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BIO-OCEANS ASSOCIATION NEWSLETTER

Issue 44, October 2009

FROM THE PRESIDENT

Fall has fallen upon us! Actually, autumns in Nova Scotia are absolutely beautiful and, after a pretty damp summer, we can only rejoice that fall has arrived. Here is a quick overview of happenings in and around our Association.

Over the summer, the Association held two social events. The first was on 8 July to the Memory Lane Heritage Village in Lake Charlotte on the beautiful Eastern Shore. By all accounts, it was a fun and rewarding afternoon. The second was the Association's annual summer picnic on 20 August at Bob and Heather Cook's residence in Portuguese Cove. The weather was glorious, the location awesome, and the turnout great. Check out the photos and report of the event inside this newsletter (see pages 8 and 9).

Regarding upcoming events, the big one this fall is the Hudson-70 celebration from 16 – 19 November. The organizing committee has prepared a full slate of activities including a public lecture by Peter Wadhams the evening of the 16 November, a full day of CCGS *Hudson* tours, ceremonies, luncheon, dignitaries' meet-and-greet on 17 November, science seminars on 18 November, and *Hudson's* departure on 19 November. Check out the full schedule inside this newsletter as well as on the Association's website.

On a related note, Clive Mason recently circulated video clips taken by Iver Duedall on the Hudson-70 cruise. These clips are on YouTube at this site: www.youtube.com/results?search_query=duedall001&search_type=&aq=f.

They make really interesting viewing – a true bit of history.

The Association has also organized a wine tour on 7 October. The festivities start at the Sainte Famille Wines in Falmouth, then move on to the Muir Murray Estate Winery. Lunch is at the Port Pub in Port Williams, which is followed by a trip to the Blomidon Estate Winery at Habitant Vineyards Winery in Canning and the Domaine de Grand Pré winery before starting home. .

Outside the Association, a notable event is the Darwin celebration by Dalhousie University, the Maritime Museum of the Atlantic, and BIO during 14 – 17 October and 20 November (see p.2 for details). The free lectures are open to the public and include a philosopher from Toronto (Dr. Ian Hacking), an historian from Harvard (Dr. Janet Browne), a geneticist from Stanford (Dr. Marc Feldman), and an evolutionary biologist from Rutgers University (Dr. Paul Falkowski).

Bosko has recently updated the Association website so check it out – lots of good stuff there. I found the historical fisheries reports, which go back to the 1890s most interesting.

In addition to our regular columns (e.g., *Noteworthy Reads* by David Nettleship), there are lots of great articles in this issue.

I wish everyone a wonderful fall and hope to see you at the upcoming events.

— Bob O'Boyle

CONTENTS

THE JOY OF DARWINIANA

The Continued Celebration of Charles Darwin in Words and Music on His Bicentenary 2009

As part of the 2009 bicentenary celebration of Charles Darwin's birth and the 150th anniversary of the publication of "*On the Origin of Species By Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*" in Halifax, Nova Scotia, is the continued presentation of special seminars and chamber music as a tribute to Darwin and his unprecedented contributions to science and mankind. Join us for four seminars, three at Dalhousie University (14-16 October) and one at BIO (20 November), on "*The Idea of Evolution*", and a musical performance at the Maritime Museum of the Atlantic on "*The Origin Cycle*" (17 October). All presentations are free and open to the public (details below) -- A joyous celebration of Charles Darwin and his accomplishments!

Calendar of Events:

"The Idea of Evolution"

(Note: Lectures on 14-16 October (8:00 pm): Ondaatje Hall – McCain Building, Dalhousie University, 6135 University Avenue, Halifax, NS; Lecture on 20 November (tentatively at 10:30 am) : Main Auditorium, Bedford Institute of Oceanography, 1 Challenger Drive, Dartmouth, NS)

14 October 2009:	Dr. Ian Hacking (University of Toronto & Sorbonne University, France) "THE TREE OF KNOWLEDGE"
15 October 2009:	Dr. Janet Browne (Harvard University, USA & Cambridge University, UK) "200 YEARS OF DARWIN"
16 October 2009:	Dr. Marc Feldman (Stanford University, USA) "DARWIN AND THE HUMAN GENOME"
20 November 2009:	Dr. Paul Falkowski (Rutgers University, USA) "THE EVOLUTION OF THE ELECTRONIC BLUEPRINT FOR LIFE ON EARTH"

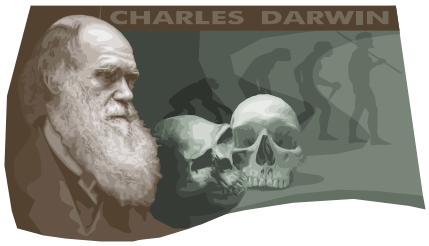
"The Origin Cycle"

(Concert at 8:00 pm, Maritime Museum of the Atlantic, 1675 Lower Water Street, Halifax, NS)

17 October 2009: Canadian Premier of "THE ORIGIN CYCLE" – Six new compositions for chamber orchestra and soprano, based on passages from Charles Darwin's "On the Origin of Species", by a 7-piece ensemble and soloist (seating is limited, to reserve call: 422-1271, ext. 200).

THE FINALE

24 November 2009: 150th Anniversary of the appearance of "On the Origin of Species" Let the cheers and fireworks begin in celebration!



Noteworthy Reads: Book Reviews in Brief

David N. Nettleship
Book Review Editor

The ***Noteworthy Reads*** section is an effort by BIO-OA to produce a representative list of recent noteworthy book publications related to the marine sciences and other subjects of general interest. The listing is not intended to be comprehensive or complete, but merely an attempt to highlight a number of 'good reads' that may be of interest to OA members and associates. Most books listed are available at local bookstores and public libraries. Book prices are regular retail in Canadian funds, but discounts of 20-30% are normally available on line at: e.g., amazon.ca or chapters.indigo.ca. Contributions of book reviews to 'Noteworthy Reads' are welcome – send via e-mail to David Nettleship: dnnlundy@navnet.net (phone: 902-826-2360).

