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President
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EDITORIAL - The pioneers of oceanography

It seems to be a condition of the human state to find pioneers in every field of endeavour. Surely our professional predecessors can be honoured by such a category, for do we not owe them what we know and what we are? Well - maybe. For hidden in the category "pioneer" is an unstated paradox: that the "pioneers" of, say, the development of oceanography, had nothing to pioneer but were involved in their own affairs. We would do better to ask what they themselves thought they were doing, and how the great historical complexities of human affairs came together in ways that we now see as unified. Some examples from a century ago will help to make my point.

On November 26, 1901 the wealthy American marine biologist Alexander Agassiz set sail from Genoa en route to the Maldive Islands, with the aim of using observations of that coral atoll sultanate to refute Charles Darwin's theory of coral reef formation. With him was a small group of assistants, including the young Henry Bigelow, who had just completed his undergraduate degree at Harvard, and who was looking forward to a career as a zoologist. What Bigelow learned from Agassiz and what he made of the Maldives is not very clear, but we do know that Bigelow accompanied Agassiz on two other major expeditions (to the Eastern Tropical Pacific and the Caribbean) and somehow, by 1906, had completed a Ph.D. dissertation on gelatinous plankton and had begun a professional

career at Harvard. In 1912, using the schooner *Grampus*, he began to study the plankton and physical oceanography of the Gulf of Maine, linking his work to the requirements of the U.S. Bureau of Fisheries for scientific information on commercial fish stocks. In 1930, having reviewed the state of oceanography in the United States for the National Academy of Sciences, he was appointed director of the newly established Woods Hole Oceanographic Institution, bringing him firmly into the beginning of our own era and modern concerns.

When the Institut für Meereskunde of the University of Berlin was inaugurated formally in January 1901, a Berlin geographer, Erich von Drygalski, was about to set off on the German South Polar expedition of 1901-1903. During the course of the expedition he detected, without much comment, anomalous temperatures and salinities (later called Antarctic Intermediate Water) at a depth of a few hundred meters, just as the *Challenger* naturalists had done a quarter century before. These observations languished until the 1920s, when they took their places in a bitter dispute over the deep meridional circulation of the oceans. And with Drygalski on that early German probe into the Antarctic was the ship's physician, Hans Gazert, who had been given a scientific task, looking for the presence of nitrifying and denitrifying bacteria in the open ocean. Gazert's qualified success - he found denitrifiers but not nitrifiers - was part of a campaign by the Kiel zoologist Karl Brandt to establish the marine nitrogen cycle as the crucial control of the marine production cycle. While Gazert worked at sea in the remote Southern Ocean, Brandt's assistant Erwin Baur had exactly the same experience in the nearby Baltic - part of the nitrogen cycle, but not every process, could be confirmed there too. At Naples a remarkably original biologist, Alexander Nathansohn, was beginning the study of marine bacteria of the nitrogen cycle, and his collaborator-to-be H.H. Gran, a botanist from Norway, was in Den Helder showing that both kinds of bacteria of the nitrogen cycle could be found in at least some places in nearshore waters.

In 1901 the Second International Conference for the Exploration of the Sea was held in Christiania, in preparation for the formal establishment of the International Council for the Exploration of the Sea (ICES) the following year. Nations were scrambling to join the programme set out by the emerging Council, not least Germany, which provided a ship, *Poseidon*, the at-sea mainstay of the German contribution (much of it centered in Kiel in the hands of Karl Brandt and Otto Krümmel) for several years to come. In Copenhagen the physicist Martin Knudsen, who had begun to provide tables relating temperature, salinity and density of seawater, crucial to the emergence of dynamic oceanography in 1899, published the first definitive version in 1901, establishing a link between the late nineteenth century obsession with physical constants and the emergence of a totally new approach to ocean circulation. Critical to the success of Knudsen's tables was precise data - just the kind that could be gained from the fine new thermometers becoming available from German instrument makers and used in studies of the deep water of northern Norway and the Barents Sea by Roald Amundsen from his ship *Gjoa* in 1901 and promoted by Fridtjof Nansen and Bjørn Helland-Hansen in the years following.

In the summer of 1901 the Berkeley zoologist W.E. Ritter was in the field with students at San Pedro, California, at the beginning of his search for a site at which marine biology could be studied and integrated into his humanistic, holistic philosophy. Two years later, with the encouragement of local entrepreneurs, Ritter's eyes had turned south, toward San Diego, and the seed of the Scripps Institution of Oceanography had been set. Far away and seemingly unrelated, the Marine Biological Association of the West of Scotland was established, at least in part to provide funding, through public memberships, for the biological station begun by David Robertson at Millport on the Isle of Cumbrae. Infighting between "amateurs" and "professionals" and financial exigency nearly derailed the Millport Marine Station, situations not unknown to the host of new or not-so-new marine stations that had proliferated between the 1850s and the turn of the century and many of which, including Millport and the San Diego institution, survive and even prosper today.

There is no obvious link between the elements and the larger pictures that could be produced from my examples. But it would not be hard to develop a plausible, historically-respectable account in which each element played a part in a "History of Oceanography" leading to our current understanding of the production of the ocean and its relation to circulation, or even to the problems of global warming. Nearly all of us writing in the field have done something of this kind - bringing together the disparate elements into a coherent account in which a beginning leads to an ending through the agency of marine scientists in the past. In such accounts there is an almost inescapable tendency to think in terms of "progress" and "pioneers" - pioneers who inevitably lead to progress. And as historians we have to tell a story (with varying degrees of analysis) that requires a time-line and protagonists. These are the necessities of our art.

But to return to my original point. As I hope my examples have shown, although remarkably dissimilar events could be drawn together now into a useful story, the view from 1901 would be much different. What then united Henry Bigelow in the Maldives, Drygalski on *Gauss* in the Southern Ocean, and Ritter on the coast of Southern California? Nothing except the human condition and scientific training. And yet each person can be promoted now as a pioneer of oceanography and even united into a single account of scientific progress involving pioneers of our

modern knowledge of the oceans. Should we want to do this? Not yet, and maybe never, I say. For to designate "pioneers" is to presuppose the future in a way that cannot be supported historically. It is nearly trite to say that we need to understand the past in its own context of we are to avoid re-telling the tales of our own times. If we become caught up in modern stereotypes, we miss the richness and complexity of the past.

Eric Mills

MAJOR JAMES RENNELL; FIRST RESEARCH ON THE AGULHAS CURRENT

James Rennell was, without any doubt, the pre-eminent pioneer of research on the Agulhas Current[1,2]. Born on 3 December 1742 at Upcot in Devonshire, England[3], he lost his father at the age of four. With little formal schooling, he secured an appointment as midshipman in the Royal Navy at the age of fourteen. On his first ship, *Brilliant*, he was party to the capture of two French privateers. His modest share of the prize money was spent, characteristically, largely on the purchase of books.

Having surveyed the Bay of St Cast, the chain of sand banks that connect Ceylon to the Coromandel coast, as well as various harbour approaches, he was recommended, at the age of 21, to the Governor of Bengal, who was anxious to have his province properly surveyed. During this survey, which took many years under very difficult conditions, Rennell was severely wounded by a tribesman on the Bhutan border in 1766[3]. From this injury he never fully recovered. His fieldwork continued, however, notwithstanding recurrent attacks of malaria and even having single-handedly to kill a leopard with a bayonet after it had mauled six of his men.

At the age of 36, the survey completed, Rennell returned to England. However, his previous employers, the British East India Company, refused to defray the cost of publication of the Bengal Atlas. Publication eventually was made possible by generous public subscription. He spent the rest of his life working on a wide variety of geographical studies, including many on ocean currents[4]. As leading authority on the ocean he was offered the post of First Hydrographer to the British Admiralty, but refused, as he was of the opinion that the duties of that position would interfere unduly with his research activities[3].

His first large work was the *Chart of the Bank and the Current of Cape Lagullas*[5] which was published in 1778[6], its style and format still largely used in Admiralty Current Charts to this day[7]. In his many analyses and discussions he exhibited an unusual understanding of the variability and complexity of ocean currents, far in advance of thinking at the time[8]. He was the originator of the terms *drift* and *stream*; the former he considered to be wind-driven, the latter due to a head of water set up by the flow of a drift current against a coast.

Rennell died on 29 March 1830 at the age of 87 and was buried in Westminster Abbey, having received many honours during his long career[9]. He had been Fellow of the Royal Societies of both London and Edinburgh, member of the Royal Institute of France, member of the Imperial Academy at St Petersburg as well as member of the Royal Society of Göttingen.

