium medusiferum* T, 1902a, by monotypy]
**Scrippsia* T, 1909 [type species: *Scrippsia pacifica* T, 1909, by monotypy]
**Tiaropsidium* T, 1909 [type species: *Tiaropsidium kelseyi* T, 1909, by original designation]
**Phialopsis* T, 1909 [type species: *Phialopsis diegensis* T, 1909, by monotypy]

**Bimeria franciscana* T, 1902d	California: San Francisco Bay
**Bimeria robusta* T, 1902d	California: San Pedro
**Eudendrium californicum* T, 1902d	California: San Francisco Bay; Tomales Bay; Pacific Grove
**Hydractinia milleri* T, 1902d	California: San Francisco; Tomales Bay
**Corymorpha palma* T, 1902d	California: San Pedro
**Tubularia marina* T, 1902d	California: Trinidad, San Francisco, Pacific Grove
**Campalecium medusiferum* T, 1902d	California: Long Beach
**Halecium annulatum* T, 1902d	California: south of Coronado
**Halecium kofoidi* T, 1902d	California: San Diego, off Point Loma
Halecium nuttingi T, 1902d[1]	Puget Sound
Campanularia fascia T, 1902d	California: San Diego, Point Loma
Gonothyraea clarki T, 1902d[2]	Alaska: Semidi Islands, Port Moller, off Nunivak Island
**Sertularella dentifera* T, 1902d	California: San Pedro
Sertularella halecina T, 1902d	California: San Diego Bay
Sertularella hesperia T, 1902d	California: mouth of San Diego Harbor
**Sertularia desmoidis* T, 1902d[3]	California: San Diego; San Clemente; San Pedro
Sertularia incongrua T, 1902d	California: San Pedro
**Sertularia traski* T, 1902d	California: San Pedro
**Aglaophenia diegensis* T, 1902d	California: San Diego
**Aglaophenia inconspicua* T, 1902d	California: San Diego
**Antennella avalonia* T, 1902d[4]	California: Catalina Island, Avalon
**Plumularia alicia* T, 1902d	California: San Diego; Long Beach
Plumularia lagenifera var. *septifera* T, 1902d	California: Catalina Island
**Bougainvillia glorietta* T, 1904c	California: San Diego Bay
**Hydractinia californica* T, 1904c	California: off San Diego
**Campanularia hesperia* T, 1904c	California: La Jolla
Obelia corona T, 1904c	California: San Diego Bay
**Clytia bakeri* T, 1904c[5]	Caifornia: Pacific Beach; mouth of San Diego Bay
**Clytia hendersoni* T, 1904c	California: San Diego Bay
**Clytia universitatis* T, 1904c	California: San Diego Bay; San Pedro Bay
**Sertularella pedrensis* T, 1904c	California: San Pedro
**Diplocheilus allmani* T, 1904c	California: Point Loma
**Ptychogena californica* T, 1909	California: off San Diego
**Scrippsia pacifica* T, 1909	California: La Jolla
**Mitrocoma discoidea* T, 1909	California: off San Diego
**Tiaropsidium kelseyi* T, 1909	California: off San Diego northwards to Monterey
Obelia purpurea T, 1909	California: off San Diego
**Phialidium lomae* T, 1909	California: off San Diego

**Phialopsis diegensis* T, 1909	California: vicinity of San Diego
**Eutimalphes brownei* T, 1909	California: vicinity of San Diego
**Irene mollis* T, 1909[6]	California: vicinity of San Diego
CTENOPHORA	
**Euplokamis californensis* T, 1904d	California: San Diego

[1] Replacement name for *Halecium geniculatum* Nutting, 1899, an invalid junior primary homonym of *Halecium geniculatum* Norman, 1867. The name is a junior objective synonym of *Halecium washingtoni* Nutting, 1901

[2] Replacement name for *Gonothyraea hyalina* sensu Clark, 1877 [not *G. hyalina* Hincks, 1866]

[3] Later changed to *Sertularia desmoides* (Nutting, 1904; Torrey, 1904c)

[4] Original spelling: *Antenella avalonia* [erroneous subsequent spelling of *Antennella* Allman, 1877]

[5] Torrey (1909) described the medusa of the hydroid *Clytia bakeri* as "*Phialium bakeri*, n. sp."