Special Publications In Celebration of the Darwin Bicentenary and the 150TH Anniversary of the Appearance of "On the Origin of Species": 24 November 1859

Selected Letters of Charles Darwin

Burkhardt, Frederick (ed.). 2008. Origins: Selected Letters of Charles Darwin, 1822-1859 (Anniversary Edition). Cambridge University Press, Cambridge, UK. 286 pp. Hardcover, $30.95 (ISBN 978-0521898621).
Burkhardt, Frederick, A.M. Pearn and S. Evans (eds.). 2008. Origins: Selected Letters of Charles Darwin, 1860-1870. Cambridge University Press, Cambridge, UK. 336 pp. Hardcover, $30.95 (ISBN 978-0521874120).

What better way to pay tribute to Charles Darwin -- the 200th anniversary of his birth in Shrewsbury, England, on 12 February 1809, the extraordinary brilliance of the man and his scientific accomplishments, and the 150th anniversary of the publication of his "On the Origin of Species" (24 November 1859) – than through his own letters to family, friends and scientific colleagues worldwide? The collection presented in these two books, carefully selected by the late Frederick Burkhardt, renowned Darwin historian and founder of the Charles Darwin Correspondence Project and associated monumental multi-volume Cambridge University Press book series "The Correspondence of Charles Darwin", provides a fascinating firsthand insight into Darwin the man both before and after the appearance of the "Origin". These letters, written to and by Darwin, reveal the complexity of his personality, his incredible curiosity and struggles in the interpretation of his scientific findings, and his passion for truth and love of nature. To read this correspondence is uplifting. Overall, they present a clear demonstration of a man of true principle and a scientific community of integrity.

General Reviews

(A selection of recent books about or inspired by Charles Darwin; also see OA Newsletter Issues 41-43 for other recent Darwin titles)

Berra. Tim M. 2008. Charles Darwin: The Concise Story of an Extraordinary Man. John Hopkins University Press, Baltimore, MD. 144 pp. Hardcover, $23.95 (ISBN 978-0801891045). – Here is a small gem of a book that provides a thorough, though concise, summary of Charles Darwin the man -- scientist, husband, father and friend – by renowned evolutionist and ecologist Tim Berra. This attractive work, with 20 colour and 60 b&w carefully selected illustrations to augment the well-written text, reviews Darwin's revolutionary scientific publications – including his masterwork, the "On the Origin of Species" -- and their impact, both past and present, on Western culture and the scientific community. Overall, an excellent short examination of Charles Darwin the person and the grand idea that changed the world and modern-day biology.

Costa, James T. 2009. The Annotated Origin: A Facsimile of the First Edition of On the Origin of Species (by Charles Darwin). Belknap Press of Harvard University Press, Cambridge, MA. 537 pp. Hardcover, $42.50 (ISBN 978-0674032811). – This edition by Belknap Press has been praised by reviewers as the best of the 150th anniversary editions that have appeared in 2009. It is an annotated text of the first edition of the "Origin", putting side by side a facsimile of Darwin's publication with an extensive page-by-page commentary by James Costa, a distinguished field naturalist and evolutionary biology scholar and teacher. Costa does a wonderful job of annotation. In more than 900 marginal notes, he explains, expands and updates what is said about evolution and causal relationships, and by doing so, provides readers with a much greater appreciation of Darwin's genius and breadth of knowledge. The separation of the notes from the text, restricting them to the outside margins, allows the original text to be read without distraction if desired, or selectively consulted when necessary. This edition is certainly for the Darwin scholar and for working biologists, but it also makes the content of "On the Origin of Species" easily accessible to all readers. A masterpiece production!

Coyne, Jerry A. 2009. Why Evolution is True. Viking, New York, NY. 282 pp. Hardcover, $31.00 (ISBN 978-0670020539). – Jerry Coyne is a biologist specializing in evolutionary genetics and leader in our understanding of the genetic changes that occur when species are formed. This volume was generated by the recent resurgence of religious fundamentalism in United States and elsewhere – the belief in divine creation of the earth and all living things within the last 10,000 years – and the need, as viewed by the scientific community including Coyne, that the time had come to present the incontrovertible evidence of evolution as a physical fact of the history of life on earth. Few scientists are more qualified to give an account of evolution, and Coyne's book has been applauded by the scientific community as being the best general explanation of evolution that has appeared for students and the lay public. It should be of immense value to educators to show that evolution matters, and instead of being afraid of its implications, we should rejoice in the knowledge of where and how we came to be, a part of a wondrous web of life that has arisen from four billion years of evolution. Coyne shows clearly that evolution does not destroy the beauty of life, but enhances it.

Desmond, Adrian and James Moore. 2009. Darwin's Sacred Cause: Race, Slavery and the Quest for Human Origins. Allen Lane (Penguin Books), New York, NY. 485 pp. Hardcover, $39.00 (ISBN 978-1846140358). – This scholarly work by two celebrated Darwin biographers extends their examination of the man beyond their multiple award-winning 1991 biography "Darwin". Here they attack the big question left unanswered from their earlier work: "Why did such a rich and impeccably upright gent go out of his way to develop such a subversive and inflammatory image of human evolution? He had everything to lose!" Through rigorous research and examination of Darwin's previously unavailable private notebooks, unpublished family correspondence, manuscripts, rare works and other archival materials, the authors present the thesis that the development of Darwin's theory of evolution and human origins was rooted in his lifelong opposition to slavery. They argue that his anti-slavery upbringing combined with firsthand observations led to his 'common descent' approach to evolution culminating in the family 'tree of life' and the belief that all life forms share a common ancestor. The evidence presented in support of their view is impressive, and does provide a new view of Darwin and his classic works from "On the Origin of Species" (1859) to "The Descent of Man" (1871). "Darwin's Sacred Cause" certainly stands out as a major contribution to the worldwide celebration of Darwin's bicentenary in 2009.

Gopnik, Adam. 2009. Angels and Ages: A Short Book about Darwin, Lincoln, and Modern Life. Alfred A. Knopf, New York, NY. 211 pp. Hardcover, $27.95 (ISBN 978-0307270788). – On 12 February 1809 two babies were born an ocean apart: Charles Darwin on an English country estate owned by a wealthy doctor and Abraham Lincoln in a one-room Kentucky log cabin belonging to a poor country farmer. In this book, award-winning essayist Adam Gopnik, long-time writer for "The New Yorker" magazine, provides an eloquent and elegant personal and intellectual portrait of each man. Through that stimulating and exciting process, the importance of the scholarship and philosophical thought of these two great men and a comparison of their amazing accomplishments – icons of evolution (Darwin) and emancipation (Lincoln) – clearly support the author's thesis that these two men established 'moral modernity' and thrust the world into a more enlightened age. Gopnik's writing is rich, rewarding and a joy to read, and without question, "Angels and Ages" stands as a significant contribution to the world's celebration of the bicentennial of the birth of Darwin and Lincoln and the enormous change they brought to the world.

