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DIVISION of HISTORY of SCIENCE AND TECHNOLOGY  
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INTERNATIONAL UNION OF THE HISTORY AND PHILOSOPHY OF SCIENCE  
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## **EDITORIAL – The Norwegian Sea, 1909 – 2009**

Exactly a century ago, one of the great monographs of oceanography appeared – Bjørn Helland-Hansen and Fridtjof Nansen's *The Norwegian Sea. Its Physical Oceanography Based Upon the Norwegian Researches 1900 – 1904*. This remarkable work is still worth reading today, for as a recent commentator (Roald Sætre, in the 2004 book *The Norwegian Sea Ecosystem*) has said, “it seems reasonable to call this classical work a paradigm shift in oceanography. The main justification for this claim is that for the first time it was possible to analyse time series on the fluctuations in the Atlantic inflow to the Norwegian Sea and relate these to variations in the atmospheric climate of Norway as well as to ice conditions in the Barents Sea. The scientists also related the heat flux variability of the Atlantic inflow to biological consequences, such as the growth conditions of trees and plants as well as of important fish stocks.” As we will see shortly, *The Norwegian Sea* did considerably more than this.

The authors of this great work, Helland-Hansen and Nansen, were at quite different stages of their careers. Helland-Hansen, thirty-two years old, had been an assistant to Nansen in 1900, when the Norwegian fishery investigations had begun under Johan Hjort using the newly-commissioned research vessel *Michael Sars* to begin oceanographic surveys in support of fisheries throughout the “Norwegian Sea” (a name now restricted to only the southeastern part of the Nordic Seas investigated during the first few years of the Norwegian research). With the Swede Johan Sandström, he had modified the circulation theorem of their teacher Vilhelm Bjerknes to allow the calculation of ocean currents from the distribution of temperature and salinity (which allowed the calculation of the internal field of mass and the motion of the water under the influence of pressure gradients and the effect of the Earth's rotation). This publication, describing the dynamic method, published in German in 1903 and in English two years later, was assessed later by the English oceanographer Joseph Proudman as bringing about “a new epoch in physical oceanography.” Distinguished, but at the start of his career, in 1906 Helland-Hansen became director of the Bergens Museum's marine station near Bergen.

Nansen's career hardly needs description. At the age of 48 in 1909, he had a well-established reputation as a polar explorer. But although trained as a zoologist (and married to G.O. Sars's sister Eva), after the North Polar Expedition on the ship *Fram* from 1883 to 1896 he had a well-merited reputation as an oceanographer. In 1896 he became Professor of Zoology in Christiania (now Oslo), and with the formal beginning of the International Council for the Exploration of the Sea in 1902 was appointed the director of the Council's Central Laboratory, which was responsible for standardizing the techniques used by the participant nations of ICES in their regular marine surveys and for designing new instruments. During 1905 he was involved in negotiations leading to the independence of Norway from Sweden, and in 1906-1907 he served as the Norwegian ambassador to Great Britain. In 1908 he was back in Norway as Professor of Oceanography in Oslo, in which position he continued to go to sea on *Michael Sars* until the ship was lost to oceanography in 1914.

When Helland-Hansen and Nansen's work began in 1900, the only detailed information on the oceanography of the Norwegian Sea came from the Norwegian North Atlantic Expeditions conducted in summers from 1873 through 1876 under the zoologist G.O. Sars and the meteorologist Henrik Mohn. From the temperature and salinity sections made during those years from the ship *Vøringen*, Mohn used his expertise in mathematical meteorology to make the first dynamic calculations ever applied to oceanic circulation, giving the detailed results in 1887 his monograph *The North Ocean: Its Depths, Temperature and Circulation*. Despite the originality of Mohn's results, Helland-Hansen showed, shortly after 1900, that the circulation calculated by

Mohn suffered from inadequate techniques used to measure temperature and salinity. Using Nansen's newly-designed reversing thermometers, with accuracy to 0.01° and determinations of salinity better than 0.05 ‰, and using the newly-refined dynamic method, they arrived at a scheme of circulation that was much more complex than Mohn had suspected – and that has held up largely unchanged into our own era.

There was more. The detailed accumulation of information from standard sections showed that there was the possibility of correlating sea temperatures with air temperature over Norway, the date of onset of the Lofoten fisheries, the growth of forests, the success of agriculture, and the success of fisheries in the future. In a truly remarkable analysis, they showed that having detailed information on the northward-flowing Norwegian Current off the central Norwegian coast allowed one to predict temperature conditions in northern Norway one year later, and in the Barents Sea two years later.

Even in our own era, one of climatic teleconnections, models of ocean-atmosphere linkages, and the dismal and all too believable prognostications of the International Panel on Climate Change, Helland-Hansen and Nansen's great work stands out not only as the first of its kind but as great by any standards. It has been forgotten by most modern oceanographers, but we, as historians of oceanography, can continue to appreciate the genius of *The Norwegian Sea* and of its authors.

### ***An Editorial Note***

This issue of *History of Oceanography* comes at a time of transition. First, we have lost our bibliographer, Deborah Day (see the tribute to her later in this issue). It is not clear if we will be able to reinstate what Jacqueline Carpine-Lancre started and Deborah Day maintained – a detailed and up-to-date bibliography of the history of oceanography. If we cannot, it will be missed sorely.

Another change is in the works. For the past several (electronic) issues of this newsletter, Dr Gary Weir has provided us the invaluable service of linking it to his electronic journal, the International Journal of Naval History. We owe him our very sincere thanks. But now plans are well underway to launch a web site for the Commission of the History of Oceanography, providing a natural home for this newsletter, and allowing a much more frequent updating of news about the Commission's affairs and of the history of the marine sciences in general. We will get out detailed information about this transformation as soon as possible.

It is still not clear who will be the new editor of *History of Oceanography* – and perhaps the majordomo of the Commission's web site. For the time being, I will continue to maintain contact with all our members via the newsletter mailing list – and I ask everyone involved in the history of the marine sciences to continue sending me news, comment, and articles for publication. They will find a good home!

## MAURY AND JANSEN, NAVAL OFFICERS AND FRIENDS

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In Matthew Fontaine Maury's book "The Physical Geography of the Sea and its Meteorology" we find quite a number of lengthy quotations from Marin Henri Jansen, a Dutch naval officer of whom Maury, as he writes in a footnote, said "*I am proud to call my friend*". (§ 316 , § 321, § 674-§675, § 703 - § 719) <sup>(1)</sup>. They are translations from an appendix to the Dutch translation made by Jansen of Maury's book <sup>(2)</sup>. This translation was accomplished in 1855, the same year as the original, and so the first edition in a foreign language <sup>(3)</sup>. As the text of the first edition was largely similar to the earlier Sailing Directions part of it already had been translated by Jansen before 1855. We find quotations from Maury in a publication by Jansen of 1853 at the eve of the Brussels Conference <sup>(4)</sup>.