References

1. Lutjeharms, J. R. E. and L. V. Shannon (1997). A century of physical oceanography in South Africa; in search of the legacy of John D. Gilchrist. In *A Century of Marine Science in South Africa*, editors A.I.L. Payne and J. R. E. Lutjeharms, Sea Fisheries Research Institute, Royal Society of South Africa, pp. 17-30 and *Transactions of the Royal Society of South Africa*, 52 (1): 17-30.
2. Lutjeharms, J. R. E., W. P. M. de Ruijter and R. G. Peterson (1992). Interbasin exchange and the Agulhas retroflection; the development of some oceanographic concepts. *Deep-Sea Research*, 39 10): 1791-1807.
3. B(arlow), E. W. (1932). Major James Rennell. *Marine Observer*, 9 (101): 94-98, 496.
4. Rennell, J. (1832). *An investigation of the currents of the Atlantic Ocean, and of those which prevail between the Indian Ocean and the Atlantic*. J. G. and F. Rivington, London, editor J. Purdy, viii + 359 pp. + 2 folded maps.
5. Rennell, J. (1778). *Chart of the Bank of Lagullus and southern Coast of Africa*, London.
6. Pollard, R. and G. Griffiths (1993). James Rennell, the father of oceanography. *Ocean Challenge*, 4 (1/2): 24-25.
7. Bravo, M. (1993). James Rennell: antiquarian of ocean currents. *Ocean Challenge*, 4 (1/2): 41-50.
8. Gould, J. (1993). James Rennell's view of the Atlantic circulation: a comparison with our present knowledge. *Ocean Challenge*, 4 (1/2): 26-32.
9. Markham, C. R. (1901). *Major James Rennell and the rise of modern English geography*. Cassell and Company, London, 232 pp.

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CANADIAN MARINE SCIENCE RESEARCH IN ARCTIC AND NORTHERN WATERS

Originally a contribution to the conference "Polar Sea of Discord and Collaboration: Science and Politics in Oceanography and Arctic Exploration," St Petersburg, Russia, 27-30 January 1999.

This paper deals mainly with the Canadian scientific groups having the closest connection with Arctic oceanographic research from about 1948 through the 1950s, among which the Pacific Oceanographic Group (POG.) stands out both in time and importance. The background and leadership of the POG. are of interest because they show how a small but effective research group came into being, and how it came to do Arctic oceanography. Apart from my research on this group (given in more detail in Mills 1994, 2001), there is virtually no historical research on the history of Canadian oceanography in the Arctic except for chronological accounts in some of the references listed at the end of this paper. Here I outline briefly the context of the POG.'s development and that of its companion scientific groups, along with some of the political events of the times, to provide a framework for understanding Canadian activity in Arctic oceanography and to indicate research areas that require attention.

Canadian physical oceanography before the Second World War was a small-scale, fragmented discipline carried out virtually independently on the East and West Coasts. But submarines rapidly precipitated the entry of Canadian oceanographers into the war and brought their work together. To study problems of sonic detection of submarines by ASDIC (an early version of SONAR), especially under varying conditions in the water column, J. P. Tully of the Pacific Biological Station at Nanaimo, British Columbia, was assigned to duty with the Royal Canadian Navy (RCN) in 1943. On the East Coast, H. B. Hachey of the Atlantic Biological Station, St Andrews, New Brunswick, was sent back from active service in England to begin similar work. At Nanaimo Tully's group became known as the Pacific Oceanographic Group, while Hachey's became the Atlantic Oceanographic Group (AOG.). Each group worked closely with the RCN and especially with the National Research Council of Canada (NRC) and reported directly to an acoustician at NRC in Ottawa, George S. Field (Hachey 1965, Middleton 1979). Both groups survived the war and became responsible for a large part of Canadian oceanographic research in the Arctic, although it was Tully's POG. that first ventured into the Arctic as the result of collaboration with anti-submarine acousticians from the United States Navy beginning in the late 1940s.

Prior to 1948, as Dunbar's reviews (1951, 1982) and Levere's book (1993) indicate, Canadian work in the Arctic, whether on land or at sea, was scanty. But with the end of the Second World War, and especially the beginning of the Cold War (1947), the pace of activity picked up, closely linked to strategic concerns of the United States, especially the possibility of Soviet submarine activity in the Canadian Arctic and the threat of air attack across the pole. Canada's Defence Research Board (DRB - established 1945-1947, see Goodspeed 1958) and Royal

Canadian Navy developed close relationships with the U.S. armed forces' civilian and military research. Some of the highlights follow.

Near the end of the Second World War, much of Canada's anti-submarine warfare (ASW) research was transferred from the East Coast to the West, to escape the danger of working at sea in submarine-infested waters. Even before the war ended, J.P. Tully and the POG. had worked amicably with defence scientists in Washington and California. As a result, the POG. was the first group of Canadian civilian oceanographers to become involved in post-war defence-related research, soon leading to work in the Arctic. In general, between 1947 and 1950 North American attention turned north when five joint Canadian-U.S. weather stations in the Arctic islands were built, and by 1955 the building of the Distant Early Warning (DEW) Line radar stations across the Canadian Arctic by U.S. contractors was at its peak. Between then and the mid-1960s, when intercontinental ballistic missiles from Soviet sites on land or at sea made most of the radar stations in the Arctic and Subarctic obsolete, U.S interest was high in the Canadian Arctic as a first line of defence. This was both an opportunity for Canadian scientists and a potential threat to Canadian sovereignty in the north, as scientific memoranda from the time show. Both played a role in the marine research planned or carried out during the 1950s and early 1960s.

In 1947 the U.S Coast Guard Ship *Edisto* made BT (bathythermograph) observations from the Strait of Belle Isle to Thule, Greenland then northward to Jones Sound, and in 1948 *Edisto* returned with the USCGS *Eastwind* to work in Smith and Lancaster Sounds. The scale of the operation sounds suspiciously more ambitious than the International Ice Patrol surveys that the U.S. Coast Guard had carried out northward from Newfoundland for several decades, but little more seems to be known of this expedition or of its purposes. In the same year Canada showed the flag by sending the naval ships HMCS *Magnificent*, HMCS *Haida*, and HMCS *Nootka* to Hudson Bay. There the RCN oceanographer W.B. Bailey aboard *Haida* took temperature, salinity and BT stations every 100 miles. But the most significant event of 1948 was on the Pacific Coast, where J.P. Tully's POG. collaborated for the first time in the Arctic with scientists from the U.S Naval Electronic Laboratory (USNEL) in San Diego. Aboard HMCS *Cedarwood* they studied basic water column structure and acoustic conditions in the Bering and Chukchi Seas. This began nearly a decade of collaboration between the two groups, aimed at assessing Western Arctic seas as a naval theatre for ASW operations.

Tully's POG. had much to offer the USNEL group. In British Columbia they had acoustically-quiet waters with a variety of physical structures, and in the Arctic they provided experienced personnel not hampered by naval discipline. After the Joint Canadian-U.S. Aleutian Scientific Expedition of 1949, with *Cedarwood* and two U.S vessels (one of them a submarine), and again involving sound and noise measurements in the Bering and Chukchi Seas, a series of Joint Canadian-U.S. Beaufort Sea Expeditions on larger scales took place from 1950 through 1954. Under the scientific direction of W.M. Cameron of the DRB and Waldo Lyon of USNEL, the basic oceanography, bathymetry, and acoustic conditions around Canada's Western Arctic islands and along the mainland coast east to Amundsen Gulf were studied systematically. The climax - and the end - of this programme came in 1954, when the USS *Burton Island* (with the Canadian Cameron aboard as joint chief scientist), and the USCGS *Northwind* met the newly- commissioned Canadian icebreaker HMCS *Labrador* in the Northwest Passage to complete a survey of McClure Strait and Viscount Melville Sound. Once again, the aim was to enable detection of foreign submarines, to allow U. S. submarines to pass with safety through Arctic waters, and to amass basic oceanographic information. To the Canadians it was a balancing act, gaining information not available with Canadian resources at the cost of further work by the United States in Canadian waters.

By 1955 U.S. interest in expensive, logistically complicated operations in Canadian waters was waning. In the same year, ironically, as the joint work wound down, the POG. was delegated to represent Canada officially in any further joint oceanographic work in the Western Arctic, and on the other coast of the country the AOG, under H. B. Hachey, which had been cool to Arctic oceanography initially, was given overall responsibility for Canadian Arctic oceanography. On the West Coast, Tully and the POG were diverted into large-scale studies of the North Pacific, the NORPAC expeditions of 1955 and succeeding years, themselves of strategic importance in providing the first detailed oceanographic data on the Subarctic North Pacific Ocean, especially in winter. In his reports, Tully made it clear that the basic research that the POG. was carrying out in the Pacific could all be given military significance, just like the PO G.'s earlier work on the Arctic.

It was less clear that this was true on the better-known East Coast, the area studied by the AOG, but nonetheless Hachey's group took advantage of opportunities to work in northern seas, including Hudson Bay and Eastern Arctic waters, using at first HMCS (later CGS) *Labrador* from 1955 through 1962.And significant amounts of marine biological work and biological oceanography were carried out by small groups from McGill University and the Fisheries Research Board of Canada beginning in 1947, including an outstanding study of Foxe Basin by E.H. Grainger, who overwintered there in the tiny research vessel *Calanus* in 1955-1956.