Milner, Richard. 2009. Darwin's Universe: Evolution from A to Z. University of California Press, Berkeley, CA. 496 pp. Hardcover, $47.95 (ISBN 978-0520243767). – This volume by Richard Milner, a revised and updated successor to his earlier acclaimed "Encyclopedia of Evolution" (1990), is a treasure of information on evolution and natural history. It is a browser's delight, with entries arranged alphabetically that provide succinct, comprehensive, summaries of a multitude of subjects on evolutionary biology and related topics. The information given is presented in an exciting and entertaining manner, supplemented by hundreds of illustrations – from rare photographs and paintings to hilarious cartoons – in the margins that highlight key points brought out in the text. For anyone wanting a sourcebook of easily accessible facts on virtually all aspects of evolution and natural history, this book is the one to have on the shelf. It is a magnificent scholarly work that will appeal to a wide audience and makes learning a fun-filled and enjoyable experience!

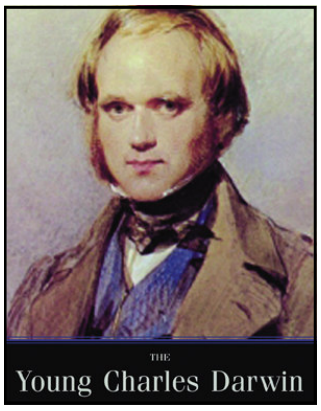
Padel, Ruth. 2009. Darwin: A Life in Poems. Chatto & Windus (Random House), Toronto, ON. 160 pp. Hardcover, $22.00 (ISBN 978-0701183851). – What could be more fitting as part of the celebration of the Charles Darwin bicentennial than a work by his great, great grand-daughter and acclaimed poet, Ruth Padel? In this collection of new poems, Padel, a prize-winning poet and journalist, gives a highly intimate and original interpretation of the life and work of her famous relative. In a moving tribute to Darwin, she not only follows the development of his scientific genius

and discovery of evolution and natural selection, but also pays particular attention to Darwin as the tender father and husband, considerate and private person. The conflict between his science and the religious views of his wife Emma is addressed, as is an analysis of the likely emotional impact it had on his health. Altogether, this book of poetry portrays a very special account of Charles Darwin's life, to be read and enjoyed by everyone.

Secord, James A. (ed.). 2008. Evolutionary Writings: including the Autobiographies. Oxford University Press, Oxford, UK. 496 pp. Hardcover, $26.95 (ISBN 978-0199208638). – This compilation of Charles Darwin's most important major works – "The Journal of Researches on the Beagle Voyage" (1845), "On the Origin of Species" (1859), and "The Descent of Man" (1871) – and his short autobiography (1887) into a single volume provides an easily accessible and grand introduction to Darwin the naturalist and scientist, and the development of evolutionary theory and the origins of mankind and other life forms. James Secord, Darwin scholar and natural history historian, adds an insightful introduction that outlines the wide-ranging significance of Darwin's works from their impacts on Victorian society to modern biology and sociology. To provide a complete picture, Secord has provided an abundant cross-section of responses from Darwin's 19th century readers which show vividly the controversial nature of the debate concerning his ideas of man's place in nature. In addition, there is a section of explanatory notes, and both a biographical index and general index. Overall, an excellent introduction to Darwinian evolution, its history, and significance to the world.

Simons, Eric. 2009. Darwin Slept Here: Discovery, Adventure, and Swimming Iguanas in Charles Darwin's South America. Overlook Press, Woodstock, NY. 258 pp. Hardcover, $26.50 (ISBN 978-1590202203). – Eric Simons, a recent graduate of the environmental and science program at the University of California (Berkeley), has given Darwin students an exciting and timely treat. After visiting Ushuaia, Argentina, and hiking through the mountains overlooking the Beagle Channel and reading Darwin's "The Voyage of the Beagle" (1845), the author decided to retrace Darwin's travels in South America. The mission was to visit as many of the locations visited by Darwin close to 180 years earlier, and attempt to view them through Darwin's eyes. What is produced is a refreshing new portrait of the young Darwin, the 20-something naturalist, showing his enthusiasm and immense powers of observation and analysis, skills that culminated in one of the most incredible discovery's made by humankind: the origin of species including *Homo sapiens* — a most exhilarating and entertaining read! As a bonus, Simons' book invites comparison, not only with Darwin's account of his travels in South America, but also against several contemporary works including: E.L. Bridges' "Uttermost Part of the Earth" (1949), B. Chatwin's "In Patagonia" (1977), J. Campbell's "In Darwin's Wake" (1997), D. Murphy's "Rounding the Horn" (2004), and the academic work by R. Darwin Keynes "Fossils, Finches and Fuegians" (2003). Comparisons are demanding, but what a thrilling adventure to trace descriptions of landscapes and people from Darwin's early observations through the nineteen hundreds into the 21th century, identifying changes that have occurred. Certainly, an exciting armchair voyage of discovery!

Thomson, Keith. 2009. The Young Charles Darwin: Influences and Ideas. Yale University Press, New Haven, CT. 288 pp. Hardcover, $28.00 (ISBN 978-0300136081). – This is a 'must' book for every student of Charles Darwin and for any library of Darwiniana. Hundreds of volumes have been written about Darwin, justifiably so, given his many scientific accomplishments and impact on the world, particularly his theory of natural selection which provided the explanatory mechanism for evolution. Most books on Darwin focus on the social, political, and religious context of Darwin's life and its influence on his thinking. Here, natural history scholar Keith Thomson delves into Darwin's early life, and to use his words "… to inquire into the range of influences and ideas, the mentors and the rivals, and the formal and informal education that shaped Darwin's thoughts on the subject of evolution". The result is an outstanding work that fills a glaring gap in our knowledge of Darwin during his formative years and the influences that shaped him. Never before has such a detailed examination been made on the science environment of Darwin's youth and his changing scientific ideas, changes that reveal the exceptional genius and creativity of Charles Darwin as a young naturalist and scientist. This scholarly work is fresh, stimulating and lively, a book to be read and absorbed by all students of natural history and life on earth.