Who was Jansen?

From his biographical notes we can give the following brief summary <sup>(5)</sup>.

Jansen was born in Antwerp in 1817, at the time Belgium and the Netherlands were one. He saw the Belgian revolt against the Netherlands in 1830, when his family fled to Flushing. There he could observe the naval operations in the Scheldt and this led him to choose a naval career. His interest was, however, not only restricted to naval affairs, but also showed a wide interest in all kinds of maritime matters and he advocated the role of the Netherlands as a maritime nation. He served two terms in the Netherlands East Indies (now Indonesia), in 1837-1841 and in 1843-1848. There he did hydrographical work, and in the second term he was charged with the task to advise on the improvement of the continuously silting entrances to Surabaya harbour. The channel he found as a new and better entrance since was called "Jansen's vaarwater" (Jansen's channel). From these periods also stems the description of the land- and sea-breezes that Jansen added to his Dutch translation of Maury's *The Physical Geography of the Sea*, and that were incorporated by Maury in the later editions of his book.

In 1851 Jansen had been sent on a mission to Middle and North America. Before he left, he received in November via F. Kaiser, professor in astronomy at Leyden University with a keen interest in navigation, copies of Maury's charts. During the crossing, he studied Maury's methods and made observations according to his directions. In April 1852 he visited Maury in Washington and he became a strong supporter of Maury's ideas. Maury at that time had already received a favourable reaction for his proposals to incorporate the collection of marine data in the project for international meteorological co-operation (December 1851). He certainly must have been happy to find a kindred spirit in Jansen. As Jansen writes: "He invited me to design a uniform log-book, saying "If you later might come at the conference, we already agree on this".

Back in Holland in June 1852 Jansen reported to the Ministry of the Navy as well as to the ship-owners in Rotterdam and Amsterdam and to Professor Buys Ballot in Utrecht of the work and results of Maury. Buys Ballot had been interested in meteorology since 1845. In 1848 he had established an observatory in Utrecht, mainly by private means. He aimed at a national, and ultimately an international network, for he was one of the scientists who hoped to find general atmospheric laws by analysis of such data. Jansen and Buys Ballot knew each other from earlier

contacts on marine matters. They both organised the support for Maury's plans in the Netherlands. On his part, Buys Ballot hoped to have the support of the government to promote his private observatory in a national meteorological centre. Jansen preferred a section of the Navy, comparable with Maury's Observatory, as the department for executing the programme. Finally, in 1853 after the Brussels Conference, the government decided for an institute (the "Royal Netherlands Meteorological Institute") under Buys Ballot, with a department for marine observations under Jansen, attached from the Navy.

Jansen served only one year as director of the department for marine observations at the Meteorological Institute. Differences with Buys Ballot in opinion and in character were the reason for his departure. His successors J van Gogh<sup>(6)</sup> and K.F.R. Andrau however continued the co-operation with Maury as testified in the quotations from Andrau in the later editions of the *Physical Geography of the Sea*.

Jansen resumed his military career. He became captain and after his retirement in 1868 received the titular rank of rear-admiral. He remained a friend of Maury and a defender of his ideas, while he himself became involved in military technique, a subject on which they also exchanged ideas<sup>(7)</sup>. They had done so earlier, in 1862, when during the Civil War Maury went to England on behalf of the Confederation and Jansen joined him in to learn more about developments in naval warfare.

Although both men shared various interests, and also had experienced criticism from the scientific community, there were also marked differences in character. Maury is described as an amiable man. Jansen, on the contrary, had many enemies because of his self-sufficient nature. Also, Maury's adherence to natural theology did not agree with Jansen's feelings, for he was a non-practicing Catholic and a sceptic in religious affairs. But this did not prevent their mutual understanding. In an obituary by Jansen at the death of Maury<sup>(8)</sup> in 1873 he writes that Maury received "that true religious teaching which made him a faithful servant of the living God, and a humble and earnest soldier and follower of Christ, although a devotee of science, and a fearless searcher after abstract truth".

On several occasions Jansen disagreed with Maury, as in the case of the Navy Retiring Board, which put Maury on the Reserved List, an occurrence that gave deep feelings to Maury<sup>(9)</sup>. And also when Maury after the Civil War attempted to form a colony of Virginians in Mexico, Jansen advised him against these plans<sup>(10)</sup>.

Their attitude to science also differed. Maury truly can be described as a "Humboldtian scientist". His interest in physical geography was not restricted to the oceans. Recognition by the scientific community was important for him. Jansen's interests were primarily with navigation. While recognizing the importance of science for navigation and clearly impressed by natural phenomena, he had no high opinion of many academic scientists and spoke of them scornfully<sup>(11)</sup>.

To what degree was this relationship significant for the development of marine sciences?

The quotations from Jansen in *The Physical Geography of the Sea*, mentioned in the beginning, describe land- and sea-breezes and monsoon winds in a more poetical than scientific language (the Dutch style was reasonably translated). Maury apparently liked this style. Yet it masks Jansen's qualities as a scientific observer and investigator. Elsewhere they are more apparent, as in the 7<sup>th</sup> edition of the *Sailing Directions* of 1855. There Maury refers to a letter from Jansen (then no longer connected to the Netherlands Meteorological Institute) that discusses the optimum route in the South Atlantic towards the Cape. And in the article published in 1853<sup>(12)</sup> Jansen refers to a letter to Maury of 1852 in which he asks why in the 3<sup>rd</sup> edition of his *Sailing*

*Directions* Maury makes no reference to the effect of sea salt on oceanic circulation. In response, Maury added his hypothesis in the 4<sup>th</sup> edition, the text of which is given in chapter X of *The Physical Geography of the Sea*.

But more important for judging Jansen's influence is his role with respect to the Brussels Conference. The model of the Abstract Log, already designed in anticipation of this conference during Jansen's stay in Washington, was later presented by Jansen to the Dutch navy (maybe with some alterations). There it had been tested in May and June 1853 on board some Netherlands naval frigates with the forthcoming conference in mind. Thanks to an early return of these ships, the log-books were taken to Brussels, where, according to Jansen, the experience gained with them played an important role at the Conference in the preparation of the international model.

Jansen became the Netherlands' delegate to the Brussels conference. There Jansen acted there as an interpreter, because of Maury's limited knowledge of the French language<sup>(13)</sup>, staying with Maury in the same hotel<sup>(14)</sup>. The success of the conference, certainly in the Netherlands and probably also internationally, can for a large part be attributed to Jansen. Although Jansen's main attention in later years was more on other maritime questions, he remained interested in Maury's scientific activities.