The election of John Diefenbaker's Progressive Conservative government in 1957 was partly based on the

rhetoric of a "Northern Vision" and on "Roads to Resources"in the north, both electioneering slogans. But the political emphasis was largely on land, not on the oceans, just at a time that the U. S. military began to pull out of the Canadian north, taking with them transportation facilities and infrastructure that had made Canadian study of its own Arctic feasible. The little Canadian research vessel CNAV *Sackville*, refitted by the DRB and RCN for oceanographic work, which went to Davis Strait for IGY surveys in the summer of 1958, was well upstaged by the voyage of the U.S. submarine *Nautilus* from Hawaii to the United Kingdom via the Canadian Arctic and the north pole at the same time. The early 1960s, a time of paradox, saw a decrease in Canadian marine scientific work in the Arctic linked to U.S. military interests, but at the same time an increase in civilian programmes, including the Canadian Polar Continental Shelf Project (initiated in 1958 but very active through the 60s and 70s), along with the foundation of the institutions and programmes that dominated Canadian government marine science activities into the 1990s. A rapid expansion of Canadian oceanography began in 1960, emphasizing the east and west coasts rather than the Arctic. Within two years the Bedford Institute of Oceanography had opened on the East Coast near Halifax, a major ice-strengthened ship, CSS *Hudson* was being built, and plans were developing to build an oceanographic institution in British Columbia. Empire-building by the federal Department of Mines and Technical Surveys led to the establishment of its Marine Sciences Branch in 1962, and the transfer of responsibility for physical oceanography from the Fisheries Research Board, the parent organization of the POG. and the AOG, to the new organization, where, in effect (with some later changes of name and responsibility), it remained until the formation of the current Department of Fisheries and Oceans, which is now responsible for the bulk of Canadian marine research taking place outside the universities.

There is no scarcity of factual information on the history of marine sciences in the Canadian north and Arctic, even though the basic material for study is very widely dispersed and often in inconvenient places like distant archives and government gray-literature reports. Some of the senior administrators of marine science in 1960s Canada are still alive and available for recollections. But there has been no attempt yet to take a synthetic look at the development of these sciences, despite Canada's quite impressive record of accomplishment with very limited resources. Details of how joint U.S.-Canadian programmes like the Beaufort Sea expeditions - or their progenitor, the ASW research collaboration of USNEL and POG. in British Columbia - came into being and were carried out are not known. We do not know in detail just how important the infrastructure provided by the U.S. military or defence contractors was for scientific investigation in the north. We do not know how influential senior administrators of the Canadian marine sciences were with their political masters. And it is not clear whether or not successive Canadian federal governments had coherent research and development policies affecting marine scientific research in the north or if activities took place in an ad hoc fashion. Many other questions of general significance in science policy studies and the history of science remain to be answered based on the tantalizing outlines of marine research in the northern waters of Canada and the Arctic Ocean.

References and Related Publications

Campbell, N.J. 1976. An historical sketch of physical oceanography in Canada. Journal of the Fisheries Research Board of Canada 33: 2155-2167.

Collin, A.E. & M.J. Dunbar. 1964. Physical oceanography in Arctic Canada. Oceanography and Marine Biology Annual Reviews 2: 45-75.

Dunbar, M.J. 1951. *Eastern Arctic waters.* Fisheries Research Board of Canada Bulletin 88, 131pp.

Dunbar, M.J. 1982. The history of oceanographic research in the waters of the Canadian Arctic islands. pp. 141-152 in M. Zaslow (ed.), *A century of Canada's Arctic islands.* Ottawa: Royal Society of Canada.

Foster, M. & C. Marino. 1986. *The Polar Shelf. The saga of Canada's Arctic scientists.* Toronto, NC Press. 128pp.

Goodspeed, D.J. 1958. *A history of the Defence Research Board of Canada*. Ottawa: Queen's Printer. xi +259pp.

Hachey, H.B. 1961. *Oceanography and Canadian Atlantic waters*. Fisheries Research Board of Canada Bulletin 134, 120pp.

Hachey, H.B. 1965. History of the Fisheries Research Board of Canada. Fisheries Research Board of Canada, Manuscript Report Series (Biological). No. 843.

Johnstone, K. 1977. *The aquatic explorers. A history of the Fisheries Research Board of Canada.* Toronto: University of Toronto Press. xv +342pp.

Hachey, H.B., J.P. Tully, H.J. McLellan, L. Lauzier, J.R. Longard & R.E. Banks. 1954. A Review of Canadian Oceaanography. Fisheries Research Board of Canada, Manuscript Reports of the Biological Stations No. 858.

Leary, W. M. 1999. *Under ice: Waldo Lyon and the development of the Arctic submarine.* College Station, Texas: Texas A&M University Press. xxviii + 320pp.

Levere, T.H. 1993. *Science and the Canadian Arctic. A century of exploration, 1818-1918*. Cambridge: Cambridge

University Press. xiv + 438pp.
Middleton, W.E.K. 1979. *Physics at the National Research Council of Canada, 1929-1952*. Waterloo: Wilfrid Laurier University Press. vii+238pp.
Mills, E.L. 1994. Bringing oceanography into the Canadian university classroom. Scientia Canadensis 18 (1): 3-21.
Mills, E.L. 2001. Pacific waters and the P.O.G. The origin of physical oceanography on the West Coast of Canada. In K.R. Benson and P. F. Rehbock (eds), *Oceanographic History: the Pacific and Beyond*. Seattle: University of Washington Press (in press).
Tully, J.P. 1953. Review of Canadian Pacific oceanography since 1938. Proceedings of the Seventh Pacific Science Congress 3: 1-8.
Weir, G. 2001. *An ocean in common. American naval officers, scientists, and the ocean environment.* College Station, Texas: Texas A&M University Press. xix + 403pp.
Zaslow, M. 1971. *The opening of the Canadian north 1870-1914*. Toronto: McClelland & Stewart. xii + 339pp.
Zaslow, M. (ed.). 1982. *A century of Canada's Arctic islands 1880-1980*. Ottawa: Royal Society of Canada. ix + 358pp.
Zaslow, M. 1988. *The northward expansion of Canada 1914-1967*. Toronto: University of Toronto Press. xv + 421pp.

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A PAINTING OF H.M.S. *CHALLENGER*

An 18"x24" oil painting of the Victorian oceanographic vessel H.M.S. *Challenger* has come to light. The painting depicts *Challenger* in the mid Atlantic, secured by hawser at St. Paul's Rocks. In all likelihood, it is based on a drawing made by *Challenger*'s artist, Swiss-born John James Wild (1828-1900) when the ship visited St. Paul's Rocks in August 1873 (see p. 98 of P.F. Rehbock (ed.), 1992. *At Sea with the Scientifics: the* Challenger *Letters of Joseph Matkin*. Honolulu: Univ. of Hawaii Press). Photographs of Wild's drawings were made by the ship's photographer for sale to the crew, and it is likely that Ship's Steward's Assistant Joseph Matkin (1853-1927) obtained a photograph of this drawing and had the painting executed from it by an unknown Chinese artist in Hong Kong, when *Challenger* visited that port from December 1874 to January 1875.

Unfortunately the painting has suffered considerable damage. The canvas is extremely thin, has been torn in a number of places, and is brittle around the edges of its wooden mounting. But the center of the scene - the ship - is unharmed. Restoration is underway currently.

The painting of *Challenger* was received by the author in July 2001 from Mrs Jean Wakem of Deeping St. James, Peterborough, UK. Mrs Wakem's late husband, Derek Wakem, a schoolmaster at the Forest School in North London, recovered it from the school's refuse bin in the 1960s. It is believed that it was donated to the school's museum sometime early in the twentieth century by a member of the Pack family, which had connections to the school. A granddaughter of Joseph Matkin, presumably heir to the painting, had married into the Pack family.

Further details about the painting will be published when the restoration has been completed. I am exceedingly grateful to Mrs Wakem for preserving and donating this unique rendeering of oceanographic history.

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XXIst INTERNATIONAL CONGRESS OF HISTORY OF SCIENCE IN MEXICO CITY
"Science and Cultural Diversity"

As decided at the XXth Congress of the International Union of History and Philosophy of Science/Division of History of Science (IUHPS/DHS) in Liège/Belgium in 1997, this congress took place in Mexico City (which had announced its application for hosting the Congress of IUHPS/DHS already in 1989 at the XVIIth Congress in Hamburg and Munich/Germany.) from 8-14 July 2001. The congress was organized by Prof. Juan José Saldaña of the Sociedad Mexicana de Historia de la Ciencia y la Tecnologia; at the end of the congress he was elected new Secretary General of IUHPS/DHS. In general speeches it was emphasized more than once that this congress was the

first one outside of the 'western' - the so called high-developed or high-technologized - countries.

The venues of the congress were the Palacio de Mineria, the Palacio de Medicina and the Palacio de Bellas Artes, all located in the historical district of Mexico City and about 15 walking minutes apart from each other. Participants could also use one of the shuttle buses commuting between these palacios.

At the opening ceremony Prof. Roshdi Rashed from France gave an inaugural lecture (in French, a printed English version was distributed among participants) on "History of science and diversity at the beginning of the 21th century". He stressed the point that the discipline of history of science has broadened its scope to social research on the sciences and recommended that it should also deal with the cultural phenomenon of science in the future (which, by the way, is a prioritized objective of our *Historisch-Meereskundliches Jahrbuch*). In consequence, later during the congress, the General Assembly agreed upon the establishment of a new Commission on Science and Cultural Diversity.