[6] *Irene* is an incorrect subsequent spelling of *Eirene* Eschscholtz, 1829

Personal Life

Harry Beal Torrey was born in Boston, Massachusetts, USA, on 22 May 1873. He was a descendant of William Torrey (1608–1690), who immigrated to Weymouth, New England, from Combe St. Nicholas, Somerset, England, in 1640 (F.C. Torrey 1924, 1929). Harry Beal was the son of James Morrell Torrey (1829–1908) and his first wife, Elizabeth Jane White (1841–1884). James Torrey lost his grocery business in Boston after a financial crisis during 1873, and moved with his family to Oakland, California, in 1875. There, he established a successful retail grocery business known as Torrey, Whitman and Gardiner (later Torrey and Gardiner). Harry Beal Torrey had an older sister, two older brothers, and a younger half-sister. His sister, Annie Louise (1863–1863), died in infancy. Frederic Cheever (1865–1935), oldest of three sons in the family, became a partner at Vickery, Atkins and Torrey, a noted California art and interior design firm at the time. The other brother, Arthur Birchard (1869–1957), was variously employed but eventually became an accountant. Harry's half-sister, Janet Stevens (1891–1991), was the daughter of a second marriage of James Torrey to Rosa Francesca Neuer (1856–1940) (F.C. Torrey 1929; Torrey 1941; Thompson 2009). Conflict between Harry and Rosa led to a split in the family and estrangement from his father during the 1890s. Several years passed before Harry and James became reconciled[2].

On 17 July 1902 Harry Beal Torrey married Grace Harbison Crabbe (1876–1939), daughter of Henry Wilson Crabbe and Martha Janet Harbison, in Los Angeles, California. Harry and Grace had met at Berkeley during 1894[3]. Grace Torrey, a writer, published a number of short stories in American magazines such as the *Saturday Evening Post*. The couple had one daughter, Elizabeth Harbison (1903–2000). She, like her father, became a medical doctor (F.C. Torrey 1929; Torrey 1941).

Torrey did not re-marry after the death of Grace in 1939. Commencing in 1952, however, he shared a companionship with Maude Rex Allen (1876–1966) that lasted until her death. Mrs. Allen was the widow of Dr. Lewis Whitaker Allen (c. 1872–1939), a surgeon in San Francisco and New York. Maude returned to California from the east coast early in the 1950s, and her partnership with Torrey brought contentment to them both in their advancing years[4].

Harry Beal Torrey maintained an active lifestyle, both physically and mentally, and he enjoyed a long and full life. While a student at the University of California at Berkeley, he was a member of the track team. Widely considered the best such team in the western United States at the time, the team took a tour in 1895 to compete against eight major universities in the mid-west and eastern parts of the country. Newspaper reports documented Torrey's success in these events. At a meet between California and Princeton University, held 11 May in Princeton, New Jersey, Torrey finished first in the 220-yard hurdles and was second in the 120-yard hurdles (Anonymous, 1895a). At a meet one week later in Philadelphia between California and the University of Pennsylvania, he again won the 220-yard hurdles and tied for first in the 120-yard hurdles (Anonymous 1895b). Other evidence reveals that he enjoyed outdoor activities. Torrey's early diaries indicate that he played tennis and handball[5,6]. In a tribute to

2. Harry Beal Torrey (hereafter HBT) diary, May 1952: Carton 10, BANC, UCB.
3. HBT diary, 1894: Carton 5, BANC, UCB.
4. "Maude Rex Allen," File 1 of 3: Carton 12, BANC, UCB.

