You Can Observe a Lot by Just Watching:

An Homage to Carl Shuster’s Contributions to Horseshoe Crab Biology

Mark L. Botton
Fordham University
Biographical Highlights

• Born November 16, 1919 in Randolph, VT
• B.S., Rutgers University (1942)

• Military service, Europe (1942-1945)
  – Army Infantry (1942-1943)
  – Army Air Force (1943-1945): 27 combat missions, Distinguished Flying Cross
Carl N. Shuster, Jr. Collection

Biographical Information

Name:
Carl N. Shuster, Jr.
State of Birth:
VT
Home State:
VA

Note
This interview was conducted by Veterans History Project volunteers on the National Mall in Washington, DC during the National World War II Reunion: Tribute to a Generation, May 27-30, 2004. Interviews in this group range from one minute to 25 minutes in length.

Gender
Male
Race

Collection Information

Type of Resource:
Audio: Audio Cassette [item] -- Oral history interview
Audio: CD [1 item] -- Reference copy
Interviewer:
Charles Stanhope
Contributor Affiliation/Organization:
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World War, 1939-1945--Personal Narratives
United States. Army.
Cite as:
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(AFC/2001/001/14281), Veterans History Project,
American Folklife Center, Library of Congress

http://memory.loc.gov/diglib/vhp/bib/14281
M.S., Rutgers University (1948)

Thesis: On the gross anatomy and histology of the alimentary tract in early developmental stages of *Xiphosura (=Limulus) polyphemus*
New Jersey Hall on the “Old” Rutgers Campus in New Brunswick, NJ
• Lecturer, Rutgers University (1948-1955)
• Summer Graduate Fellow, WHOI (1949-1955)

• Ph.D., NYU (1955)

Thesis: On morphometric and serological relationships within the Limulidae, with particular reference to *Limulus polyphemus* (L.)
Carl Shuster and specimens he will measure in effort to determine size and growth rates of Limulus at points scattered from Maine to Florida.
The author’s sons compare a living horseshoe crab with its likeness on the sun dial of the Marine Biological Laboratory at Woods Hole, Massachusetts. Photograph by the author.
• University of Delaware (1955-1963)
  – Professor of Biological Sciences and Director, University of Delaware Marine Laboratories

• Washington, DC area (1971-)


• Flow General, Inc. (1984-1988)

• Adjunct Professor of Biological Oceanography, VIMS (1979-)
89 total publications listed in Google Scholar, spanning 67 years!

First one = 1948, On the gross anatomy and histology of the alimentary tract in the early developmental stages of *Xiphosura (=Limulus) polyphemus* Linn. M.S. Thesis, Rutgers University.

Which one of Carl’s papers has the most citations?
• Which one of Carl’s papers has the most citations?

Publications by Carl N. Shuster


Publications by Carl N. Shuster


Other information on publications by Carl N. Shuster

• Carl’s Ph.D. thesis has been cited 45 times!

• Carl’s most cited non-horseshoe crab paper:

A Contribution to the Population Biology of Horseshoe Crabs, *Limulus polyphemus* (L.), in Delaware Bay

CARL N. SHUSTER, JR.
General Research Corporation
Environmental Sciences Operations
McLean, Virginia 22102

MARK L. BOTTON
Fordham University
College at Lincoln Center
New York, New York 10023
Sir David Attenborough
June, 1977 visit to Delaware Bay, NJ with the *Life on Earth* film crew from the BBC

- Original title was “An estimate of the 1977 spawning population of the horseshoe crab, *Limulus polyphemus*, in Delaware Bay”

- Intended journal was *Chesapeake Science*, which ceased publication in December, 1977

- First submitted to *Estuaries* in 1979 (rejected)
- Re-submitted to *Estuaries* ~ 1980 or 1981 (rejected)
Second revised manuscript, now with a new title, was submitted to *Estuaries* in 1985, and accepted. The editor’s cover letter stated that:

“One reviewer rated your manuscript fair, requiring minor revision, and the other rated it fair, not acceptable with any revision...Given the long history of this ms., many reviewers clearly have had problems with it...”
Shuster & Botton (1985)

- Shoreline surveys of spawning adult HSC’s ("back-of-the-envelope" estimates)

- Approximating the number of spawning females from densities of egg clusters

- Number of eggs per cluster

- Number of eggs in gravid females
“Significantly, the present center of spawning activity is along a beach largely undisturbed by man. Activities which alter or destroy beaches will ultimately have a negative impact upon populations of horseshoe crabs.” (p. 370)
“Limulus polyphemus is a slow growing animal... Once a population of this species is established it may therefore be more stable than a shorter-lived species. Conversely, if heavily harvested, it may take longer to repopulate an area.” (p. 370)
“Life table statistics are not available, especially for the several age classes of young Limulus. Should the need for management...arise, statistics on the fate of the young will be required in order to predict the effect of fishing and other pressures on populations.” (p. 371)
Carl Shuster and the Flourishing of International Cooperation: Visit to Delaware Bay in 1989 by Dr. Sekiguchi and Students
1994 visit to Japan by Shuster and Botton, guided by Koichi Sekiguchi, Hiroaki Sugita, and others
Examining *Carcinoscorpius* at the Shimoda Marine Laboratory, 1994

With Hiroaki Sugita, Tomio Itow, and Koichi Sekiguchi, 1994
With Koichi Sekiguchi at the entrance to the Kabutogani Museum in Kasaoka City, Japan in 1994
With Koichi Sekiguchi in Imari, Japan in 1994, admiring the HSC tile on the sidewalk

We were especially intrigued by the double pair of claspers in *Tachypleus* males, compared to the single pair in *Limulus*.
Horseshoe Crab Conservation Goes International
ISSCHC 07 Program

11-14 June 2007
Dowling College, Oakdale
New York, USA


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International Symposium on the Science and Conservation of Horseshoe Crabs
Long Island, NY
June, 2007
Other speakers will discuss Carl’s significant contributions to HSC management and public education.
Louis Agassiz: “Study nature, not books”
Yogi Berra: “You can observe a lot by just watching”
Carl has always stressed the importance of long-term observations of nature.

This was the typical scene south of the Rutgers University Cape Shore Laboratory ca. 1980.
The same region in May, 2016
A little further to the south, in May, 2016
The beach directly in front of the Cape Shore Lab itself – the very beach where I first met Carl in 1977!
Carl’s keen observations and insights about HSC’s have been indispensible.

Thank you for your inspiration, guidance, and friendship!