THE HUDSON-70 EXPEDITION

D.L. McKeown

During a discussion at the bar on *CCGS (nee CSS) Hudson* one evening in February 1967, Bill Ford, Ced Mann, and Captain Walter Kettle conceived the ambitious idea of having the ship undertake a year long oceanographic expedition around the Americas. It would allow Canadian oceanographers an opportunity to explore and compare oceanic properties of three different oceans, the Atlantic, Pacific, and Arctic, aboard a vessel well suited to the task; and it would be an historic first as no ship had ever circumnavigated both continents before. Less than a year later, after rapid and enthusiastic approval by senior departmental bureaucrats and the Minister of Energy, Mines and Resources, on 19 November 1969 the ship departed on this historic voyage.

Hudson first sailed south through the North and South Atlantic to the vicinity of South Georgia stopping along the way at Rio de Janeiro and celebrating Christmas Day at sea. During this long transect, physical, chemical, and biological samples and data were collected, and the acoustic characteristics of the deep scattering layer were mapped. After a port call at Buenos Aires, the ship sailed farther south to work between South America and Antarctica, where a line of current meter moorings was laid across Drake Passage. After 11 days, the instruments were recovered and all but one had worked. While this may not seem remarkable now, it was a major technological achievement at that time. Simultaneously, a team of scientists and a crewman carried out a multi-day survey of inshore marine biota in the coastal channels of Tierra del Fuego aboard one of *Hudson*'s survey launches.

After embarking a new group of Canadian and Chilean scientists at Punta Arenas, the ship undertook a study of the physical, chemical, and biological life of 33 Chilean fjords. This afforded the Canadians with an opportunity to contrast them with similar fjord structures along Canada's east and west coasts. After another staff change in Valparaiso in April, the ship began a long transect north through the South and North Pacific Oceans. In addition to a continuation of the physical, chemical, and biological sampling which mirrored the work done during the Atlantic transect, gravimetric measurements were made to provide ground truth data for the planned determination of ocean currents by satellite observations.

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TENTATIVE PROGRAM

This past spring, two of the original Hudson-70 participants, Peter Wadhams and Roger Smith, proposed that the undertaking be commemorated. BIO management were very receptive to this idea and immediately formed a committee under the chairmanship of Gary Sonnichsen and Claudia Currie to organize the event.

All Hudson-70 participants are encouraged to contact Claudia Currie at clcurrie@nrcan.gc.ca if you have not already heard from the organizing committee. An open invitation is extended to all the BIO community to participate in the celebration. The tentative program is as follows:

16 November:

Hudson arrives at BIO

7:00 pm: Peter Wadhams, Hudson-70 participant, presents a public lecture at the evening meeting of the Nova Scotia Institute of Science (Time and date to be confirmed)

17 November:

8:30 -10:30 am: *Hudson* Tour including exhibits of historical interest

11:00 am - 12:30 pm: Hudson-70 ceremony in Main Auditorium at BIO

12:30 pm: Lunch for invited guests including Hudson-70 participants, spouses or widows & dignitaries aboard CCGS *Hudson*

2:00 - 4:00 pm: Harbour tour for Hudson-70 participants, spouses or widows, and dignitaries, weather permitting

4:30 - 6:30 pm: Icebreaker reception in BIO auditorium for all

18 November:

9:00 -12:00 pm: Hudson-70 Science Seminar Series in BIO's Main Auditorium

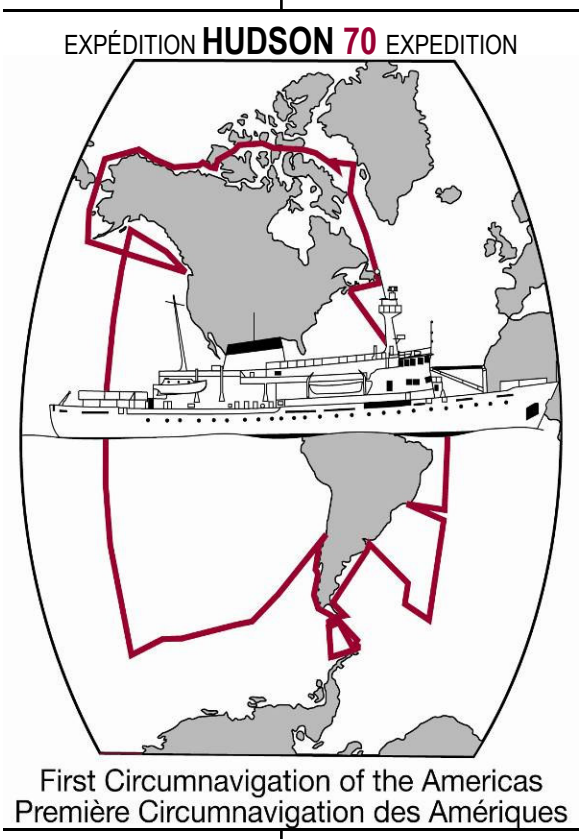
12:00 - 12:15: Lunch and discussions

1:30 - 2:30 pm: Peter Wadhams – What it was like to be on CSS *Hudson* for an entire year

19 November:

Hudson departs BIO on its next science expedition.

After a three week break for unplanned engine repairs in Vancouver, the ship conducted a four-week long geophysical survey off the coast of British Columbia. On 13 August 1970, she departed Victoria for the Beaufort Sea where another four-week geological and hydrographic survey program laid the groundwork for much of the modern day hydrocarbon exploration in that area. *Hudson* transited the Northwest Passage between 22 and 30 September 1970. She then met up with CSS *Baffin* and the Canadian icebreaker CCGS *John A. MacDonald* in Melville Sound where the three ships proceeded to Resolute for a final staff change. After a final geophysical survey in Baffin Bay, the ship sailed for Halifax and arrived at BIO on 16 October 1970. The *Hudson* had sailed 55,000 miles in 11 months and completed the first circumnavigation of the Americas by any ship while 122 scientists collected a vast amount of data and samples from three different oceans.