Frederick Slate, a close friend and professor of physics at the University of California, Torrey wrote in 1930: "He was a capital companion in the mountains. He loved the open, and strenuous hiking without odds. It was an experience to follow him on an unbroken trail where seasoned muscles and a practiced judgment and a calm and hardy spirit all contributed to speed and success."[7] One of his publications (Torrey 1919b), dealing with mountain sickness, reflects his involvement in mountaineering. He and his daughter Elizabeth were part of a two-week outing on Mount Rainier in the northwestern United States, during which both reached the summit at over 4300 m (Schneider 1919: 306). In addition, he was involved in teaching physical education while on the faculty of Stanford University. As a youth he had tried smoking, but he claimed in a diary report to have quit in 1901 while in his late 20s, believing it exacerbated the eye problems he was experiencing at the time[5]. Yet he is known to have smoked a pipe while aboard the Fisheries Steamer *Albatross* in 1906 during the North Pacific Expedition[8].

A person with an active, inquiring mind, Torrey had many interests outside of science and medicine including philosophy[9], education[10], politics[11,12], religion and spirituality[13], peace and war[14], and sports (especially baseball and college football)[15]. He read widely, and prepared reviews of books and articles in the belief that it helped him more thoroughly grasp the content. Using a typewriter, he kept extensive diaries and notes, along with correspondence and newspaper clippings of current events. Politically, his beliefs aligned predominantly with those of the Democratic Party, although he voted at various times for both of the two major political parties in the United States[12].

Torrey's parents were Unitarians, and he joined a Unitarian church in Berkeley shortly after his marriage[16]. While he attended church off and on throughout his life, and read the Bible and other literature for insights into religion and spirituality, he considered himself a Humanist. Among his notes is this statement: "...I have been conscious all my life of a certain clear interest in the RIGHTEOUS LIFE. This may be a product of the genes inherited from an ancestry of Pilgrims, Puritans, Quakers.... At the same time, I can remember no pressure throughout my life of authoritarian dogmatic morality. I was never asked to, nor have I ever subscribed to any sectarian creed"[17].

Education and professional life

Torrey attended secondary schools in Berkeley, California, and graduated from Berkeley High School in December 1890. He received B.S. and M.S. degrees in zoology from the University of California, Berkeley, in 1895 and 1898 respectively, and was inducted into the Phi Beta Kappa academic honor society. During 1900–1901 he was a Fellow in Zoology at Columbia University in New York City, and he earned a Ph.D. degree from that institution in 1903 under cell biologist Edmund Beecher Wilson (1856–1939)[18]. His dissertation was based on investigations of the natural history, behavior, development, and regeneration of a hydroid he himself had described, *Corymorpha palma* Torrey, 1902d[19]. In 1927, while in his mid-50s, he was awarded an M.D. degree from the Medical College of

5. HBT diary, 1901: Carton 5, BANC, UCB.
6. HBT correspondence, HBT to Grace Harbison Crabbe, 10.ix.1901: Carton 5, BANC, UCB.
7. Addresses Delivered at the Memorial Service for Frederick Slate, 6.iv.1930, http://texts.cdlib.org/view?docID=hb9c6008w6;NAAN=13030&doc.view=frames&chunk.id=div00003&toc.depth=1&toc.id=div00003&brand=calisphere, last accessed 7 October 2011.
8. Austin Hobart Clark Papers: correspondence to his wife Mary Wendell Upham Clark (hereafter AHC to MWUC), 15.v.1906, National Museum of Natural History, Smithsonian Institution (hereafter NMNH, SI).
9. "Ethics": Carton 12, BANC, UCB.
10. "Education": Carton 12, BANC, UCB.
11. HBT diary, 1949–1962: Carton 9, BANC, UCB; HBT diary, 1963–1970: Carton 10, BANC, UCB.
12. Politics and Government": Carton 10, BANC, UCB.
13. "Religion": Carton 12, BANC, UCB.
14. "Peace & War": Carton 12, BANC, UCB.
15. HBT diary, 1964: Carton 9, BANC, UCB; HBT diary, 1965: Carton 10, BANC, UCB.
16. "My Religious Education," p. 4: Carton 10, BANC, UCB.
17. "How I came to Study Animal Behavior," p. 4: Carton 10, BANC, UCB.
18. HBT diary, 1892–1901: Carton 5, BANC, UCB; HBT diary, 1902–1921: Carton 6, BANC, UCB.