The joint session of the Pacific Circle and the Oceanography Commission of IUHPS/DHS, chaired by Mike Osborn and myself, was surprisingly well attended (about 20 persons including some of the meteorology branch, which has now established its own Commission on History of Meteorology). Unfortunately 5 of 12 speakers listed in the program had been unable to come, which gave us unexpected extra time in the very tight schedule for extensive discussions. Since it was not proposed to publish the contributions of this session, three speakers are interested to see their papers published in the *Historisch-Meereskundliches Jahrbuch.*

I attended the General Assembly on behalf of the Commission of Oceanography of DHS. The extension of the presidency of the Oceanography Commission of Eric Mills was accepted for a further 4-year-period without comment. Two commissions were discontinued due to inactivity for a couple of years. By 37:29:1 votes Beijing was selected as venue for the next congress in 2005 against an alternative proposal from Budapest. With some hesitation due to the situation of human rights in China I did vote for Beijing, because it had applied for the third time and it would bring the congress to Asia for the first time. I would have wished that this question had been brought up in the discussions within our commission before. All council members were elected according to the proposal of the nominations committee, except the only woman, Kirsti Andersen from Denmark (the 7th, i.e. last, assessor), had been proposed by Joan Mason of the Royal Society, UK.

I also attended an ad hoc meeting of the Council at the very last day on future perspectives, at which national delegates from the UK, Germany and USA presented critical opinions on the present activities of the Division, such as decreasing participation, lack of transparency and communication within the Council and national delegates, missing bridges to other fields of the Union, and poor promotion of young scientists.

Finally, it should be mentioned that the organizers arranged social-cultural events for every evening - a very effective way to promote contacts between participants of different disciplines. The most exciting ones were a Fiesta Mexicana with mariachi music, excellent food and tequila as well as the visit of the Ballet Folklórico de México.

Walter Lenz, Institut für Klima - und Meeresforschung, Universität Hamburg, Hamburg, Germany

THE VIIth INTERNATIONAL CONGRESS OF OCEANOGRAPHY - KALININGRAD 2003

As announced in last September's *History of Oceanography*, the VIIth International Congress of Oceanography (ICHO-VII) will be held in Kaliningrad, Russia, in August 2003, organized by the Museum of the World Ocean, the Russian Academy of Sciences, the Ministry of Culture of the Russian Federation, and Ministry of Industry, Science and Technology.

The main theme of the Congress is "International Aspects of the History of Development of Marine Sciences." Exhibits at the Museum of the World Ocean, and its principal display, the famous research vessel *Vitiaz*, will form the centerpieces of ICHO-VII.

A first announcement of ICHO-VII is in preparation and should be sent to everyone on the mailing list of *History of Oceanography*. In the meantime, proposals for papers or symposia and requests for information may be sent to:

Museum of the World Ocean
Naberezhnaya Petra Velikogo, 1
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PROCEEDINGS OF ICHO-VI, QUINGDAO, CHINA, 1998

Paris, 12 July 2001. Production of ICHO VI proceedings is underway. Good news for those who submitted papers at ICHO VI!

Arrangements have now been set up for the publication of the selected papers of the Sixth International Congress of History of Oceanography (ICHO VI), held in Qingdao, China, August 1998. Largely due to technical difficulties, such arrangements were time-consuming in getting off the ground, but now funding has been identified and the reviewing, editing and publishing apparatus and procedure have been worked out.

As you perhaps will recall, the ICHO VI organizers requested that all manuscripts be submitted directly to Professor Mingyuan ZHU, First Institute of Oceanography (FIO, Qingdao), before the end of 1998. Subsequently, FIO and the Intergovernmental Oceanographic Commission (IOC) of UNESCO decided to co-operate in publishing the proceedings, partly to shoulder jointly the burden of increased costs nowadays of production, printing and distribution, but also in order to increase and enhance their international diffusion and availability. As of 10 July, the project had attracted the additional support of the International Ocean Institute (IOI, serving as a "trigger" for other co-sponsorships), the Chinese Delegation to IOC, the USA's Office of Naval Research, UNESCO's Venice Office and CSI platform, the Marine Policy Center of Woods Hole Oceanographic Institution, and Chelsea Instruments, Ltd. (UK). Other support, including that of the German Research Ministry and ROPME (Regional Organization for the Protection of the Marine Environment, Secretariat in Kuwait), may be forthcoming.

How it is being done:

An official agreement was recently established between UNESCO (through its IOC) and FIO, whereby IOC assumes the responsibility for the reviewing and final editing of all papers, as well as for the composition and layout for printing. An Editorial Panel has been set up, with Selim MORCOS (ICHO VI participant/author) as Chairman, and Mingyuan ZHU (ICHO VI organizing committee at FIO) as Vice-Chairman. Other members of the Panel are: Roger CHARLIER, Gunnar KULLENBERG, Walter LENZ, Zhendi PAN, and Emei ZOU. Various members of the Panel, its advisers and other assisting colleagues met in UNESCO, Paris, for initial consultations during the months of June and July 2001. The Panel co-opted the services of Mr. Gary Wright, as Technical Editor, and of Dr. Makram Gerges, as Associate Editor. It is foreseen that the final product will be published jointly by UNESCO/IOC and by FIO, through Ocean Press China.

Authors take note!

An effort is being made by the organizers of the proceedings publication project to afford all authors the opportunity to quickly update and upgrade their papers, not only in view of important and more recently available information, but also to adhere to UNESCO's publishing norms and standards. Authors are being provided with guidelines for the ICHO VI proceedings publication, both in order to help them and to expedite the final editing.

Papers that were submitted *by Chinese authors* should be re-submitted, with updated information (if desired) and in accordance with the above-mentioned guidelines, to Prof. Zhu, FIO, (myzhu@public.qd.sd.cn) and will be initially reviewed and edited by the Chinese members of the Editorial Panel. *All other authors* should correspond directly with Dr Morcos, who, as Panel Chairman, has the responsibility of supervising the organization of the reviewing and editing for content of all papers, including the final editing of the Chinese papers. Correspondence from non-Chinese authors should be addressed directly to him (selimmorx@aol.com) with copy to Gary Wright (g.wright@unesco.org,) of IOC. Mr Wright will provide liaison services, particularly inside UNESCO, and will be responsible for the final copy-editing of the entire manuscript and will supervise the composition and layout. FIO will be responsible for the printing and much of the distribution. As well, IOC will distribute, free of charge, about 1000 copies to its distribution list, which includes institutions and agencies world-wide.

Role of the Commission of Oceanography

The Commission of Oceanography of IUHPS is assisting the IOC of UNESCO in the implementation of the project to review and edit the manuscript. Thus it joins the afore-mentioned co-sponsors and supporters in making possible the ICHO VI proceedings publication.

About the Editorial Panel

Selim Morcos is a former professor of oceanography at the University of Alexandria and former staff member of the (then) Division of Marine Sciences of UNESCO. Mingyuan Zhu is research professor and Director, Division of Marine Biology at FIO. Roger Charlier is a professor of geology, most recently at the Free University of Brussels and the University of Chicago. Gunnar Kullenberg, former professor of physical oceanography at the University of Copenhagen and former Executive Secretary of the IOC, is currently Executive Director of IOI. Walter Lenz, of the Zentrum für Meeres- und Klimaforschung (Hamburg), is Vice-Chairman of the Commission of Oceanography. Zhendi Pan is professor of physical oceanography and currently Director of the Polar Research Institute in Shanghai. Emei Zou is professor of physical oceanography at FIO. Makram Gerges is former Regional Director for UNEP and currently a Senior Research Fellow at the Marine Policy Center of Woods Hole Oceanographic Institution (USA). The Panel thus represents a combination of considerable experience and knowledge in the realms of oceanography and of scientific and historical literature.

Gary Wright, IOC, UNESCO, 1, rue Miollis, 75732 Paris cedex 15, France

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Gary Wright was, for over a decade, the editor of UNESCO's *International Marine Science (IMS) Newsletter* (the printed version of *IMS* was discontinued in July 1996) and other UNESCO marine science publications. Since his retirement he has continued to serve as a publications consultant for IOC of UNESCO.

REPORTS ON THE HISTORY OF OCEANOGRAPHY IN RUSSIA

A lengthy and very useful manuscript titled "Russia. Reports on the History of Oceanography Presented at Conferences held by the Museum of the World Ocean (Kaliningrad)" was sent to *History of Oceanography*. Space constraints restrict me to only some of the information from the past four years, presented here in abbreviated form. For more information, please contact Dr Svetlana Sivkova, Museum of the World Ocean, Naberezhnaya Petra Velikogo, 1, 236006 Kaliningrad, Russia - *Editor*

A) THE 8TH CONFERENCE HELD BY THE RUSSIAN GEOGRAPHIC SOCIETY (KALININGRAD BRANCH) AND THE MUSEUM OF THE WORLD OCEAN (KALININGRAD): *COMPLEX STUDY OF THE ATLANTIC OCEAN BASIN* 1997:

1. D.Ya.Berenbeim (Kaliningrad). The World Ocean and Myths of Ancient Greece.
2. M.I.Polischuk, P.P.Chernyshkov, V.N.Yakovlev (Kaliningrad). Contribution of Fishing Oceanology to the Studies of the Geography of the Ocean (the Atlantic Ocean and the South-East Pacific taken as an example).
3. R.V.Abramov (Kaliningrad) Edmond Halley's Studies of the Atlantic.
4. L.A.Ghimbitskaya (Kaliningrad). The Main Stages of Development of Equipment for the Research of the Sea Bottom Relief.
5. A.B.Zubin (Kaliningrad). The 40th Anniversary of AO IORAN.
6. S.V.Dolgova (Kaliningrad). Kolchak's Name on the Map of the Arctic.
7. I.N.Boikina (Kaliningrad). Circumnavigation of the Bark "KRUZENSHTERN".