In winter 1857 Jansen, returning from a voyage to Australia and the Netherlands East Indies visited Robert FitzRoy, who in consequence of the Brussels Conference had been appointed "Meteorological Statist" to the Board of Trade. From Maury, Jansen had got the impression that there was some disagreement between those two. As he writes, FitzRoy did not disagree with Maury, but was more interested in weather forecasts rather than in sailing directions. In a letter around that time (25 December 1857)<sup>(15)</sup>, Maury asks Jansen to "come over and help with the 8<sup>th</sup> edition of the *Sailing Directions*....". In a second letter (25<sup>th</sup> September 1860), Maury informs Jansen of his departure to London for a new edition of his book, and asks Jansen to join him. Jansen was with him for two weeks and he mentions Maury's plea at the Royal Geographical Society for the exploration of the Antarctic Regions<sup>(16)</sup>.

For Jansen, these contacts with the Geographical Society were the occasion to become interested in Arctic exploration. Maury believed in an open Arctic Ocean<sup>(17)</sup>. In 1865, Jansen, confronted with this question, published his views in an article published by the Royal Geographical Society. He became one of the driving forces of the Dutch participation in the exploration of the Arctic, and of the expeditions with the *Willem Barents* in the North Polar Sea, 1878-1884<sup>(18)</sup>.

In history, Maury's *Physical Geography of the Sea* is "not a segment of the highroad of marine science, but a bypath, interesting enough...", as stated by Leighly<sup>(19)</sup>. But it had its influence on the international co-operation of a broad community of seafarers that started with the Brussels Conference. It appears appropriate to pay attention, along with Maury, to Marin Henry Jansen, his friend, "like a brother", and the godfather to one of his grandchildren.

The author acknowledges the help of Mr Hendrick Wallbrink of the Royal Netherlands Meteorological Institute (KNMI) in drawing his attention to several documents cited in this contribution.

- (1) The sections as they are in Leighly's re-edition (Cambridge, Mass.1963) of the 8<sup>th</sup> American edition of 1861.
- (2) "*Natuurkundige beschrijving der zeeën*" door M.F. Maury, vertaald door M.H.

- Jansen, 1855
- (3) Leighly (Introduction to *The Physical geography of the Sea*, Cambridge, Mass. 1963, p. xv) gives translations in 6 languages.
  - (4) “*Het Stroomen van den Oceaen, een veld van onderzoek voor den Zee-thermometer*”, [*The currents of the Ocean, a research area for the sea-thermometer*] In: *Meded. Zeewezen* 1853
  - (5) S.P. l’Honoré Naber “*Het leven van een vloothouder. Gedenkschriften van M.H. Jansen*”. Utrecht 1925. [*The life of a naval commander. Memoirs of M.H. Jansen*]
  - (6) An uncle of the painter Vincent van Gogh.
  - (7) A subject that also had Maury’s interest. See F.L. Williams, *Matthew Fontaine Maury. Scientist of the Sea*, 1963 p.335. Jansen worked with Maury during his experiments with “torpedos” (mines) in 1864. See C.L. Lewis *Matthew Fontaine Maury, the Pathfinder of the Seas* p. 178.
  - (8) M. H. Jansen “*Matthew Fontaine Maury, LL.D. A Memoir*”. In: *Ocean Highways. The Geographical Record*. March 1873: 380-382.
  - (9) Note by Jansen in his personal copy of the biography by Maury’s daughter: Diana Fontaine Maury Corbier, 1888. *Life of Matthew Fontaine Maury. USN and CSN Compiled by his Daughter*.
  - (10) Corbier, 1888 (9), p.237.
  - (11) In Jansen’s copy of the translation of the *Physical Geography of the Sea* he wrote some lines from Byron’s *The Corsair* (beginning of Canto I) contrasting the seaman and the landlubber.
  - (12) See (4).
  - (13) “*Maury was asked to make the opening address, which he did in simple French remembered from his study..*” See (7) p. 217.
  - (14) Maury was there with two daughters and two nieces. Jansen speaks of “a pleasant company”.
  - (15) This and the other letter are in the archives of the KNMI (Royal Netherlands Meteorological Institute).
  - (16) It is in that period that Maury learned of the election of Lincoln.
  - (17) *The Physical Geography of the Sea* (1), & 449.
  - (18) W.F.J. Mörzer Bruyns. “*De eerste tocht van de Willem Barents in de Noordelijke IJszee. 1878*” Zutphen 1985. [*The first voyage of the Willem Barents in the North Polar Sea*]
  - (19) See (3) p. ix



## THE ACCESSION OF FRANCE INTO ICES

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One may wonder that France was not a founding member of the International Council for the Exploration of the Sea (ICES) in 1901. As a matter of fact, France was not invited to participate in the Preparatory Conference at Stockholm in 1899. In their application to King Oscar II (1829-1907) of Sweden and Norway, inviting the King to convene a conference for organizing the study of the sea, the Swedish scientists Gustaf Ekman (1852-1930), Otto Pettersson (1848-1941), and August Wijkander (1849-1913) mention only Norway, Denmark, and Great Britain as those countries whose cooperation it was most important to obtain. It says further that even if only these three countries would join Sweden in the investigations important results might be obtained, as the experience from their cooperation in 1893/94 had shown. The application goes on to say that if the governments of these countries were willing to join the scheme it would probably be easier to obtain participation from others. The Swedish government might then consider whether negotiations about participation in the work should be extended to the governments of the other North Sea countries as well as to Russia and France (1).

At an early stage it had obviously become clear that the invitation should be extended to other than the three countries first mentioned, for a copy of the application to the King carries a handwritten footnote saying: "Germany and The Netherlands added later". So these countries were added to the list of those invited, as were also Russia (with Finland). From the invitation to the Conference (2) Walther Herwig, the chief delegate for Germany, noted that France and Belgium had not been invited. He considered it an error that these countries had been omitted. So the programme presented to the Conference by the German delegation contained a proposal to the effect that the governments of France and Belgium be invited to adhere to the agreements of the Conference (Anon., 1899, p. XVI). The proposal was carried in a somewhat weakened version (loc. cit., p. 16):

"The Conference recommends that these resolutions be brought by the nations concerned to the knowledge of the governments of France and Belgium".