Cornell University, Ithaca, New York (Torrey 1941). This marked a return to an original aspiration, inasmuch as he had entered Berkeley with medicine as an intended career. His shift to zoology had come two years later[20].

The academic career of Harry Beal Torrey was varied and noteworthy. At the University of California, Berkeley, he served successively as Assistant in Zoology (1895–1898), Instructor in Zoology (1898–1900; 1901–1904), Assistant Professor of Zoology (1904–1908), and Associate Professor of Zoology (1908–1912). Meanwhile, from 1903 to 1912 he was an original member of the research staff at the biological station of the Marine Biological Association of San Diego. During part of that time he also served as librarian of the station. Established by faculty members at UC Berkeley, including Torrey, the association was initially directed by zoology professor William Emerson Ritter (1856–1944). The modest research station soon gained the interest and financial support of philanthropist Ellen Browning Scripps (1836–1932) and her half-brother, Edward Willis Scripps (1854–1926), a media magnate, and it eventually expanded to become the renowned Scripps Institution of Oceanography, La Jolla, California. In 1906 at the invitation of David Starr Jordan (1851–1931), president of Stanford University, Torrey became a Temporary Assistant with the United States Bureau of Fisheries and a participant in the North Pacific Expedition aboard the steamer *Albatross*. An innovator, Torrey introduced "experimental morphogenesis," the first course in experimental zoology at Berkeley, in 1907. Two years later he divided it into two distinct courses, genetics and developmental mechanics (Eakin 1956).

From 1912 to 1920 Torrey was Professor of Biology at Reed College, Portland, Oregon. Notes reveal that all instruction in his courses there was developed around research[21]. In addition to teaching, his responsibilities at Reed included Director of both the fish hatchery (http://www.reed.edu/alumni/oral_hist_facilities.htm, last accessed 13 August 2011), and the college museum (Bailey 1936: 3). Meanwhile, he served as editor of a Pacific Coast edition of the *Popular Science Monthly* (Torrey 1915a). Torrey's publications reflect the transition in his research from early work on natural history of marine invertebrates to studies in experimental biology and behaviour. Before leaving Reed College in 1920, his interests had broadened further to include endocrinology and medicine. In particular, he was a proponent of public health and an advocate of the prevention of health problems (Torrey 1922a). He was also a pioneer in the teaching of biology and sex education in schools (Torrey 1927a, b; Anonymous 1931). From 1920–1926 he was a member of the faculty at the University of Oregon, serving as Professor and Head of the Department of Zoology (on the campus at Eugene), and as Director of Research in Medical Science and Professor of Experimental Biology in the medical school (at Portland).

While completing his training as a physician at Cornell University Medical College between 1926 and 1928, Torrey was a consultant with the American Social Hygiene Association and served at the Medical Clinic of the Cornell University Medical College in New York City from 1927–1928. He believed a physician had dual responsibilities: to promote illness prevention through care of the body and avoidance of disease, and when necessary to provide treatment. In 1928 Torrey joined the faculty at Stanford University as Professor of Hygiene and Physical Education, and Director of Student Health Services. One of his primary duties there was to care for the physical well-being of male students[7]. From 1933 until his retirement he was also Professor of Biology at that institution.

Information about Torrey in successive editions of the biographical directory *American Men of Science* mirror the changes in his research interests over the years. In the 1906 edition, for example, these were listed as "Methods of reproduction and regeneration of invertebrates compared; experimental evolution and taxonomy among Coelenterata" (Torrey (1906c). In the 1921 edition they were "Taxonomy, embryology, non-sexual reproduction, regeneration and behavior of invertebrates; experimental biology; problems of differentiation" (Torrey 1921). In the 1961 edition they were "Mechanisms of animal behavior; developmental mechanics; invertebrates; effects of thyroxin on cell division and differentiation; interrelations of endocrine organs; history of biology and medicine" (Torrey 1961). The primary focus of Torrey's research papers shifted from natural history of marine invertebrates (1901–1909) to experimental biology and especially physiology, including endocrinology (1910–1939). Meanwhile, his publications also addressed topics in philosophy (Torrey 1913a), public health and medicine (Torrey 1922a, 1927b, 1944), education (Torrey 1927b), and history of science and medicine (Torrey 1938a, b, Torrey & Felin 1937).