B) THE 9TH CONFERENCE HELD BY THE RUSSIAN GEOGRAPHIC SOCIETY (KALININGRAD BRANCH) AND THE MUSEUM OF THE WORLD OCEAN (KALININGRAD): *COMPLEX STUDY OF THE ATLANTIC OCEAN BASIN* 1999:

1. V.L.Stryuk, L.L.Emelianova, E.A.Romanova (Kaliningrad). Russian Geographic Research and Discoveries in the World Ocean.
2. V.N.Yakovlev (Kaliningrad). Main Achievements in Fishing and Oceanology Research held by the AtlantNIRO and the Zaprybpromrazvedka.
3. I.G.Sigaev (Kaliningrad). Results of Fishing and Oceanology Research Held by the AtlantNIRO in the North-West Atlantic.
4. M.I.Polischuk, V.N.Shnar, V.N.Yakovlev (Kaliningrad). Fishing and Oceanology Research in the Atlantic Part of Antarctica.
5. P.P.Chernyshkov (Kaliningrad). Main Results of Fishing and Oceanology Research held in the Central-East

Atlantic.

6. T.E.Pashkova (Murmansk). Some Historical Aspects of Research in the Barents Sea.
7. L.A.Ghimbitskaya (Kaliningrad). Programs of Research of the Atlantic Bottom Relief.
8. O.K.Sedov (Kaliningrad). Contribution of the Barks KRUZENSHTERN and SEDOV to the Exploration of the World Ocean.
9. R.V.Abramov (Kaliningrad). On Onomastics of the First Ships of Exploration.
10. L.L.Emelianova (Kaliningrad). Drawing Materials of Russian Marine Scientific Expeditions (the late 18th - the first half of the 19th cent.) as a Sourse of Naturalistic and Historical Information.
11. A.V.Smirnova (Kaliningrad). Outstanding German Oceanographer and Glaciologist E.Drygalsky, a Native of Koenigsberg.

C) THE 2NDINTERNATIONAL CONFERENCE *HISTORY OF NATIONAL OCEANOLOGY* (ORGANIZED BY THE MUSEUM OF THE WORLD OCEAN) 1999: The History of the Research Vessel "Vityaz" and Her Role in World Ocean Investigations.

1. I.Afonin,V.Stryuk,I.Afonina. (Kaliningrad)Main Stages of Reconstruction of the Research Vessel "Vityaz." S.Dolgova.(Kaliningrad) Unknown Pages of the Glorious Ship's History
2. N.Makeyeva. (Kaliningrad)Contribution of the R\V "Vityaz" to the Exploration of the Fishing Grounds in the World Ocean
3. A.Sminova (Kaliningrad). History of the vessel "Mars"
4. G.Udintsev.(Moscow) From the History of the R/v "Vityaz". Preparation for Geological Research (1946-1949) and Geological Works of 1-st and 2-nd "Vityaz" Cruises
5. I.Khabidova.(Kaliningrad) Investigations of the Deep water Trays aboard the R\V "Vitas" and Impossibility to Damp Nuclear Remains in the Ocean
6. E.Khoromskaya. (Kaliningrad)The Role of the R\V "Vityaz" reflected in the System of the Official Propaganda in the USSR
7. B.V.Shekhvatov.(Moscow) "Vityaz": New Technology

Foundation of Oceanography

1. R.Abramov (Kaliningrad) On Onomastics of the First Research Vessels in Russia
2. N.Ermakova. (Kaliningrad)About Tuition of Mineralogy at the Albertina University
3. S.Ignatyev (Sebastopol)Research Fleet of Russia (late XIX-early XX centuries)
4. V.Krasnov. (Moscow)Admiral Makarovs Hydrological Research and Academy of Sciences
5. E.g.Kuznetsov,A.P.Yaremenko.(Kaliningrad) Main paths and Stages in the National Shipping of Navigation, Sea transport and National Shipping of Navigation, Sea Transport and Oceanography in Pre - revolutionary Russia
6. V.Sinyukov (Moscow). A 100 - year Schooner(1899-1999) "Zaria" - the First Vessel of the academy of Sciences and the Russian Rescue Expedition under the Command of a.V.Koltchak(1903)
7. V.Smirnov (St.Petersburg). S.O.Makarov and the Academy of Science

Research Oceanography Institutions and Their Investigations

1. A.J.van Bennekom (Holland). Some Notes on the History of Marine Research in the Netherlands
2. E.Goubanov, I.Serobaba, V. Budnichenko (Kerch). The History of YugNIRO Marine Oceanological Research
3. I.M.Ovchinnicov (Gelendzhik). The advanced Post of the Russian Oceanology at the Black Sea
4. E.Sentabov (Murmansk). History and Current Oceanological Research of PINRO in the Norwegian and Greenland Seas
5. A.Furduev, R.Shvachko (Moscow). Studies of the Ocean Aboard Scientific - Research Vessels of the Acoustics Institute

Prominent Researchers of the Ocean and Scientists - Oceanographers

1. B.M.Balayan (Kaliningrad). The Contribution of M.M.Ermolaev to the Arctic Exploration
2. E.Golotsvan (Moscow). Heads of the Sevastopol Biological Station and Their Contribution to the Russian Hydrobiology
3. L.Demina (Moscow). P.Bezrukov is the Founder of the National Marine Geology
4. S. Ignatyev,A.Ivanov (Sebastopol). With the Name of Kovalevsky on Board
5. N.Komarova (Moscow). F.I.Soymonov'sName in the History of Russian Sea Navigation
6. V.I.Lymarev (St.Petersburg). O.K.Leontyev and Ocean Science

Geological and Geometrical Investigations

1. B.I.Vasiliev, V.V.Gorbachev (Vladivostok).Development of Marine Geological and Geophysical Studies in the Russian Far East
2. L.Ghimbitskaya (Kaliningrad). On the History of Bottom Relief Cartographing of the Atlantic Ocean
3. E.Emelyanov (Kaliningrad). The Investigation of the Baltic Sea as a Model of Sedimentation and Ore Formation
4. E.M.Emelyanov(Kaliningrad). History of some Scientific Ideas in the Oceanology (1960 - 1999)
5. E.M.Emelyanov (Kaliningrad). Russian Lythological-Geochemical Studies in the Atlantic Ocean During 1969-1999
6. L.Zakharov (Kaliningrad). The History of the Bottom Sediment Investigations on the Atlantic Shelf for Fishery Purposes
7. G. Kharin (Kaliningrad). Investigations of Magmatism on the ocean Bottom
8. K.Shmikus, E.Emelyanov(Gelendzhik. Kaliningrad). Russian Geological Studies in the Mediterranean Sea
9. K.Shimkus, E.Emelyanov.(Gelendzhik Kaliningrad). Russian Geological studies of the Black Sea
10. K.Shimkus,E.Emelyanov(Gelendzhik. Kaliningrad). International Projects for the Black Sea Geological Studies

Biological Investigations

1. Yu.Gargopa (Rostov-na-Donu). The State of Investigations of the oceanological Conditions for Formation of Azov Sea Bioresourses
2. M.Heptner Moscow). Principal Stages in the National Biological Investigations of Coral Reefs and Atolls
3. E.Krasnov (Kaliningrad). On the History Of National Reefology
4. I.Smirnov, A.Neyelov A.Golicov (St.Petersburg). History of Biological Oceanology, Data Bases and Global Ecology
5. N.Yudenkova (Kaliningrad). The History of Pollution and Enviromental protection Problems Investigations in the Baltic Sea
6. A.Pedchenco (Murmansk). The Irminger Sea and History of Researches and Modern Methods of Oceanographic Observations

Information Data Base and Engineering Studies

1. E.Vyazilov (Obninsk). History of the World Ocean Research in the Oceanographic Data Base
2. V.Gritsenco, E.Zabolotnova (Kaliningrad). GIS AS Natural Result of Evolution in Storage Information Forms
3. M.Zaferman (Murmansk). Technical Oceanology : Applied Aspects

Applied Oceanographic Researches

1. A.Alekseev, V. Borovkov, A.Mikhin, T.Tereschenko, V.Shleinik (Murmansk). The Kola Meredian Section and Its Role in the Development Of Fishery and Oceanography in Russia (Devoted to a 100 - year Anniversary since the Beginning of Observations
2. O.Sedov,A.Remeslo (Kaliningrad). New Quality for the Bark “Kruzenshtern”
3. V.N.Yakovlev (Kaliningrad). Ocean and Oceanologists “Smelling” Fish

Current Conditions of Research Fleet

1. S.Ignatyev (Sebastopol). Modern Condition of Research Fleet in Ukraine
2. G.Smirnov (Moscow). Russian Academy of Sciences Research Fleet and Suggestions for Its Exploitations