In his report to the German Reichskanzler on the meeting, Herwig explained that before the Conference he had pointed out that the various states bordering on the North Sea had different interests - a fact that should be taken into consideration in the international agreements. In this respect Germany belonged to a group of countries comprising also Belgium, France, and The Netherlands, but not Russia. It would therefore be an advantage to have France and Belgium involved in the proposed investigations. According to Herwig, the course of the Conference had confirmed him in this view. Conversation with the Swedish/Norwegian Foreign Minister and the Swedish delegates had convinced him that they did not see any inconvenience in the German proposal - on the contrary, they were in favour of it. So Herwig abided by the proposal, though in the somewhat weakened form quoted above. The recommendation would give the two states an opportunity to enter into negotiations about participation without directly inviting them to do so, which the Conference should avoid. According to Herwig, however, a strong resistance against the proposal arose from the British delegates, followed by the Norwegians. After some formal objections they stated that it was the intention, in addition to the international organization for the

exploration of the northern seas, to establish a second organization which should comprise the countries bordering on the Atlantic Ocean, i.e. first and foremost Great Britain, France, and the United States. Herwig aired the opinion that this might be just a passing thought by the British delegate John Murray. However, the ideas about a special Atlantic organization may have been real enough, because such plans emerged repeatedly during the following years. But even if such a project should materialize this would, according to Herwig, rather speak for the recommendation than against it. The issue was that the recommendation was carried unanimously (3).

Belgium decided to join the International Council in 1903 (Smed, 2000, pp. 5-7). France, however, was many years about reaching the same decision. Through the medium of the Swedish/Norwegian legation in Paris, the French government was informed about the resolutions passed by the Stockholm Conference and was asked whether it would be prepared to participate in the project (4). In reply to an inquiry by the Foreign Minister, Théophile Delcassé (1852-1923), the Director of the Mercantile Marine, who had examined the question from a biological point of view, declared that participation in the project would cause considerable expenditure, and the Parliament had already voted the necessary amounts for carrying out scientific research of benefit to the fisheries (5). A negative opinion was also given by the Service Hydrographique of the Navy who considered that although the observations of currents, salinity, and temperature proposed by the Conference would have undeniable scientific interest and might even supply information useful to the navigation, the advantages to be expected were not sufficient to justify the expenses that participation in the project would entail (6). From these opinions the answer by the French government must be in the negative and the reasons adduced in support of this were those stated in the opinions cited above (7).

This was the decision of the administrators. Apparently nobody had asked the French scientists. Their opinion was far more positive. In a long article Julien Thoulet (1843-1936) reported on the Stockholm Conference, regretting that this event had passed nearly unnoticed in France (Thoulet, 1901, pp. 193-198). Charles Rabot, of the Société de Géographie, presented a detailed report on the Conference, noting that France had not been involved in this great scientific project of so considerable practical interest:

In 1899 our budget of three millions has not been able to provide the few thousands francs necessary for the participation of our country in the Stockholm Conference and to assume the engagement resulting of this participation (Rabot, 1901, pp. 289-291).

Rabot followed up the subject by reporting on the inaugural meeting in Copenhagen in 1902, again noting that France kept out of the project. He stressed that it had been organized not only for solving purely scientific problems, but also for the benefit of the fishermen. He expressed the hope that the absence of France was provisional only and that in the near future Europe's second maritime power would adhere to the international maritime researches (Rabot, 1902, pp. 188-190). In addition, the distinguished marine biologist Alfred Giard (1846-1908) greatly regretted that France stayed outside the cooperation, and battled in vain for her adhesion to the organization (A.C., 1908, pp. 493-494). On his request, the *Association française pour l'avancement de science* at its congress in 1905 discussed the participation of France in the North Sea investigations organized by ICES (Anon., 1905a, p. 3). The congress expressed the wish that France should take part in these investigations, which would be clearly oriented towards practical problems of interest to the fisheries (Anon., 1905b, p. 3).

ICES needed the cooperation of France. There might, for example, be a need for restrictions on some fisheries in the North Sea. Obviously they could not become effective without the participation of France. So the ICES Bureau, the executive board of the organization, kept contact with French authorities about the matter. At the meeting of the Bureau in April 1907 the General Secretary, Christian Frederik Drechsel (1854-1927), reported that from correspondence with Professor Giard it appeared that the *Comité consultatif des pêches maritimes* had decided to propose to the Minister of Naval Affairs that France in future should participate in ICES. The Bureau considered it desirable to await the decision of the French government before steps were taken to promote the participation of France (8).

In July 1910 the Bureau must have found that time was ripe for further steps to be taken. In a letter to the ambassador of France in Copenhagen the interest that ICES took in the cooperation of France in the international investigations was stressed. It was explained that during recent years the investigations had been extended more and more to the Atlantic with its great fishing grounds near Ireland and Newfoundland. Also the English Channel offered favourable conditions for biological and oceanographical studies. The letter goes on saying that ICES already corresponded several times with the ambassador on this matter, and it had now decided to invite representatives of France to its next meeting for a discussion of the possibilities of cooperation (9).

The USA too had expressed an interest in joining ICES. So at the Bureau Meeting in September 1910 and the immediately following Council Meeting, Hugh M. Smith, Deputy Commissioner of Fisheries, USA, and Paul Fabre-Domergue (1861-1940), Inspecteur Général des Pêches Maritimes, France, were present as guests and were informed in some detail about the activities of ICES. The Bureau protocol reports (10):

H.M. Smith then stated that he was anxious that USA should join and hoped this wish would be realized: but in view of the areas concerned he should regard it very unfortunate if Canada did not join also.

Fabre Domergue said that he very much wished that France also should co-operate; for several reasons it might, however, not be so easily effected.

Finally it was decided that official letters should be forwarded to U.S. America and France - through the Danish Ministry of Foreign Affairs - stating the desirability of their co-operation. [...] The letter to France should take a more vague form to that to USA, saying that the Bureau and Council had endeavoured to give Dr. Fabre Domergue all the information regarding their organization and the object for which the investigations were conducted, that the interchange of views seemed most useful, and the Council would be very glad if the French Government could see their way to co-operate.

During the meeting Fabre-Domergue had solicited information about the amounts spent in the various countries on the international investigations. So at the end of the meeting the Bureau distributed a circular to the member countries requesting answers to the following questions: 1. The amount of the annual contributions of each participating country for international sea investigations. 2. How is the administration of the investigations carried out in each country? 3. What ships are available in each country for the investigations? (11). The replies received were submitted to Fabre-Domergue.