19. "My Ph.D.": Carton 10, BANC, UCB.
20. "Medicine," p. 1: Carton 10, BANC, UCB.
21. "Chronology": Carton 10, BANC, UCB.

A strong trend away from systematics was widespread in academia at the time, with the discipline often being dismissed as old-fashioned compared to "modern biology." Such opinions had a negative impact on systematic work of a number of early twentieth century cnidarian biologists, including A.G. Mayer and especially C.C. Nutting (e.g. Calder 2004: 22–23; Stephens and Calder 2006: 18, 96, 116–117). Biology was evolving, advancing, broadening, and becoming more scientifically rigorous, and justifiably so, but the accompanying decline in the status and practice of systematics, one of its most fundamental disciplines, was unfortunate. It is debatable, however, whether negative attitudes towards systematics had much influence on Torrey's research interests. Unpublished notes suggest that he found at least some of his taxonomic work an ordeal: during preparation of a report on leptomedusae (Torrey 1909) in 1908, he commented "I grind at medusae"[22]. Torrey's interests had always been broader than animal classification and nomenclature, as his first publication (Torrey 1898) on non-sexual reproduction in a species of sea anemone reveals. His final works in systematics, on leptomedusae of the San Diego region (Torrey 1909) and on new species of ceranthids from southern California (Torrey & Kleeberger 1909), were published while he was still in his 30s. Indeed, all of his taxonomic publications appeared within the first decade of the twentieth century. Even then, they were interspersed with publications on regeneration, regulation, and non-sexual reproduction (Torrey 1901b, 1907a, 1910b, 1910d; Torrey & Mery 1904), dinoflagellate blooms (Torrey 1902a), animal morphology (Torrey 1902c; Torrey & Martin 1906), ecology (Torrey 1904b), behavior (Torrey 1904a, 1905b, 1907c, 1910c), and differentiation and development (Torrey, 1905a, 1906b, 1907b, 1910a).

In 1937, in a discussion of his interests in biology, Torrey wrote:

> "I don't think I have ever been strongly interested in collecting. I never collected birds or eggs or shells or beetles, etc., to any great extent. I have always liked the out-of-doors; but I do not remember being intensely interested in growing things – in natural history – for its own sake. I have been much more interested in mechanisms than events. Which has led me easily away from taxonomy and descriptive morphology to analytical studies of the factors in variation and differentiation. I'm afraid I have been primarily more interested in general than specific details as such; tho I am of course well aware that the accurate knowledge of details may be the essential basis of generalizations. Bearing out what I have been saying is the fact that my master's dissertation – the first paper I published – was semi-analytical. My doctor's dissertation was fundamentally so. I early was attracted to what Roux named developmental mechanics. And my interest persists. I have always been inquisitive about how things work. Though I did some fairly good taxonomic work 35 years ago as a part of my training, and described perhaps thirty species and published a paper in 1902 that remains a historic basis for studies of west coast hydroids, I introduced into that paper considerations – novel for that day – of the factors governing the growth forms and variation of these plant-like animals.... Names do not interest me. But behavior does, especially the mechanisms of behavior.... It was an accident of circumstance that I became a zoologist before I studied medicine"[23].

Nevertheless, his contributions to taxonomy and to natural history of the California coast remain noteworthy. In addition to descriptions of new taxa of Cnidaria and Ctenophora, Torrey (1901a) in early studies also described a new species of phoronid, *Phoronis pacifica*, from California, the first representative of that small phylum to be reported from the American west coast. It and *Phoronopsis harmeri* Pixell, 1912, originally described from Vancouver Island, are now believed conspecific (Zimmer 2007). Moreover, his report on a dinoflagellate bloom during 1901 (Torrey 1902a) is thought to be the first published account of a red tide in the Southern California Bight (Franks 2003). It described a massive red tide extending from Santa Barbara to San Diego, with accompanying bioluminescence and animal mortalities.