New Trends in the Science of Ocean

1. V.Litvin (Kaliningrad). Appearance and Formation of the Marine Landscape Science
2. A.F.Plakhotnik (Moscow). Conceptual Foundation of the Modern Knowledge Development About the World Ocean Nature

Oceanology in Museum Expositions And Museum Collections

1. I. Boikina (Kaliningrad). Review of the Museum Store Stocks at the Russian Federation Museum of the World Ocean
2. B. Zalogin, K.Kuzminskaya (Moscow). Development of Oceanology in the Expositions of the Earth Sciences Museum at Moscow Lomonosov State University

3. N. Lukashina, V.Stryuk (Kaliningrad). The Catalogue of Palaeontological Specimens of Museum of the World Ocean
4. E. Romanova (Kaliningrad). The Scientific Concept of Natural Complex in the Museum of the World Ocean
5. V.Stryuk, L.Emelianova (Kaliningrad). Museum of the World Ocean: a New Center for Research in the History of Oceanography.
6. V. Stryuk,G. Kharin, D.Yeroshenko (Kaliningrad). The Catalogue of Geological Specimens at the Museum of the World Ocean

The Role of Painters in the Research of the World Ocean

1. M. Heptner (Moscow). The Role of N.N.Kondakov (1908-1999) a Zoologist- Painter in the Development of National Sea and Ocean Biological Investigations in the Country
2. L. Emelyanova (Kaliningrad). History of Naturalist Painting in Russia and the role of Pioneering Expedition Painters in Study of Wild World
3. V. Zernova (Moscow). Sea, Science and Art

New Books on the History of Oceanography

1. V.Litvin, V.Stryuk (Kaliningrad). New Reference Book "Russian scientists-participants in the voyages of the r/v VITYAZ".

NEWS AND EVENTS

ROZWADOWSKI RITTER FELLOW FOR 2001. The William E. and Mary B. Ritter Memorial Fellowship of the Scripps Institution of Oceanography, the premier award recognizing accomplishment in the history of the marine sciences, was received this year by Dr Helen Rozwadowski of the Georgia Institute of Technology's Program in History of Science. Dr Rozwadowski's lectures at SIO and in the University of California at San Diego's Science Studies program were titled "Science and turn-of-the-twentieth century internationalism: the International Council for the Exploration of the Sea (ICES) and other contemporary examples," "No longer 'forever closed to human gaze:' nineteenth-century discovery of the deep sea," and "The uneasy partnership of physics and biology: development of fisheries oceanography throughout the twentieth century." Her book on the history of the International Council for the Exploration of the Sea is now being prepared for publication by the University of Washington Press in Seattle.

MAURY III HELD IN PACIFIC GROVE. The Third Matthew Fontaine Maury Workshop on the History of Oceanography was held in Pacific Grove and Moss Landing, California from June 20-24, 2001 under the heading "The Machine in Neptune's Garden: Historical Perspectives on Technology and the Marine Environment." The prepared papers treated topics such as history of anti-submarine and fisheries acoustics, the role of individuals such as Roger Revelle and Mary Sears, the importance and fate of large hydraulic models, the relation between oceanography and the atomic bomb, contributions of deep ocean drilling, data-gathering buoys and El Niño, the role of technicians in tidal theory, engineering and the oceans in the 1960s, and the introduction of mathematical physics into studies of ocean circulation. The papers are being prepared for submission as a book manuscript to a major publisher.

NEW HISTORY OF GEOPHYSICS COMMITTEE. The American Geophysical Union announces the creation of a new History of Geophysics Committee "to bring together members of the AGU interested in the history of the geosciences. The sponsoring technical committee cuts across all the sections." For information, contact <wsinhateh@agu.org>.

GUIDE TO THE EDWARD ALLEN FRIEMAN PAPERS. Scripps Institution of Oceanography Archives has completed *A guide to the Edward Allan Frieman papers, 1959-2000*, Manuscript Collection MC 77. It may be accessed electronically via the Online Archive of California at <http://www.oac.cdlib.org/dynaweb/ead/ucsd/scripps/> or in hard copy from the SIO Archives as SIO Reference Number 00-15, 162 pages. The papers of Edward Frieman (b. 1926), 85 cubic feet, document his career as physicist, Assistant Secretary of the Dept. of Energy, Vice Chair of the White House Science Council under Ronald Reagan, Vice president of the SAIC, and Director of the Scripps Institution of Oceanography. They are particularly strong in American science policy during the Carter and Reagan presidencies. A great deal of material documents the world

of academic science, the US military, the intelligence community, and science in industry after the end of the Cold War, including the move of US science policy away from a view focused on conflict with communist nations and the Bush/Conant arguments for government support of science toward a new world view and national expectations for science.

HMS *Challenger* AND ABORIGINAL SKELETAL REMAINS. Michael Westaway, Manager of the Repatriation Section of the National Museum of Australia (m.westaway@nma.gov.au) is interested in hearing form anyone with information about the collecting locations of aboriginal skeletal remains that were given to members of the *Challenger* Expedition in March 1874 during the ship's visit to Australia. Originating from the Framlingham Aboriginal Community in SW Victoria, the remains have been returned to Australia from Edinburgh, but it is not certain exactly where they originated.

HISTORY OF MARINE SCIENCE IN ROMANIA. The Commission of Oceanography's regional representative Dr Alexandru Bologa of the Romanian Marine Institute in Constanta sends the following information about activities there in the history of marine sciences. 1) Commemoration of 125 years of the Romanian Geophysical Society (founded 15 June 1875) was held by the Romanian Academy of Sciences in Bucharest on February 4, 2001. 2) A scientific session of the Romanian Academy in Bucharest on May 16, 2001 included a paper by Dr Alexandru Marinescu on the French marine biologist Henri Lacaze-Duthiers and his Romanian students. 3) The annual symposium of the Romanian Committee of History and Philosophy of Science and Technology (Subcommittee Constanta) met in Constanta on June 30, 2001 and included a paper by Mariana Pavaloiu "Cdr. (r.) Eng. Corneliu Enachescu - contributions to the history of Cateanu map (1897-1902)." 4) Dr Bologa attended the XXIst International Congress of History of Science in Mexico City; his paper there was titled "International development of marine sciences in the Black Sea area."

BIBLIOGRAPHY OF BIOGRAPHIES OF MARINE SCIENTISTS. A preliminary version of a cumulative bibliography of biographies of marine scientists, useful to historians, students, policy-makers, and the world of learning at large is now available at the following address: http://www.scilib.ucsd.edu/sio/indexes/biographies.html. Its compiler, Deborah Day, Archivist of the Scripps Institution of Oceanography, would like to hear from anyone with corrections of or additions to this bibliography. Please contact her at <dday@ucsd.edu> or by mail at Archives, Scripps Institution of Oceanography, University of California at San Diego, La Jolla, CA 92093-0219, USA.

BIBLIOGRAPHY AND BIOGRAPHIES

BIBLIOGRAPHY

Allard, Dean C. 1999. The origins and early history of the steamer *Albatross*, 1880-1887. *Marine Fisheries Review* 61 (4) : 1-21.

Allard, Dean C. 2000. Spencer Baird and support for American marine science, 1871-1887. *Earth Sciences History* 19 (1): 44-57.

Anuarul Muzeului Marinei Romane 2000 (Romanian Naval Museum Yearbook 2000), III no. 1. Constanta: Ed. C.N./A.P.M.C., 2001, 267 pages.

Atanasiu, C., M. Cojoc and A. Atanasiu, *Navigatie si...politica (Navigation and ...politics).* Constanta: Ed. Muntenia & Leda, 2001, 224 pages.

Ballard, Robert D. and Will Hively. *The eternal darkness: a personal history of deep-sea exploration*. Princeton: Princeton University Press, 2000, xii, 388p.

Baughman, T.H. *Pilgrims on the ice: Robert Falcon Scott's first Antarctic expedition.* Lincoln, Nebraska & London: University of Nebraska Press, 1999, xvii, 334 pages.

Bologa, Alexandru S. 1999. The VIth International Congress on History of Oceanography. *Noesis: Travaux du*

Comité Roumaine d'Histoire et de Philosophie des Sciences XXIV: 189-190.

Bologa, Alexandru S. And Nicolae C. Papadopol. 1999. Évolution des moyens nautiques de recherches océanologique en Roumanie (1893-1996). I. Recherches sur la Mer Noire. *Noesis: Travaux du Comité Roumaine d'Histoire et de Philosophie des Sciences* XXIV: 165-176.

Bryant, John H. and Harold N. Cones. *The first modern polar expedition, 1925.* Annapolis: Naval Institute Press, 2000, 232 pages.

Bunton, William J. *Death of an aquanaut; a vivid memoir of events that triggered the collapse of the U.S. Navy's Sealab project.* Hong Kong: Best Publishing Company, 2000, 69 pages.

Burstyn, Harold L. 'Big science' in Victorian Britain: the Challenger Expedition (1872-6) and its report (1881-95). In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 49-55.

Calatorii extraordinare (Extraordinary voyages). Conferences presented by the Romanian Geophysical Society between 1886-1928. Bucuresti: Ed. CD Press, 2000.

Carozzi, Albert. *Manuscripts and publications of Horace-Benedict de Saussure on the origin of basalt (1772-1797).* Geneva: Editions Zoe, 2000, xxviii, 769p.