In November 1910, the Danish Ministry of Foreign Affairs, at the request of ICES, officially invited France and USA to join the Council. A memorandum describing the organization and its activities accompanied the invitation (12). Shortly after, information was

received that steps had been taken by USA to join ICES. From the French government, however, there was no response, and private letters to Fabre-Domergue remained unanswered (13, 14). So when in November 1911 the Danish delegate to ICES and Hydrographical Assistant to the Bureau, Martin Knudsen (1871-1949), paid a visit to Paris the General Secretary asked him to find out about Fabre-Domergue's opinion and why he did not answer letters (15). Knudsen reported that the Ministry of Naval Affairs had asked Fabre-Domergue for information concerning participation of France in ICES. Fabre-Domergue had then communicated the expenses involved, viz.: construction of a research vessel, ca. 80,000 francs; running of it, ca. 100,000 francs annually; the annual contribution to the Bureau, 31,000 francs. The government would not burden the budget with expenses of that size. For the investigations then carried out by France about 60,000 francs were available annually, of which about 40,000, francs were used for the laboratory in Paris; so it was out of question to spend 31,000 francs on the running of the Bureau in Copenhagen and then be unable to contribute substantially to the investigations. Asked whether ICES could in any way assist Fabre-Domergue in the endeavours to obtain the participation of France, he had answered that at present there was absolutely nothing to do. During his conversation with Knudsen, Fabre-Domergue had remarked that, after all, he would have more sympathy for cooperation between France, Spain, Portugal, and Italy. Because nothing was said about whether or not such cooperation was in preparation Knudsen paid a visit to Jules Richard (1863-1945), Director of the Musée océanographique at Monaco. Richard, however, knew only about the negotiations concerning Mediterranean and Atlantic investigations that had taken place in connection with the inauguration of the Musée in March 1910, and said that it was absolutely not to be expected that France would pay any contribution to the Atlantic investigations proposed there (16).

At the Bureau meeting in April 1912, it was noted that very favourable communications had just been received from the USA, according to which the final information about their accession to ICES could be expected any day (17). Through the medium of the Danish minister in Paris this information was communicated to the French government, which was reminded that since a Council Meeting would probably be held in September it would be convenient to have the reply of France before that time. The French Minister of Foreign Affairs answered that he had not failed to inform the Minister of Naval Affairs about the wish of the Danish government. Hitherto, however, the Administration had not been in favour of participation in ICES. Nevertheless the Minister of Foreign Affairs had requested that the study of the question should be taken up again, and he would seek a solution that would satisfy the wish expressed by the Danish government (18).

Now a private person interfered: the French ship-owner Oscar Dahl. He had met with Drechsel and the Danish marine biologist Johannes Schmidt (1877-1933) in Copenhagen, where they had discussed the question of the accession of France to ICES. Soon after, Drechsel sent Dahl a detailed description of ICES, its way of working, and some of the problems dealt with. Drechsel stressed that France was likely to profit greatly from joining ICES, and on the other hand ICES could only with difficulty do without France as a participant. France, with her extensive coasts, her considerable fishery, her distinguished scientists, and her great resources in practically all spheres, would be able to excellently supplement and augment the great, and for economic life important tasks, on which ICES was engaged (19).

Dahl had come to the conclusion that the reason France had not joined ICES simply was a question of persons. He maintained that because of mutual jealousy the persons involved could not agree between themselves upon the choice of a delegate and had then preferred that France was not represented at the Council Meetings. They had urged that the British naturalists were said

to be just waiting for the opportune moment for Great Britain to withdraw from the Council, and that even among Scandinavian naturalists there was a certain dissatisfaction with the results hitherto obtained. Dahl had protested against these contentions and had referred to the fact that recently the USA had joined ICES. He said that he would do his utmost to support the accession of France to ICES, which he considered to be of great importance to him and his fellow trawler-owners. So he solicited from the ICES Bureau information that would enable him to prove to the French Minister of Naval Affairs that France simply was victim to a case of personal antipathy (20).

Drechsel admitted that there was some dissatisfaction and disagreement between the scientists concerning the results obtained by the investigations. This would always be so where scientists were involved, he thought, and he stressed that all those who were directly connected with ICES had worked in full harmony. Outside these circles, however, there were some who seemed to be of the opinion that the money spent should have been used for purely scientific research instead of, as in ICES, for scientific investigations aiming at practical results leading to international legislation. In England this view was essentially represented by the Marine Biological Association. Also a few Scandinavians held this view, though only Norwegians, Drechsel thought. All the leading persons on this subject in the member countries cooperated in full agreement. During the 11 years that ICES had existed, every decision and every programme had been adopted unanimously (21).

Now Oscar Dahl took steps to persuade the Ministry of Naval Affairs that France should join ICES. In this matter he was supported by Jean Charcot (1867-1936) who already then had a great name in France as an explorer and oceanographer. When reporting to Drechsel, Dahl stressed how extremely important it was to emphasize to the French government the practical results to be obtained from the international investigations, such as those by Johannes Schmidt at Iceland, which with remarkable accuracy allowed establishing the migration of cod around the island. Dahl was sure that the minister who could make the decision would take into consideration mainly how much useful information the trawler-owners could extract from the investigations. Personally Dahl had the greatest respect for the scientific side of the work (22).

Dahl's campaign may have contributed to convincing the French government. In any case it now decided to join ICES on the conditions set out in the memorandum annexed to the official invitation submitted earlier. The decision was communicated officially about New Year 1914 together with the information that the research vessel *Pourquoi-Pas?*, under the command of Jean Charcot, had been designated to cooperate in the oceanographic and biological investigations (23).

It was, of course, welcomed that France now agreed to cooperate. A difficulty was, however, that France expected two conditions to be fulfilled: First, its contribution should be the lower one of the two rates used in ICES, i.e., the same as that paid by Belgium, Denmark, Norway, Sweden, and The Netherlands. Second, ICES should as soon as possible distribute its studies in a direction more favourable to the interests of the French fishermen and mariners. In ICES it caused some surprise that France was willing to place itself in a position to make a lower than Germany, Great Britain, and Russia. There was also some concern that this might cause other member countries to apply for a reduction of their contribution. Moreover it was not clear how the French request for a different distribution of the investigations should be interpreted (24). As a solution to the contribution question the Senior Vice-President of ICES, Otto Pettersson, suggested that France might pay an annual amount in between what was paid by the small countries and the great powers. This could be justified with reference to the fact that some of the coasts of France were bordering on the Mediterranean, in which ICES did not work. It was

therefore proposed that France should pay half the contribution paid by the great powers, till the ICES investigations in the Atlantic would have reached such an extent and have become so expensive that it would seem reasonable that France should pay the full contribution. In proposing the reduced amount, the ICES Bureau also had in mind that if France paid the full contribution it might claim an extensive use of the French language in the meetings and reports whereas the official languages of ICES had hitherto been English and German only (25).

In the French Administration, however, there was still much opposition to France joining ICES. According to Oscar Dahl, Fabre-Domergue was the implacable enemy. He was said to have spread the rumour that ICES did not supply any service, and that certain countries - such as Great Britain and Germany - were only waiting for the definitive refusal by France before withdrawing from the organization. In Dahl's opinion it was solely due to Fabre-Domergue that the accession of France to ICES had not yet become official although it had been agreed in principle by the minister (26).