As recorded in the "Cited Reference Index" of "Web of Science", Torrey's publications were cited 396 times from 1899 to October 2011. By far the most frequently cited of his works is the early taxonomic report on hydroids of the west coast of the United States (Torrey 1902d: 61 times). It was his seventh publication, and he was 29 when it appeared. That paper, published more than a century ago, is of continuing relevance in hydrozoan systematics,

22. "Scripps": Carton 12, BANC, UCB.
23. "Autobiographical," extracted from HBT to D.R. Dickey, 26.ix.1937: Carton 10, BANC, UCB.

having been cited at least 10 times in the period between 2006 and 2011. Others amongst his most frequently cited works dealt with effects of thyroxin on domestic fowl (Torrey & Horning, 1922: 29; 1925a: 26), a dinoflagellate bloom along the coast of California (Torrey 1902a: 19), and west coast sea anemones (Torrey 1902b: 19; 1904a: 19).

Studies on Cnidaria

Following his return from the eastern United States with the University of California track team in 1895, Torrey spent 12 days during July at a small cottage in coastal San Pedro, California. It was his introduction to seaside zoology, and he described it as "...packed full of novel and exciting experiences"[22]. Two species in particular attracted his attention, the hydroid *Corymorpha palma* and the actiniarian *Sagartia davisi* Torrey, 1904a. Both were cnidarians, and they kindled his interest in the group. Torrey also began collecting and studying hydroids that year in waters around Oakland, California, and his interests included influences of ecological factors on them. He kept notes of his observations and incorporated many of them in papers he published several years later. The geographic scope of his studies soon extended elsewhere in San Francisco Bay. Nevertheless, Torrey later declared "...my real interest was not in taxonomy. I had an eye for order and system – for housekeeping. But early I was struck with the plasticity of hydroids, their responses to ext (sic) conditions – that often mislead taxonomists[24].

Torrey's (1898) first scientific publication dealt with non-sexual reproduction in the actiniarian *Metridium fimbriatum* Verrill, 1865 [=*Metridium senile fimbriatum*] from Oakland Harbor, California. Four years later, he undertook a detailed study of variation in the genus *Metridium* de Blainville, 1824 as part of research on anemones of the Harriman Alaska Expedition (Torrey 1902b). In the same paper, he described two new genera and three new species of actiniarians, representing the first nominal taxa established by him (Table 1). Two years later, Torrey (1904a) reported on behaviour in the actiniarian *Sagartia davisi* [=*Diadumene lineata* (Verrill, 1869)]. It is not obvious from the paper that Torrey considered it to be new to science and that a name was being established for it. He provided a description of the species, but merely in a footnote. However, criteria of availability of the name *Sagartia davisi* are taken here to have been met in Torrey (1904a) and he is regarded as author of the name. A month later Torrey and Mery (1904) discussed non-sexual reproduction and regeneration in *S. davisi*, but again, they gave no indication that the species was new. Other publications on actiniarians by Torrey (1906a) and Torrey & Kleeberger (1909) provided information on taxonomy of the abundant and widespread west coast actiniid *Bunodactis xanthogrammica* [=*Anthopleura xanthogrammica* Brandt, 1835] and on three new nominal species of cerianthids from California, respectively (Table 1).

In other work on anthozoans, Torrey (1901b) undertook experiments on regeneration and regulation in the shallow-water pennatulid *Renilla reniformis* (Pallas, 1766). His research on it, intended as the foundation of his Ph.D. dissertation at Columbia under E.B. Wilson, was undertaken in part during the summers of 1900 and 1901 on the American east coast at Beaufort, North Carolina. By the second half of 1901 the project had not advanced to his satisfaction, and he changed his dissertation topic to investigations of a hydroid species from California that he knew well, *Corymorpha palma*.