Peter Wadhams, one of the participants, recently summed up the expedition's achievements as follows:
"... just because (geoscience surveys) are location-dependent, the first expedition to work in an area will inevitably have a huge and lasting impact, while in oceanography as such the impact is more subtle. Thus we can point to specific achievements of Hudson 70 in geoscience such as: discovery of ice scouring in the Beaufort Sea; determination that Baffin Bay has oceanic structure (the well known paper "Baffin Bay - An Ocean"); sorting out the plate structure off the Queen Charlottes; sediment work in Beaufort Sea and NW Passage etc.. In oceanography, the most important site-specific achievement was probably the Chilean fjord survey, since nobody had worked there before and UBC was able to match the results against their knowledge of BC fjords. Close behind came the Drake Passage current meters, which were a real achievement even though (or because) the currents were not what was expected. But in the other areas like chemistry, biology and general physical oceanography the impact was incremental, adding sections in areas where little was known (like Iver Duedall's paper "An oxygen section in the South Atlantic") and in fact performing the task of filling in gaps and adding little bits to a rising sum of background knowledge about the world ocean as a whole. This was precisely the task of the great long lasting oceanographic expeditions of the past - Challenger, Meteor, Albatross etc. - and in that sense you might think of it as Hudson 70's greatest achievement. It really was the last of the big, long, worldwide general oceanography expeditions that ought to map the physics, chemistry and biology of the oceans. Nobody bothers to do that any more, and science is the poorer for it."

"As for *Hudson's* role in having career-changing effects on junior scientists, I think that was certainly true for Roger Smith and myself. Actually it was a bad effect, as it was hard to go back to a normal life after a voyage like that."

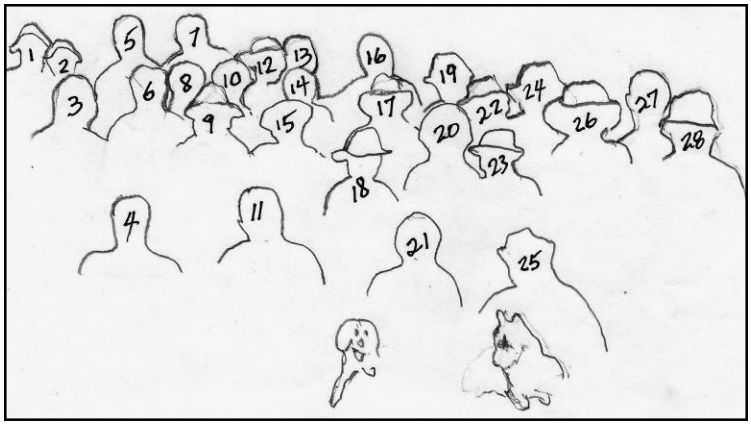
Two books have been written about the expedition. The first, *Voyage to the Edge of the World,* (1973) by Alan Edmonds, outlines the major objectives of each leg of the cruise, describes how some of the work was done, and, in a very limited way, summarizes the scientific outcomes. This is a somewhat dry account of the expedition, but is worth reading to acquire an understanding of what was done and why. The book is long out of print but still available in many libraries including the BIO Library and, from time to time, can be found for sale in used bookstores and on the internet.

The second book, *The Great Ocean of Truth: The Hudson-70 Voyage Around the Americas (2009)* by Peter Wadhams, has just been published. The author was the only member of the scientific staff to remain on board for the entire trip. In 1969, he had just graduated from university and was contemplating a career in oceanography but was uncertain as to exactly what aspect to pursue. He contacted Bosko Loncarevic who hired him as the scientific "Man Friday" for the trip. I have read the first draft of his book and enthusiastically recommend it to anyone who wants a well-written personal account of the expedition including the personalities involved and what took place on the ship and ashore from day to day. The book can be purchased from the author by e-mailing him at pw11@cam.ac.uk and it will soon be on sale in the BIO Gift Shop.

Annual BIO - OA Summer Picnic

Bob and Heather Cook once again hosted the Association's summer picnic on 20 August at their spacious and beautiful home in Portuguese Cove overlooking the ocean. When they hosted us last in 2006, we met inside their spacious home, but fog, wind, and rain prevented us from venturing outside or using their large new deck overlooking the approaches to Halifax Harbour. This year, the sun was shining and we got to enjoy both the outside and the inside of their property. It was a marvelous and relaxing afternoon picnic. Thank you Bob & Heather!

Pictured are some of those who attended this year's picnic at the Cook residence (see key at right):
1. Doug Loring, 2. Sue Loring, 3. Sjan Kuper, 4. Keith Manchester, 5. David McKeown, 6. David Nettleship, 7. Tom Foote, 8. Joyce Foote, 9. Ted Phillips, 10. Elizabeth Mason, 11. Michael Latrémouille, 12. Carol McKeown, 13. Clive Mason, 14. Linda Christiansen-Ruffman, 15. Edna Cunningham, 16. Alan Ruffman, 17. Chris Corkett, 18. Georgina Phillips, 19. Carl Cunningham, 20. Angela Nettleship, 21. Heather Cook, 22. Betty Buckley, 23. Jackie Dale, 24. Dale Buckley, 25. Bob Cook, 26. Iris Hardy, 27. Bob MacDiarmid, 28. Carol Manchester.



Remembering BIO and the Hudson-70 Expedition

Iver W. Duedall

[*Editor's Note:* Dr. Duedall was employed at the Marine Ecology Laboratory from 1966 to 1972.]

My association with BIO and the Marine Ecology Laboratory (MEL) of the Fisheries Research Board of Canada began in spring 1966 when George Needler came to Oregon State University (OSU), Corvallis, as a recruiter for the then Canadian Department of Energy, Mines and Resources (DEMR). At that time, my only knowledge of BIO and MEL was through the work of Robert (Bob) Platford on the physical chemistry of seawater. I attended one of George's meetings at the OSU School of Oceanography and told him that I would like to work with Bob Platford because my MSc thesis dealt with the physical chemistry of seawater and Bob's work was outstanding. On George's return to BIO, he conveyed my interests to Bob Platford who then provided a job offer in his laboratory with approval from Lloyd Dickie, Director of MEL at that time.

My wife and I arrived in Nova Scotia in the summer of 1966 after traveling the Trans-Canada Highway from Vancouver in our VW Beetle. Bob Platford and his wife kindly greeted us when we got to Dartmouth, assisting us in locating a place to live in Uplands Park, about 20 minute drive from BIO.