Charlier, R.H. 1997. Re-invention or aggorniamento? Tidal power at 30 years. *Renewable and Sustainable Energy Reviews* 1 (4): 271-289.

Charlier, R.H. and L. Menanteau. 1997. The saga of tide mills. *Renewable and Sustainable Energy Reviews* 1 (3): 171-207.

Citizen, seaman, scientist (dedicated to S.D. Lappo). Collection of articles. Moscow: Publishinginf Center "Meteorology and Hydrology," 1997 (in Russian; summary in English).

Day, Deborah, et al. 2000. *A guide to the Edward Allan Frieman papers, (1959-2000).* La Jolla: University of California, San Diego/Scripps Institution of Oceanography, SIO Reference 00-15 (September 2000), 162 pages. (Electronic copy also available at the Online Archives of California with a link from the SIO Archives web page: http://scilib.ucsd.edu/sio/archives)

Deacon, M.B. 1999. A grounding in science? John Murray of the *Challenger*, his grandfather John Macfarlane, and the Macfarlane Museum at Bridge of Allan. In: *Natural history and the sea*, edited by J.A. Gibson. *The Scottish Naturalist* 111, 225-265

Deacon, Margaret, Tony Rice and Colin Summerhayes, eds. *Understanding the oceans: a century of ocean exploration.* London, New York: UCL Press, 2001, xviii, 300 p.

Dekker, Elly, ed. *Globes at Greenwich: A catalogue of the globes and armillary spheres in the National Maritime Museum.* Oxford, New York: Oxford University Press, 1999, 592 pages.

Farrington, John W. 2001. Sverdrup, Johnson and Fleming's *The oceans* revisited: what is the future of graduate education in ocean sciences? *Oceanography* 14 (2): 34-39.

Fisher, Susanna. 2001. The organisation of hydrographic information for English navigators: five hundred years of sailing directions and charts. *Journal of Navigation* 54 (2): 157-166.

Fogg, Gordon E. 2000. The Royal Society and the Antarctic. *Notes & Records of the Royal Society* of *London* 54 (2): 85-98.

Fogg, Gordon E. 2000. The Royal Society and the South Seas. *Notes & Records of the Royal Society of London* 55

(1) (Millennium Issue): 81-103.

*40 years since the day of foundation. P.P. Shirshov Oceanology Institute, Atlantic Branch.*Kaliningrad: Russian Academy of Sciences, 1998.

Friedrich, Walter L. and Alexander R. McBirney. *Fire in the sea; the Santorini volcano: natural history and the legend of Atlantis.* Cambridge, England: Cambridge University Press, 2000, xiv, 258p.

Funnell, Brian M. Palaeoceanography: Tapping the ocean's long-term memory. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 124-137.

Gall, R. and M. Shapiro. 2000. The influence of Carl-Gustaf Rossby on mesoscale weather prediction and an outlook for the future. *Bulletin of the American Meteorological Society* 81: 1507-1523.

German, Christopher R. Hydrothermal activity at mid-ocean ridges. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 138-152.

Gould, W. John. Direct measurement of subsurface ocean currents. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 173-192.

Grassle, J. Frederick. 1998. 'Nothing could diminish the excitement of seeing the animals for the first time:' biologists' first look at vent communities - Galápagos Rift 1979. *Oceanus* 41 (2): 1-5.

Guymer, T.H., P.G. Challenor and M.A. Srokosz. Oceanography from space: past success, future challenge. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 193-211.

Hackemer, Kurt Henry. *The U.S. Navy and the origins of the military industrial complex.* Annapolis: Naval Institute Press, 2001, xii, 183.

Hamblin, Jacob. 2000. Visions of international cooperation: the case of oceanic science. *Minerva* 38: 393-423.

Hamblin, Jacob. 2000. Science in isolation: American marine geophysics research, 1950-1968. *Physics in Perspective* 2: 293-312.

Hanauer, Eric. 2000. Fish imagery through the ages. *Dive Training* 10 (11): 30-39.

Hanauer, Eric. Winter 2000/2001. Scientific diving in America: a look back. *Marine Technology Society Journal* 34 (4): 5-10.

Hlebica, Joe. 2000. The biological colony: Scripps Institution of Oceanography 1916 to 1924. *Scripps Institution of Oceanography Explorations* 7 (1): 22-29.

Hlebica, Joe. 2001. The call to war: Scripps Institution of Oceanography 1936 to 1948. *Scripps Institution of Oceanography Explorations* 7 (3): 20-29.

Hlebica, Joe. 2001. Roger Revelle and the great age of exploration. *Scripps Institution of Oceanography Explorations* 8 (1): 22-29.

Ionescu, I., G. Boranda and M. Mosneagu, *Noi contributii la istoria Marinei Militare Romane (New contributions to the history of the Romanian Military Navy).* Constanta: Ed. Muntenia & Leda, 2001, 240 pages.

Kunzig, R. *Mapping the deep. The extraordinary story of ocean science.* New York: W.W. Norton, 1999, 345 pages.

Larson, Edward J. *Evolution's workshop: God and science on the Galápagos Islands*. New York: Basic Books, 2001, xiv, 320.

Laughton, A.S. Shape as a key to understanding the geology of the oceans. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 92-107.

Levin, Tanya and Ronald E. Doel. 2000. The Lamont-Doherty Earth Observatory Oral History Project: a preliminary report. *Earth Sciences History* 19 (1): 26-32.

Litivin, V.M. *Russian scientists - participants of the research vessel "Vitiaz" voyages*. Kaliningrad: Museum of the World Ocean, 1999, 169 pages (in Russian; summary in English).

Mamaev, O.I *To the memory of the friend. A collection of articles. Reminiscences about about Professor Oleg I. Mamaev.* (in Russian; summary in English).

Marsden, Rosalind. Expedition to investigation: the work of the Discovery Committee. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 69-86.

Mickhailov, M., E. Vyazilov, V. Lomanov and N. Studentov. *Russian marine expeditional investigations of the World Ocean*. St Petersburg: Gidrometeozdat, 1998 (in Russian, summary in English).

Mills, Eric L. Oceanography. In: *Readers guide to the history of science*, edited by Arne Hessenbruch. London: FitzroyDearborn, 1999, 531-532.

Mills, Eric L. 'Problem children of analytical chemistry.' Elucidating the seasonal cycle of marine plankton production through nutrient analysis. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 229-250.

Mindell, David A. *War, technology and experience aboard the USS Monitor*. Baltimore and London: Johns Hopkins University Press, 2000, xii, 187p.

Nelson, Clifford M., ed. 2000. *Records and history of the United States Geological Survey.* CD-ROM. Washington, D.C.: U.S. Geological Survey, U.S. Department of the Interior.

Ojaveer, E., L. Rannak and T. Laevastu. *One and a half centuries of sea and fisheries investigations in Estonia*. Tallinn: Estonian Academy Publishers, 2000.

Oleson, John Peter. 2000. Ancient sounding weights: a contribution to the history of Mediterranean navigation. *Journal of Roman Archaeology* 13: *294 -310*

Oreskes, Naomi. 2000. Getting oceanography done. *Earth Sciences History* 19 (1): 36-43.

Pauly, Philip J. *Biologists and the promise of Ameican life: from Meriwether Lewis to Alfred Kinsey*. Princeton, N.J.: Princeton University Press, 2000, xvi, 313.

Phillips, John L. *The bends: compressed air in the history of science, diving, and engineering*. New Haven, Connecticut; London: Yale University Press, 1998, xii, 260pages.

Plakhotnik, A.F. *History of sea exploration by Russian scientists until the middle of the 20th century*. Moscow: Nauka, 1996 (in Russian; summary in English).

P.P Shirshov Institute of Oceanology. *Chronicles of expeditionary actions of the Institute (O. Kuznetsov, V. Kort).* 2 issues. Moscow: P.P. Shirshov Institute for Oceanology, 1993 (in Russian; summary in English).

Rainger, Ron. 2000. Patronage and science: Roger Revelle, the U.S. Navy, and oceanography at the Scripps Institution. *Earth Sciences History* 19 (1): 58-89.

Rainger, Ron. 2001. Constructing a landscape for postwar science: Roger Revelle, the Scripps Institution, and and University of California, San Diego. *Minerva* 39 (3): 327-352.

Rao, T.S.S. and R.C. Griffiths, *Understanding the Indian Ocean. Perspectives in oceanography.* Paris: UNESCO Publishing, 1998, 187 pages.

Rice, A.L. The Challenger Expedition: The end of an era or a new beginning? In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001 27-48.

Rice, A.L. The Challenger Expedition on postage stamps. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 282-287.

Roger, T., S. Wilson and J. Dennis Burton. Why is the sea salty? What controls the composition of sea water. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 251-260.

Rosove, Michael H. *Let heroes speak: Antarctic explorers, 1772-1922.* Annapolis: Naval Institute Press, 2000, 376 pages.

Rozwadowski, Helen M. 'Simple enough to be carried out on board:' the maritime environment and technological innovation in the nineteenth century. In: *Teknikens landskap: en teknikhistorisk antologi tillägnad Svante Lindqvist*,edited by Ulf Larssin and Marika Hedin. Stockholm: Atlantis, 1998, 83-89.