Overall, more than one-third of Torrey's academic publications (31of 84 listed here) dealt with the biology of coelenterates. A majority of these (23 of 31) involved studies of hydrozoans, three of them being landmark taxonomic works on hydroids (Torrey 1902d, 1904c) and leptomedusae (Torrey 1909) of California. In them, he established four new nominal genera and 41 new nominal species (Table 1). Of these, three of the genera (*Scrippsia* Torrey, 1909, *Tiaropsidium* Torrey, 1909, and *Phialopsis* Torrey, 1909) and 32 of the species are still recognized as valid (Cairns *et al*. 2002; Schuchert 2012). Torrey also published a series of papers on biology of the athecate hydroid *Corymorpha palma* (Torrey 1904b, 1905b, 1907b, 1910b, c, d), of various species of the thecate hydroid genus *Aglaophenia* Lamouroux, 1812 in California waters (Torrey & Martin 1906, Torrey 1910a), and of oxygen and polarity in *Tubularia* (Torrey 1912b). In addition, he experimentally investigated differentiation and senescence in the hydroid *Clytia bakeri* Torrey, 1904c (Torrey 1905a). A number of his publications on hydroids were merely abstracts summarizing results of experiments, or correspondence briefly relating observations on certain species (Torrey 1902e, 1906b, 1907a, 1912a, 1927c, 1928d, 1933b, 1934, Torrey & Martin 1912a, b). He also provided a mostly positive review of Mayer's (1910a, b, c) three monographs on medusae of the world (Torrey 1911).

24. "Hydroids, including Experimentation": Carton 10, BANC, UCB.

Of the 32 species of hydroids Torrey described, *Garveia franciscana* (Torrey, 1902d) is perhaps most widely known. An invasive species endemic to brackish waters, it is known from temperate and tropical estuaries worldwide. It is also notorious as a fouling organism (Rincon & Morris 2003; Partaly 2006; Neves & Rocha 2008). Although originally described from San Francisco Bay, California, that is unlikely its place of origin. Possibly identical and a nomenclatural threat to Torrey's better-known species name is *Calyptospadix cerulea* Clarke, 1882, originally described from the Chesapeake Bay area on the east coast of the United States. Exceptionally good illustrations of *G. franciscana*, based on specimens from the Netherlands, appear in a paper by Vervoort (1964).

Torrey and the 1906 North Pacific expedition

On 3 May 1906, the United States Bureau of Fisheries steamer *Albatross* departed San Francisco, California, on a seven-month expedition across the North Pacific Ocean. Departure had been delayed by the great San Francisco earthquake and fire of 18 April 1906. It was to be a perilous and tragic cruise, plagued by storms, rough seas, and the threat of mines from a war that had just ended between Japan and Russia. Lost overboard during the cruise was the ship's captain, Lieutenant Commander LeRoy Mason Garrett (1857–1906) (Dunn 1996). Torrey boarded the vessel on 12 May during a stopover in Seattle, Washington. From there, *Albatross* steamed northwards to Union Bay, British Columbia, for coal. The expedition then made its way to the Aleutian Islands, the Bering Sea, and the Russian Far East before circumnavigating Japan. Torrey disembarked from the ship in Yokohama, Japan, near the end of the expedition, and returned home in September on the steamer *Mongolia*[25]. Correspondence of a fellow scientist on the cruise, zoologist Austin Hobart Clark, 1880–1954, suggests that while relationships on *Albatross* during the expedition were unusually harmonious, Torrey was perceived as having been a loafer and was "unpopular" on board[26]. *Albatross* arrived back in San Francisco on 10 December, having stopped en route in Honolulu, Hawaii[27].