Working with Bob Platford was very rewarding; he was a very careful physical chemist measuring activity coefficients of major components in seawater. In Bob's lab was Carl Cunningham who I got to know very well as a colleague and as a friend. Carl provided a lot of assistance to both Bob and me. My early research at BIO-MEL was measurement of partial molar volumes of weak acid salts in seawater, a follow-up study from my MSc thesis. The weak-acid work was published in the journal *Geochimica et Cosmochimica Acta*.

Unfortunately, my association with Bob Platford was short-lived as he took a new position at the Canadian Freshwater Institute in about 1968. I was sorry to see Bob leave MEL; his work was excellent and we had maintained a close professional and personal/family association. Bob and his family would visit us in Uplands Park, especially during the winter. He would always bring the family sled so that we could all experience some good down-hill sledding.

In 1968 I began some new research on the compressibility of seawater and partial molal compressibility of salts in seawater. This work would form the basis of my PhD dissertation under the direction of Professor Peter Wangersky at Dalhousie University. Also in 1968, there was word circulating around BIO of the proposed Hudson-70 Expedition. By this time, I had developed association with Art Coote. Art, along with Ray Hiltz who worked for Art, were developing analytical methods for the Technicon Autoanalyzer to be used for P, N, and Si analyses on the Hudson-70 Expedition. Art was looking for someone to carry out dissolved oxygen analysis on Hudson 70. Thinking back, I can't remember whether I volunteered to make the dissolved oxygen measurements or if Art asked me to consider doing the work. In any event, and after discussions with my wife, I decided to be part of Hudson 70. By this time we had bought our house on Golf Links Road in Bedford, and it was here that we developed a life-long friendship with Don and Dorothy Peer (MEL) who lived at the end of Golf Links Road in their new house that Don had built.

Thus, in early 1969, I began to set up a dissolved oxygen measurement system at BIO which included becoming competent on running/calibrating the Winkler titration method for determining dissolved oxygen in seawater. I adapted the Carpenter method which was the accepted and current methodology at the time. I asked Don Knox and George Connolly who worked in the BIO machine shop to design and build a Winkler reagent dispenser that would accurately release the required volume of Winkler reagents into a known volume of seawater with one rotation of a knob on the dispenser. The regular method for dispensing reagents was slow and involved separate volumetric additions of the reagents.

From November 1969 to about June 1970, I was aboard the CSS *Hudson* during the Hudson-70 Expedition. On legs one (to Rio) and two (from Rio to the South Atlantic to Buenos Aires), most of my work involved the measurement of dissolved oxygen at all the hydrographic stations occupied by CSS *Hudson*. Bruce Carson was in charge of running the hydro casts. As Knudsen water bottles were brought up and put into the bottle rack, I would withdraw a known volume of seawater, dispense the Winkler reagents with the new dispenser, and then, in about 30 minutes, carry out the titration in the CSS *Hudson* wet lab. Each set of the oxygen data was worked up with the aid of a computer program (on paper tape) that was uploaded to the onboard PDP8 (or PDP10, can't remember) computer that was operated by Peter Wadhams. The worked-up data came fast as a printed output. We were able see the major oceanic water masses at each station as we plotted (by hand) the oxygen concentrations on a large section sheet of graph paper.

Art Coote and Ray Hiltz left Hudson-70 in Buenos Aires, but not before training me in the operation of the Technicon Autoanalyzer. I carried on the N, P, and SI measurements - primarily in the Chilean Fjord leg of Hudson-70 – that followed the Drake Passage work. During the fjord phase of the expedition, I met the young Chilean scientists who boarded CSS *Hudson* at Punta Arenas, Chile. Two Chileans, Lisandro Chuecas and Francisco Rey, took interest in the hydrography and nutrients of the fjords and provided assistance in making the nutrient measurements. Later, in 1979, Chuecas, Rey, and I co-authored a paper on Chilean nutrient distributions which was given at an ASLO meeting in Rhode Island.

Art Coote rejoined Hudson-70 in Valparaiso, and he and I worked together on nutrient and dissolved oxygen measurements for the Pacific leg of the Hudson-70 Expedition.

When CSS *Hudson* arrived in Vancouver, my wife and son greeted me at the dock. We took a brief holiday in Oregon and then returned to Nova Scotia.

Art Coote, Ray Hiltz, and I co-authored three papers dealing with nutrients and oxygen distributions in the Atlantic and Pacific. The dissolved oxygen results were published as two papers in the *Journal of Geophysical Research* (Oceanography section), and nutrient analysis in the book *Advances in Automated Analysis*, Volume II, Industrial Analysis, (1970) published by Thurman & Associates, Miami, .

Now back at BIO, in about July 1970, I resumed my work on the compressibility of seawater. Prior to Hudson-70, I had a dual bellows/pressure-bomb apparatus built by a company in Waltham, Massachusetts. However, when the apparatus arrived at BIO, it was clear that the sensing device to measure compressibility changes in seawater as a function of salinity, sea-salt variation, and temperature would not be sensitive enough for what I was trying to achieve. I discussed this problem with Steve Paulowich, electronics specialist at MEL. Working together, we came up with a novel approach in which each bellow would be fitted with identical transformers that would sense the movement of identical nickel stainless steel-based cores, machined by the BIO Metrology group machinists, that were attached to the bellow. Thus, with one bellows filled with standard seawater and the other with modified seawater, we were able to accurately and precisely measure differences in compressibility between two solutions as hydrostatic pressure was applied up to 1000 bars (equivalent to 10,000 metre ocean depth). Steve built a differential operational amplifier to sense the distance that the cores in the transformers moved as a result of pressure. As usual in such experiments, there was a great deal of trial and error. Eventually, the system worked, and with calibration and some correspondence with Professor Millero, University of Miami, we were able to measure both the absolute compressibility of seawater, as well as the compressibility differences when salts were added to one of the bellows system.

Steve Paulowich and I published a description and the calibration of the bellows instrument in *The Review of Scientific Instruments*. In this work, I need to acknowledge some wonderful discussions I had with Charlie Maunsell, physical oceanographer at BIO. Before coming to BIO, Charlie had worked in the field of ocean acoustics. The speed of sound in seawater depends on the compressibility of seawater. And thus, during the calibration of the bellows device, Charlie directed me to some of the classic publications on the speed of sound and compressibility of seawater.