Rozwadowski, Helen M. History of ocean sciences. *Encyclopedia of Ocean Sciences.* London, Academic Press, 2001, 1-4.

Ryland, J.S. 2000. European marine biology: past, present, and future. Biologia marina Europea: passato, presente e futuro. *Biologia Marina Mediterranea* 7 (1): 1-27.

Schroder, Wilfried, ed. *History and philosophy of geophysics.* Potsdam: Bremen-Ronnebeck, 2000, 220p.

Scientists of the P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences. Moscow: Institute for Oceanology, RAS, 1996 (in Russian; summary in English).

Shirshov Institute of Oceanology: half century of world ocean study. Moscow: Nauka, 1999, 249 pages (in Russian; summary in English).

Sinyukov, V.V. *Alexander Vasilievich Koltchak as an Arctic explorer.* Moscow: Nauka, 2000, 235 pages (in Russian; summary in English)

Stow, Dorrik A. Silent, strong and deep: the mystery of how basins fill. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 108-123.

Stryuk, V. (editor), *History of national oceanography. Report and abstracts of the Ist International Conference.* Kaliningrad, 1996 in Russian, summary in English).

Strkyuk, V. (editor), *History of national oceanography. Abstracts for the II International Conference September 20-24, 1999.* Kaliningrad: Museum of the World Ocean, 1999, 267 pages. (Most in Russian; contents in English)..

Swinney, G.N. 1999. Wyville Thomson, *Challenger,* and the Edinburgh Museum of Science and Art. In: *Natural*

history and the sea, edited by J.A. Gibson. *The Scottish Naturalist* 111: 207-224.

Tyler, P.A., A.L. Rice and C.M. Young. Deep sea biology in the 1990's: a legacy of the Challenger Expedition. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 261-271.

Van Keuren, David K. 2000. Building a new foundation for the ocean sciences: the National Science Foundation and oceanography, 1951-1965. *Earth Sciences History* 19 (1): 90-109.

Weir, Gary. 2000. Fashioning a professional dialogue in oceanography: the U.S. Navy and the ocean science community, 1924-1960. *Earth Sciences History* 19 (1): 110-129.

Weir, Gary, *An ocean in common. American naval officers, scientists, and the ocean environment.* College Station, Texas: Texas A&M University Press, 2001, xix, 403 pages.

Wolff, T. 1999. The crustacean collections of the Zoological Museum, University of Copenhagen, Denmark [Proceedings of the Fourth International Crustacean Congress, 1998]. *Crustaceans and the biodiversity crisis,* edited by Frederick R. Schram & J.C. von Vaupel Klein. Leiden: Brill, 61-72.

Wynne, Michael J. and William J. Woelkerling. 2001. International Phycological Society presidents: the first forty years. *Phycologia* 40 (2): 172-181.

Zaferman, M. and M. Mukhin, *Research fleet of PNIRO*. Murmansk: PNIRO, 1996, 62 pages (in Russian; summary in English).

Zalogin, B., V. Lebedev, and K. Sabinin. *"The Last of the Mohicans" of classical oceanology. Dedicated to Oleg M. Mameyev (1925-1994).* Moscow, 1997 (in English).

BIOGRAPHIES

Albert I, Prince of Monaco (13. XI. 1848, Paris - 26.VI. 1922, Paris)
Carpine-Lancre, Jacqueline. Oceanographic sovereigns: Prince Albert I of Monaco and King Carlos I of Portugal. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 56-68.

Bascom, Willard Newell (7.XI.1916, New York City-20.IX. 2000, La Jolla, California)
Wiegel, Robert L. 2001. In Memoriam: Willard N. Bascom, November 7, 1916-September 20, 2000. Shore and Beach 69 (1): 35-36.

Carlos I, Dom, King of Portugal (Carlos de Braganza) (1863-1908)
Carpine-Lancre, Jacqueline. Oceanographic sovereigns: Prince Albert I of Monaco and King Carlos I of Portugal. In*: Understanding the oceans: a century of ocean exploration,* edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London, New York: UCL Press, 2001, 56-68.

Charnock, Henry (25.XII.1920-27.XI.1997)
Cartwright, David E. 1999. Henry Charnock, C.B.E. 25 December 1920-27 November 1997. *Biographical Memoirs of Fellows of the Royal Society of London* 45: 37-50. [Bibliography pp. 49-50.]

Costa, Emanuel Mendes da (24.V.1717, London-?.V.1791, London)
Rousseau, G.S. and D. Haycock. 2000. The Jew of Crane Court: Emanuel Mendes da Costa (1717-1791), natural history and natural excess. *History of Science* 38: 127-170.

Edmond, John Marmion (1943-6.IV, Boston, USA)
Boyle, Edward and Peter Molnar. 2001. John M. Edmond (1943-2001). *EOS: Transactions of the American Geophysical Union* 82 (35): 383.

Gilbert, Perry Webster (1.XII.1912, North Branford, Connecticut, USA-)
Hueter, Robert E. 2001. Historical perspectives: Perry W. Gilbert. *Copeia* 2001 (1): 279-284.

Gill, Adrian Edmund (1937-1986)
Bachelor, G.K. and R. Hide. 1988. Adrian Edmund Gill. *Biographical Memoirs of Fellows of the Royal Society of London* 34: 223-258.

Knauss, John Atkinson
Leinen, Margaret. 2001. John Knauss: fifty years of service to oceanography. *Oceanography* 14 (2): 5-9 [This issue of *Oceanography* is dedicated to John Knauss and includes many articles about his work and by his colleagues]

Merrell, William J., Mary Hope Katsouros, and Jacqueline Bienski. 2001. The Stratton Commission: the model for a sea change in national marine policy. *Oceanography* 14 (2): 11-16. [This issue of *Oceanography* is dedicated to John Knauss and includes many articles about his work and by his colleagues]

Matthews, Drummond Hoyle (5.II. 1931, - 20.VII. 1997, Taunton, UK)
White, Robert S. 1999. Drummond Hoyle Matthews 5 February 1931-20 July 1997. *Biographical Memoirs of Fellows of the Royal Society of London* 45: 277-294. [Partial bibliography pp. 294.]

Mullin, Michael Mahlon (17.XI.1937, Galveston, Texas-19.XII.2000, La Jolla, California)
Checkley, David. 2001. Obituary: Michael M. Mullin 1937-2000. *Fisheries Oceanography* 10 (1): 131.

Petterssen, Sverre (19.II.1898, Hadsel, Norway-31.XII.1974, London, England)
Petterssen, Sverre. *Weathering the storm: Sverre Petterssen, the D-Day forecast, and the rise of modern meteorology.* Edited by James Rodger Fleming. Boston: American Meteorological Society, 2001. [English edition of Petterssen's memoir published in Norwegian as *Kuling fra nord*]

Randall, John Ernest (22.V.1924, Los Angeles-)
Greenfield, David W. 2000. Historical perspectives: John E. Randall. *Copeia* 2001(3): 872-877.

Rozanov, Alexander Gregievich (30.XI.1935, Moscow-)
Alexander Gregievich Rosanov. *Oceanology* 35(6) (June 1996): 868-869. [English translation: original Russian edition was published November-December 1995]

Stewart, Harris B., Jr. (18.VI. 1922, Auburn, New York-25.IV.2000, Naples, Florida)
Anon. 2000. Harris B. Stewart, Jr. 1922-2000. Canadian Meteorological and Oceanographic Society, *CMOS Bulletin SCMO* 28 (5): 153.

Stommel, Henry Melson (27.IX.1920, Wilmington, Delaware, USA- 17.I.1992, Boston, Massachusetts)
Wunsch, Carl. 1997. Henry Melson Stommel. *Biographical Memoirs of Fellows of the Royal Society London* 43: 223-258.

Sverdrup, Harald Ulrik (15.XI. 1888, Sogndal, Norway -21.VIII. 1957, Oslo)
Friedman, Robert Marc. Polar dreams and California sardines: Harald Ulrik Sverdrup and the study of ocean

circulation prior to World War II. In: *Understanding the oceans: a century of ocean exploration*, edited by Margaret Deacon, Tony Rice and Colin Summerhayes. London and New York: UCL Press, 158-172.

Kitaigorodskii, Sergei Aleksandrovich. *Vvedenie v fizicheskuiu okeanografiiu, ili, piat otkrytii Kharabalda Sverdrupa.* Moscow: Meteorologiia i gidrologiia, 1995. [In Russian]

Swallow, John Crossley (11.X.1923, New Mill near Huddersfield - 3.XII.1994, Gunnislake, England)
Charnock, Henry. 1997. John Crossley Swallow. *Biographical Memoirs of Fellows of the Royal Society of London* 43: 503-519.

Zevina, Galina Benitsianovna (1926, Moscow-)
Korn, O.M. 2001. Galina Benitsianovna Zevina. *Russian Journal of Marine Biology* 27 (3): 192-194. [in English; includes bibliography]

Zhirmunskii, Alexei Viktorovich (15.X.1921, Petrograd-20.X.2000, Vladivostok)
Alexei Viktorovich Zhirmunksii (1921-2000). *Russian Journal of Marine Biology* 27 (1): 62-63.