To get things going, in May 1914 Drechsel met in Paris with the Minister of Naval Affairs and explained to him the importance to ICES of the accession of France, but also the importance or even the necessity of France participating, especially if Fishery conventions were to be established for the North Sea. The Minister declared that they were ashamed that they had not yet implemented this matter; he would now seek the necessary appropriation and would do his best to accelerate the decision (27). Actually the matter was already in progress at that time. In March 1914 the French Foreign Minister had informed the Minister of Public Instruction that adhesion of France to ICES had been applied for. As an argument he explained that, whereas the organization hitherto had mainly worked in the North Sea, it now planned to extend the exploration to the Atlantic Ocean. If the adhesion of France to ICES became effective the R/V *Pourquoi-Pas?* would be made available for the investigations that would be assigned to France (28).

Now Henry Maurice (1874-1950), the British member of the ICES Bureau, sought a meeting with the newly appointed Chef du Service des Pêches Maritimes, F. Kerzoncuf, in to discuss with him details about the accession of France to ICES, and to obtain the cooperation of France in work on the English Channel. Maurice met Kerzoncuf at Boulogne in June 1914 and got the impression that the accession of France was sure, but that Kerzoncuf, however, had considerable difficulties with the scientists of his country and especially with Fabre-Domergue (29). It was doubtful whether things would be so far advanced that France would be represented at the session of the Council in September 1914. Kerzoncuf was, therefore, invited to attend the Council Meeting in a private or semi-official capacity (30). In August, however, the World War broke out, and the planned Council Meeting was cancelled.

The activities of ICES now had to be kept at a low level. The main goal became to keep the organization alive. ICES did survive the war, and in October 1919 Maurice reminded Kerzoncuf about their conversation before the war and asked whether it was still the intention of France to join ICES. Kerzoncuf answered in the affirmative. The reason why he had not written Maurice earlier on this matter was that a bill whose purpose was to create an Office Scientifique et Technique des Pêches Maritimes had been before the French parliament. It had now been passed. The new Office should centralize all research to be done at sea. The Office had the use of two vessels, which could be dedicated to oceanographic investigations. So Kerzoncuf hoped that France would be able to effectively support the common programme for the exploration of the sea (31). Incidentally, in the opening address at the inauguration of the above mentioned Office the speaker deplored the modest contributions by France to marine research and continued (Anon., 1919a, pp. 344-345):

hitherto France, in spite of the requests which many times have been addressed to her, has taken no part in the international investigations for the scientific exploitation [sic] of the seas." (From French).

An editorial in a fishery magazine about the inauguration strikes the same note (Anon., 1919b, pp. 336-337):

And now to work! It is too long that France, who has refused to adhere to the International Research Institute [i.e. ICES], has worked blindly in routine and ignorance. (From French).

In the ICES Bureau there was some doubt if the answer from Kerzoncuf could be taken as an official request from France to become a member of the organization (32). That this was so, however, became confirmed by a direct application from British authorities to those of France (33). Immediately after receipt of this confirmation, the ICES Bureau arranged that the French Minister of Foreign Affairs was approached. Referring to the negotiations before the war and to the recent correspondence between France and Great Britain the Bureau again invited France to join ICES and to send delegates to the first post-war Council Meeting, to be held in London in March 1920. It was explained that the main item to be discussed at the meeting was the question of investigation of the plaice in the North Sea and an international convention about the protection of that fish. Before the war the delegates had agreed upon a proposal on this matter, and all member countries had been disposed to enter into negotiation with the Danish government on the basis of the principles proposed - some of the countries, however, on the condition that all the interested states, including France, were ready to participate (34).

A decree issued by the President of France then nominated Kerzoncuf and Théodore Tissier, Head of the Conseil d'Administration de l'Office Scientifique et Technique des Pêches Maritimes, delegates to the Council Meeting and authorized them to sign relevant documents on behalf of France (35). The two delegates, accompanied by some experts, participated in the London meeting, at which Kerzoncuf observed that because of special circumstances France had not joined the Council as early as she ought to have done and that he would be the first to admit how much this delay had been detrimental to the fishery interests of his country (Anon., 1920, pp. 25-26).

The membership of France would now seem to have been settled. However, when in early April an official document to that effect had not yet been received, the General Secretary reminded Kerzoncuf that before the London meeting the Danish Ministry of Foreign Affairs had addressed to the French Government an official invitation to join ICES. As no answer had been received, the Ministry was in a dilemma as to when it should communicate to the member governments the outcome of the negotiations (36). Kerzoncuf was astonished that the official reply had not yet reached the Danish Ministry, and said that he would take steps to speed up matters. He stressed that there were no problems involved; the delay must be due to administrative slowness (37). At long last a delayed letter was received from the French Government, saying that on the basis of the power allotted to them by the President of France the French delegates to the London meeting had acceded to ICES, and that France would from now on contribute to the expenses of the Bureau of the Council together with the other participating governments (38). This was further confirmed when the French Ministry of Foreign Affairs in January 1921 announced that the Office Scientifique et Technique des Pêches Maritimes would

for five years represent France at ICES and would pay an annual contribution of 25 000 Danish Kroner (39). After 20 years of negotiations France had become a member of ICES.

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### Literature

- A.C. (= Adolphe Cligny). 1908. Alfred Giard (nécrologue). – Bulletin trimestriel de l'enseignement professionnel et technique des pêches maritimes, XIII (3).
- Anonymous. 1899. Conférence internationale pour l'exploration de la mer, réunie à Stockholm 1899. Imprimerie K.L. Beckman, Stockholm.
- Anonymous. 1905a. Journal de Monaco, 48<sup>e</sup> année, no. 2448.
- Anonymous. 1905b. Journal de Monaco, 48<sup>e</sup> année, no. 2472.
- Anonymous. 1919a. L'inauguration de l'Office des Pêches. La Pêche Maritime, 27 Mars 1919.
- Anonymous. 1919b. L'office technique et scientifique des Pêches est institué. La Pêche Maritime, 20 Mars 1919.
- Anonymous. 1920. Procès-verbaux de la treizième réunion du Conseil. Cons. perm. int. Explor. Mer, Rapp. P.-v., Réun., 26 (B).
- Rabot, C. 1901. Réunion de la Commission internationale des recherches océanographiques. La Géographie, IV (10).
- Rabot, C. 1902. Réunion de l'Association internationale pour l'étude des mers. La Géographie, VI (3).
- Smed, J. 2000. The accession of Belgium to ICES. ICES/CIEM Information, No. 36.
- Thoulet, J. 1901. L'étude internationale de l'Océan. Revue scientifique (revue rose), 4<sup>e</sup> série, XV (7).