Iver and Mary Duedall, July 2008.

With the compressibility device calibrated, I made a series of measurements which were interpreted in terms of water structure. Basically seawater has less compressibility than freshwater because a portion of the tetrahedral water structure in normal water is disrupted by ionic properties of ions. By manipulating the composition of seawater in one of the bellows in the compressibility apparatus, I was able to associate compressibility changes with specific salts in seawater. Peter Wangersky at Dalhousie University was most interested in water structure and thus provided excellent guidance in the interpretation of the compressibility results. That interest eventually led to my PhD dissertation which was published in *Progress in Oceanography* later.

There are a few other BIO remembrances that stick in my mind. At coffee break time (morning and afternoon), George Needler would more or less hold court in the BIO cafeteria. By this I mean that several of us would assemble around a table where George would be discussing some of the latest work being done in physical oceanography. Someone would say something and George would usually challenge the statement - he was really good at that! The discussions that followed were often electrifying. And this experience was the first time I came to appreciate "back of the envelope" calculations and descriptions of ocean processes. I learned a lot of physical oceanography sitting at that table.

On the social side, there were many holiday parties and some annual BIO picnics. As I recall, the picnics were usually run by Ron Trites at MEL—Ron put it all together. At least one picnic was held on Macnabs Island. I can't remember how we got there, but I do remember several events, especially the potato sack race. Another annual picnic took place at one of the lakes near Dartmouth and was a joint affair with Dalhousie University's oceanography department; jousting on canoes was a main event. George Needler and his wife always hosted a Christmas or New Year's party at their house. It was tradition that the main course was some sort of specially cured (for several days) beef, a recipe that was handed down from George's father, Alfred Needler.

In early 1972, my wife and I decided to move back to the United States. At first, it was not an easy decision as we had made many friends in Dartmouth/Halifax. However, as a result of a discussion I had with Martin Blaxland, MEL administrator, who told me that my position would likely be eliminated, it was clear that we must seriously consider moving on. In the spring of 1972, I was offered the position of Assistant Professor of Oceanography at the State University of New York in Stony Brook, Long Island. While we were living on Long Island, we had several visitors from BIO.

In 1982, I was appointed Department Head and Professor, Department of Oceanography and Ocean Engineering at Florida Institute of Technology (FIT), Melbourne, Florida. I retired in 2004 and currently teach online oceanography, geology, and environmental science from home - or in our RV when we are travelling.

Our two boys, Paul and Mark, born in Halifax in 1967 and 1971, are very proud of their Canadian heritage. One son and wife often visit Halifax, and Mary and I have kept in contact with a few of our Nova Scotia friends. Now, as a member of the BIO Oceans Association, we hope to renew other friendships that have been lost over the years.

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THE ARCTIC
UNDERSEA MAPPING SUPPORTS TERRITORIAL CLAIM

Jill Mahoney

Reprinted from The Globe and Mail, Friday 28 August 2009, p. A7.

The scientists working on an icebreaker high in Canada's north are sending their boss enticing messages. They are collecting excellent data.

The team is on a six-week mission to help map the Arctic Ocean's seabed and provide evidence to buttress the federal government's claim to a huge swath of the polar sea floor and any potential oil and gas resources.

"It's amazing. They keep telling me that the data quality is superb," said Jacob Verhoef, a federal scientist who is leading efforts to survey the seabed off Canada's Arctic and Atlantic coasts. "What it shows is that in the Beaufort Sea there is a significant amount of sediment and that allows Canada … to define our outer limits well beyond 200 nautical miles."

The work is part of a 10-year, $109-million effort by the government to prove that in some areas, Canada's sovereign rights extend far beyond the accepted boundary of 200 nautical miles offshore. If officials can make a case under the *United Nations Convention on the Law of the Sea*, which establishes rules for claiming an extended continental shelf, Canada will gain exclusive rights to resources on and below the seabed. The country has until 2013 to submit its claim.

Despite tension between Canada and the United States over Arctic sovereignty, the two countries are collaborating in the Arctic survey for the second year in a row. The U.S. scientists aboard the U.S. Coast Guard icebreaker *Healy*, are doing high resolution sonar scans of the floor of the Beaufort Sea. Mr. Verhoef noted that gathering scientific information is extremely difficult because the area is so remote and icy and data can only be collected during a small window once a year.

However, Mr. Verhoef acknowledged the two countries could submit rival territorial claims in some areas. "Then it becomes a thing for the diplomats and whatever to negotiate. That is beyond the science," he said.

Working on the Canadian Coast Guard icebreaker *Louis S. St. Laurent* since August 6, 21 Canadian scientists and technicians are conducting seismic surveys that measure the shape of the seabed and the thickness of sediment deposits. This is the group's third trip to the area north of the Yukon-Alaska border. Another one or two operations are planned, Mr. Verhoef said.

Scientists have already finished mapping underwater geological formations in the Atlantic Ocean. Analysis of their data will take another year, Mr. Verhoef said.

The CCGS Louis S. St. Laurent *hosted a Farewell Open House at the BIO jetty on 29 June 2009 prior to sailing to the Canadian Arctic to undertake the scientific research work described above.* [Photo by M. Latrémouille]

Annual Financial Report for 2008 - 2009: 26 April 2008 to 24 April 2009*

Bob Reiniger, Treasurer

OPERATING FUND		FOUNDATION FUND	
Opening BNS Balance - 26 April 2008	$219.81	Opening BNS Balance - 26 April 2008	$39.19
➤ Income - Fees	1580.00	➤ Income - Donation	1550.00
➤ Income - Socials	23.00	➤ Income - Bank interest	0.45
➤ Income - Bank interest	0.18	➤ Expenses - Beluga Award	(1523.29)
➤ Transfer from the ING Account	770.00	➤ Expense - Bank charges	(3.40)
➤ Expense - Newsletter	(957.13)	**Closing BNS balance**	**62.95**
➤ Expense - Office supplies	(110.71)		
➤ Expense - Organization costs	(172.65)		
➤ Expense - Socials	(259.48)		
➤ Expense - Bank charges	(11.90)		
Closing BNS balance	**151.12**		
ING Account			
Opening Savings Balance - 26 April 2008	6426.95		
➤ Income - Interest	214.14		
➤ Transfer to the BNS Account	(7.70)		
➤ Transfer from the BNS Account	9.30		
➤ Transfer to ING GIC's	(60.00)		
➤ Transfer from ING GIC's	1000.00		
Closing ING Savings Account	1801.09		
Closing ING GIC's Account	5000.00		
Closing ING Accounts Balance	**6801.09**		

* Prepared by B. Reiniger (Treasurer) and Verified by Bob O'Boyle (President).