Torrey's primary responsibility during the cruise was to examine and preserve catches and make preliminary lists of invertebrates, and his "...first concern was for the Coelenterata"[27]. Field notes and observations on Cnidaria, together with a diary of the cruise, are held in eleven files at the Bancroft Library, University of California, Berkeley[27, 28]. Several drafts of a narrative of the voyage by Torrey exist in these files, but his account of the cruise was never published. Likewise, he published nothing on cnidarians or any other invertebrate group collected during the expedition. Instead, alcyonarians of the cruise were described by Nutting (1913), and medusae and siphonophores were examined by Bigelow (1913). Hydroids of the expedition were eventually identified by Nutting, but a manuscript that he prepared on them toward the end of his life was never published (Calder 2004). Cnidarians of the North Pacific Expedition, including the hydroids, are housed at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. In his work on medusae and siphonophores, Bigelow (1913) acknowledged Torrey for use of his field notes, and observed that the material was in excellent condition. Notes in Torrey's files indicate he had taken considerable care in preservation of collected material[27]. These notes also reflect mild displeasure with Bigelow for having ignored some of Torrey's observations on the specimens. Nutting (1913) did not even mention Torrey in his paper on alcyonarians of the expedition, although he earlier had named two species of cnidarians in his honour (Nutting, 1905, 1909).

Retirement

After retiring from Stanford University and being appointed Professor Emeritus in 1938, Torrey moved back to Berkeley and became Director of the Clinics and Director of the Children's Hospital of the East Bay, Oakland, California (Torrey 1921; Fletcher 1941). Upon relinquishing administrative duties at the hospital in 1942, he entered private medical practice and declared in correspondence to a colleague (Denis L. Fox), "I have abandoned

25. AHC to MWUC: 08 and 09.ix.1906, NMNH, SI.
26. AHC to MWUC: 13.vii.1906, NMNH, SI.
27. "Japan Voyage, 1906": Carton 10, BANC, UCB.
28. "Field Notes": Carton 10, BANC, UCB.

my administrative duties at the Children's Hospital of the East Bay to devote myself henceforth to the life of the spirit and the medical problems of frail humanity" (Torrey 1961; Foster *et al*. 1999). A subsequent letter by him in the *Journal of the American Medical Association* reveals that he was an early proponent of universal health care in the United States (Torrey 1944). From 1943–45 he served as a consultant to schools of Contra Costa County in California (Torrey 1961). Throughout his career Torrey retained at least a modest interest in natural history, and he served as president of the Western Society of Naturalists in 1915, 1924, and 1937. After retirement he remained active in the Zoology Department at UC Berkeley (Eakin 1956: 75, 80), and often visited the faculty club. However, he did not continue scientific research and ceased publishing scientific articles. While in his latter years he contemplated writing a book, about "life," it was never completed[11]. He died on 9 September 1970, at age 97, of arteriosclerotic heart disease (Anonymous 1970).

Honours and Eponyms

A *Memorial Resolution* (Oliphant *et al*. 1970) passed at Stanford University (Palo Alto, California) honored Torrey as follows: "Harry Beal Torrey liked people and had a warm, ingratiating personality. He was interested in young people and gave generously of his time to students. He frequently entertained students and young faculty in his home and was always ready to share his many enthusiasms and wide-ranging cultural interests. As an undergraduate at the University of California he was interested in athletics and his fraternity, interests he maintained throughout his life.**"**

Four species of cnidarians, *Sertularella torreyi* Nutting, 1905 (Hydrozoa), *Psammogorgia torreyi* Nutting, 1909 (Anthozoa), *Halecium torreyi* Motz-Kossowska, 1911 (Hydrozoa), and *Pachycerianthus torreyi* Arai, 1965 (Anthozoa), are named in honour of Harry Beal Torrey.

Acknowledgements

I thank David Farrell, David Kessler, and James Eason of the Bancroft Library, University of California at Berkeley, for assistance in locating and examining archival material on Torrey. Helpful reviews of my manuscript were received from David Pawson and Lester Stephens. Dr. Pawson also kindly sent comments on Dr. Torrey from the correspondence of Austin H. Clark to his wife while on the 1906 *Albatross* cruise to the North Pacific. Daphne Fautin of the University of Kansas assisted in answering questions related to taxonomy of actiniarians. John Strom of the Carnegie Institution for Science, Washington, D.C., provided a PDF copy of a Torrey paper published in the *Carnegie Institution of Washington Year Book* (1928). Diane Rielinger of the Marine Biological Laboratory, Woods Hole, provided the photograph of H.B. Torrey used herein. This work was supported in part by funds from the Partnerships for Enhancing Expertise in Taxonomy (PEET) program of the United States National Science Foundation.

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