### Letters (or copies)

Abbreviations:

G.S.: General Secretary of ICES, C.F. Drechsel.

RAC: Rigsarkivet (Copenhagen).

RAS: Riksarkivet (Stockholm), UD 1902 Doss-system.

S/N: Swedish/Norwegian.

1. Gustaf Ekman, Otto Pettersson, and August Wijkander to King Oscar II 18 October 1897. RAS, Vol. 2396, Mål 11.
2. The S/N Foreign Minister to his legations in Berlin, London, Copenhagen, Brussels (for The Netherlands), and St. Petersburg 14 April 1899. As 1.
3. Report in DDR Zentrales Staatsarchiv, Abt. Merseburg, Rep. 87 B, Nr. 3646, Blatt 106-110a. (Now in Geheimes Staatsarchiv Preussischer Kulturbesitz, Berlin).
4. The S/N Foreign Minister to his legation in Paris 28 October 1899. RAS, Vol. 2912, Mål 3.



5. Note from the chief of the naval staff to the Service hydrographique of the Navy 7 February 1900. Archives Nationales (Paris), Marine 1 JJ/123.
6. Unsigned note (probably from the Service hydrographique) to the chief of the naval staff 10 February 1900. As 5.
7. The French Foreign Minister, T. Delcassé, to the S/N legation in Paris 19 February 1900. As 4.
8. Protocol of the Bureau Meeting in April 1907. In ICES Secretariat.
9. G.S. to the ambassador of France in Copenhagen 15 July 1910. RAC, No. 10.649, Box 42, File 2.A.
10. Protocol of the Bureau Meeting in September 1910. RAC, No. 10.649, Box 7, File 1.A.7.
11. Circular from G.S. to the ICES member countries 26 September 1910. As 9.
12. G.S. to the Danish Ministry for Foreign Affairs 12 November 1910. As 9.
13. G.S. to Fabre Domergue 7 November 1910. As 9.
14. G.S. to Fabre Domergue 16 February 1911. As 9.
15. G.S. to Martin Knudsen 8 November 1911. RAC, No. 1935, Box D.3 and as 9.
16. Martin Knudsen to G.S. 11 November 1911. As 15.
17. Protocol of the Bureau Meeting in April 1912. As 8.
18. Danish Ministry of Foreign Affairs to G.S. 20 April 1912. As 9.
19. G.S. to Oscar Dahl 30 April 1913. As 9.
20. Oscar Dahl to G.S. 7 May 1913. As 9.
21. G.S. to Oscar Dahl 15 May 1913. As 9.
22. Oscar Dahl to G.S. 29 December 1913. As 9.
23. The French Ministry of Foreign Affairs to the Danish Chargé d'affaires in Paris 26 December 1913. As 9.
24. Henry Maurice to G.S. 13 January 1914. As 9.
25. Memorandum by Otto Pettersson 26 January 1914. As 9.
26. Oscar Dahl to G.S. 20 March 1914. As 9.
27. G.S. to Oscar Dahl 23 May 1914. As 9.
28. The French Foreign Minister to the Minister of Public Instructions 7 March 1914. Archives nationales (Paris), F<sup>17</sup> 13 061.
29. Henry Maurice to G.S. 19 June 1914. As 9.
30. G.S. to F. Kerzoncuf 8 July 1914. As 9.
31. Kerzoncuf to Maurice 31 October 1919. As 9.
32. G.S. to Maurice 13 January 1920. As 9.
33. Cable from Maurice to G.S. 21 January 1920. As 9.
34. ICES Bureau to the French Minister for Foreign Affairs 22 January 1920. As 9.
35. Decree issued by the President of France, Paul Deschanel, 28 February 1920. As 9.
36. G.S. to Kerzoncuf 7 April 1920. As 9.
37. Kerzoncuf to G.S. 3 May 1920. As 9.
38. French Ministry of Foreign Affairs to the Danish legation in Paris 20 April 1920. As 9.
39. French Ministry of Foreign Affairs to the Danish legation in Paris 26 January 1921. As 9.

## MARTIN KNUDSEN'S ACTIVITIES IN THE ICES SERVICE HYDROGRAPHIQUE

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### **Martin Knudsen's appointment with ICES**

At the 2nd International Conference for the Exploration of the Sea in Christiania (Oslo) in 1901 it had been decided that should the General Secretary of the Council to be established represent hydrographical (i.e. physical oceanographic) science, one of his principal assistants should be a biologist, and *vice versa* (Anon., 1901, p. 19). At the first meeting of the International Council for the Exploration of the Sea (ICES), Copenhagen, in July 1902 the Dutch biologist Paulus P.C. Hoek (1851-1914) was elected General Secretary (Anon., 1903, p. 7). Consequently a hydrographical assistant should be appointed. The meeting agreed to empower the Bureau, i.e. the Council's President, Vice-President, and General Secretary, to communicate with candidates about the conditions for the post, and it also agreed upon the proposal of the Vice-President, Otto Pettersson (1848-1941) that the Danish hydrographer Martin Knudsen (1871-1949) be communicated with first. In accordance therewith, Knudsen was appointed First Assistant to the Bureau from 1 August 1902.

The choice of Martin Knudsen for the post came naturally in view of his earlier achievements. He had carried out valuable work on the "Ingolf"-Expedition of 1895 and 1896 to Icelandic and West Greenland waters. He had worked up hydrographical data from inner Danish waters and from the routes to Iceland and Greenland in a number of important papers. Furthermore, he had participated as a Danish delegate at the two Conferences in 1899 and 1901 heralding ICES. When, at the first of these, it was decided to undertake a revision of the existing hydrographical tables, the direction and completion of the work was entrusted to Knudsen. The outcome of the work was the Hydrographical Tables, which Knudsen could present in 1901 (Smed, 2010). In his accounts of the expenditure involved in the elaboration of the Tables, Knudsen had not included any salary for his own work. The auditors of the accounts, Otto Krümmel (1854-1912) and Fridtjof Nansen (1861-1930), mentioned this in their comments. Otto Pettersson therefore pointed out to the Danish chief delegate at the Christiania Conference, Christian Frederik Drechsel (1854-1927), that they all felt indebted to Knudsen for his great unsalaried work, and he asked Drechsel to discuss the matter with Knudsen, so that at the first meeting of the Council proposal might be made for a salary to Knudsen, or, if for formal reasons this would not be possible, he might be offered an appointment as First Assistant to the Bureau or as Editor of the hydrographic bulletins which should be issued (Pettersson, 1902).