Mystery Device

D.L.McKeown

Recently, Mike Hughes and I inventoried the contents of a container in the BIO "Boneyard" being used to store oceanographic equipment artifacts belonging to the Association. We were unable to identify the item shown here.

The upper portion appears to be a homemade resistance bridge. There are two glass vials in the lower portion with electrodes built into them. The wooden box also contained two plastic bottles, one of seawater and the other a silver nitrate solution.

Does anyone know what this is, who created it, and what it was used for? If you do know, contact me at 477-5887.

Madingley Rise and early geophysics at Cambridge

Carol A. Williams

[Editor's Note: The title refers to a book by Carol A. Williams published in October 2009 [Third Millennium Information Ltd,, 2-5 Benjamin Street, London ECIM 5QL, ISBN 978-1906407183].

Madingley Rise may have a familiar ring to some Nova Scotians given the strong links between the Bedford Institute of Oceanography/Atlantic Geoscience Centre and scientists at Cambridge University. It is a yellow-brick Victorian country house which houses the Department of Geodesy and Geophysics of Cambridge University: in 1980 it was reorganized as Bullard Laboratories, part of the Department of Earth Sciences.

While the teaching of geology had been introduced to Cambridge University around 1728, there was no provision for the teaching of geodesy and geophysics. Strangely, this lack was most apparent to an astronomer, Hugh Frank Newall (1857-1944), the builder of Madingley Rise. Newall bullied committees to round up support for the introduction of formal teaching in these subjects at the University and, with a committee of Fellows of Trinity College, persuaded Trinity to fund a praelectureship in geodesy for which he nominated Sir Gerald Lenox-Coningham, formerly a geodesist with the Survey of India. The outcome was that a small School of Geodesy was established in 1921. The main activity of this School beyond lectures was in pendulum gravity measurements and the establishment of the Gravity Survey of Great Britain.

The story continues with a Department of Geodesy and Geophysics being established in 1931. Harold Jeffreys was the first appointee and subsequently Sir Gerald was well-guided in recruiting by J.J. Thompson at the Cavendish Laboratories who recommended Teddy (Sir Edward) Bullard and Ben Browne. These three new recruits, together with technician Leslie Flavill, formed a powerful team with Jeffreys a talented mathematical physicist and prolific author of papers and books, and the two young, practical physicists Teddy and Ben. After making a regional gravity and magnetic survey of the East African Rift Valley in 1934, Teddy Bullard then turned his interests towards seismic experiments, building the necessary instruments with Leslie Flavill and making the first seismic survey in England. With the encouragement of Dick Field at Princeton, Teddy joined a cruise with Maurice Ewing at the Woods Hole Oceanographic Institution and learned the techniques of seismic surveys at sea. He returned and undertook the first British seismic experiment at sea in 1938 followed by a second experiment using two sailing vessels in 1939.

Over time, the Department of Geodesy and Geophysics grew and required more space. Professor Newall had died leaving Madingley Rise to Trinity College. Ben Brown, a fellow of Trinity, helped persuade Trinity to release the house to the University and in 1955 Madingley Rise became the headquarters of the Department of Geodesy and Geophysics.

In 1960, Teddy , by then Sir Edward, took over the Headship of the Department from Ben Brown. He had previously been Head of the Department of Physics at the University of Toronto and Director of the National Physical Laboratory in London.

He had made many contacts in North America and made a point of inviting leading geophysicists on sabbatical leave to visit Madingley Rise. These included Tuzo Wilson, who had been a student of Jeffreys. The best students were also attracted, many of whom established their careers in Nova Scotia, including Bosko Loncarevic, Mike Keen, Reg Gilbert, Clive Mason, Charlotte Keen, (one of the first female students), Richard Haworth, David McKeown, and Keith Louden. Bosko, on leaving Cambridge, joined BIO and did much to maintain close contact between Nova Scotia and Cambridge. There ensured many visits, including several from Teddy Bullard, joint cruises, and joint publications between the two institutions.
Although a relatively small Department, its scientists have many achievements to their fame including confirmation of the liquidity of the outer core (Jeffreys), initiating the measurement of heatflow and the study of dynamo theory of the Earth's magnetic field (Bullard), establishing that the Earth's magnetic field had reversed (Hospers), evidence for sea floor spreading (Vine & Matthews), and plate tectonics (Dan McKenzie and Bob Parker). Dan McKenzie is the first recipient of the A.G. Huntsman Award for Excellence in Marine Science (1980). He spent time at BIO, as did Vine and Matthews .

Madingley Rise, a hardcover book comprising 208 pages and 70 illustrations, is more a chronology than intrinsically a scientific work. It should be of considerable interest to a wide audience.

See www.tmiltd.com for further information.

Winter 1963: Staff and students of the Department of Geodesy and Geophysics, Madingley Rise, Cambridge University. Familiar faces in the second row include Clive Mason (3rd from the left), Carol Loncarevic (6th from the left), and Bosko Loncarevic (2nd from the right).

In Memoriam

Elmer Ambrose Lewis, on 13 July 2009, aged 98. Elmer worked with Tom Foote in deploying and recovering current meters for the Atlantic Oceanographic Laboratory. He retired from BIO in 1976.

David Esson Slauenwhite, on 28 August 2009, aged 47. David was employed in the Ocean Circulation Section of the Ocean Sciences Division at BIO since 2006 as a Physical Scientist.

ABOUT THE ASSOCIATION

The Bedford Institute of Oceanography Oceans Association was established in 1998 to foster the continued fellowship of its members; to help preserve, in cooperation with the Institute's managers and staff, BIO's history and spirit; and to support efforts to increase public understanding of the oceans and ocean science. Membership is open to all those who share our objectives. Most current members are present or past employees of BIO or of the federal departments of Environment, Fisheries and Oceans, and Natural Resources (or their predecessors) located in the Halifax Regional Municipality. Membership is $10.00 per year, $40.00 per half decade, or $150.00 for a lifetime membership.

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