There can be no doubt that Knudsen was highly esteemed among his colleagues. This is clearly expressed in an internal German report on the Stockholm Conference. At that time the intention was to have a central office, including a laboratory, under the direction of a General Secretary. In the report mentioned, the possible candidates for this post were discussed. Otto Krümmel, a member of the German delegation to the Conference, indicated as well qualified candidates Knudsen and the Englishman Henry N. Dickson (1866-1922). Krümmel preferred either of these for Fridtjof Nansen, who was considered to be interested in the post (Smed, 1989, pp. 6-8).

## **The Bulletin**

The backbone of the hydrographic investigations decided upon by the Council were the surveys carried out along fixed lines four times a year, during the first week of February, May, August, and November, the first cruises to be undertaken in August 1902. The data from these seasonal cruises were sent to the Council's central office, and it was Knudsen's main task, in his capacity as Hydrographic Assistant to the Bureau, to edit the data for publication in the *Bulletin des résultats acquis pendant les croisières périodiques*, which was published quarterly.

The Bulletin not only included the raw data: temperature, salinity, and content of oxygen, nitrogen, and carbon dioxide, all at standard depths, together with meteorological observations; for the periods of the seasonal cruises Knudsen prepared and published in the Bulletin two charts showing isotherms and isohalines at the surface of the region investigated. One chart, on the scale of 1:18,000,000, gave a view of the entire region; the other, on a larger scale (1:6,000,000), showed the situation in the North Sea, the Skagerrak, the Kattegat, and part of the Baltic. The isolines were based not only upon the data from the standard stations, but also upon observations made on board mail steamers, light-ships etc. during the periods of the seasonal cruises. The observation programme of these cruises also included collection of samples of plankton for qualitative determination, with a view to discriminating between different water masses on the basis of their plankton. These observations were published in the Bulletin from the second number onwards. Furthermore, starting with the second year the Bulletin showed the distribution of temperature and salinity at depth along the fixed lines by means of the so-called hydrographic sections, prepared by Knudsen and his assistant Johan Gehrke. This addition to the Bulletin was welcomed by the Council as constituting an important improvement.

## **General Report on the work 1902-1904**

At the Council Meeting in Hamburg in February 1904, the delegates felt a need for taking stock and decided that a report on the results of the work during the first two years of the international cooperation should be prepared and published. The report should contain a short general introduction for which the Council was to be considered responsible, and a number of annexes, which were published on the responsibility of their authors.

Obviously there were some problems with the editing of the Report. Pettersson stated that Knudsen, of course, would be editor of the hydrographic part (Pettersson, 1904a). Knudsen was willing, but he could not really imagine that Hoek would leave it to him (Knudsen, 1904a). Apparently Hoek was against the Report in general. In any case Pettersson wrote to Knudsen, requesting information about the prospects and if Hoek intended to resist, passively or actively, the Report. Pettersson intended do everything to bring about the Report and he was prepared to cooperate and discuss the matter with everybody who had the same end in mind. Against those, however, who would not put the Report in order before the end of the year, he would make war (Pettersson, 1904b)!

Apparently the pinpricks continued. The relations between Knudsen and Hoek were not the best. When Pettersson requested information regarding various details in the Report (Pettersson, 1904c), Knudsen regretted that he could give only incomplete information. As he had expected, he had not much cooperation from the editor, i.e. Hoek. His assistance with the Report was limited to his functioning as an intermediary between Hoek and the draughtsman or the process reproduction firm as far as a few figures and charts were concerned. Knudsen added, however, that if only Hoek would abstain from interfering with the hydrographic part of the Bulletin he would, for a quiet life, let him do with other items what he liked (Knudsen, 1904b).

Knudsen was obviously disappointed in the Report. To Theodor Homén (1858-1923), a delegate for Finland to the Council, but at that time exiled to Novgorod in Russia, he wrote that a General Report was now being prepared in which, in his opinion, a number of serious errors were made; fortunately, however, he had not much to do with the project, he added (Knudsen, 1904c).

Among the hydrographers opinions were divided as to what the Report should contain. The Norwegian Bjørn Helland-Hansen (1877-1957) confidentially informed Knudsen about a meeting with Otto Pettersson, who thought that much hydrography should go into the Report. According to Helland-Hansen, Otto Pettersson wanted to have all "fishery events" tested by means of hydrography and was not afraid of publishing whims although they lacked a solid basis. Pettersson would prepare a draft, which he asked Helland-Hansen to go over before sending it to Knudsen. Helland-Hansen would be pleased to try to clear the stones away, so that Knudsen might get off easily from this if publishing such material could not be totally avoided (Helland-Hansen, 1904), an offer which Knudsen gratefully accepted (Knudsen, 1904d).

The Report (Anon., 1905a) was published in an English and a German version. Knudsen contributed a paper to its hydrographic section. He had earlier written a popular account in Danish about the science of hydrography and some of the results obtained (Knudsen, 1905a). This account had a section about the waters around the Faroe Islands and Iceland, at that time Danish dependencies. The section also reported on the influence of the East Icelandic Polar current on the climate of the Faroes. Pettersson, to whom Knudsen had sent his Danish manuscript to learn his opinion of it, now proposed that Knudsen prepare for inclusion as an annex to the General Report a paper about the influence of the Polar current upon the climate not only of the Faroe Islands, but also of the Shetland Islands and northern Scotland. It was important, Pettersson stressed, to get the Englishmen to understand that their climate was influenced by hydrographic changes (Pettersson, 1904d)! Knudsen did prepare the paper (Knudsen, 1905b) which he could easily do, because he had already dealt with the subject earlier (Knudsen, 1900, pp. 37-42).

### **Change of programme**

After the original programme of hydrographic observations had been followed during the first two years, a need for some change was felt. The first indication came from a meeting of the hydrographers who were engaged as assistants in the international cooperation. The meeting, which was held at Copenhagen on 18-23 July 1904, was attended by 15 hydrographers from the Council's eight member countries. As a guest, L.-G. Sabrou from the Musée océanographique at Monaco participated and published a report on the meeting (Sabrou, 1904, pp. 1-15). The purpose of the meeting, which had been summoned by the Council at the suggestion of Knudsen, was to give the hydrographers, who worked isolated in the laboratories on more or less the same problems, an opportunity to discuss their work and exchange ideas, and in this way come out with new ideas or more perfect methods of work. The participants presented a number of papers which were discussed and some of which were later published in the Council's series *Publications de circonstance*.

An important outcome of the meeting was a number of proposals (Anon., 1905b, p. 36) about hydrographic investigations to be carried out, viz.:

- that chemical investigations of the substances, which have a direct bearing on the existence of animal and vegetable life, should be carried out as an essential part of the hydrographic work
- that current measurements should be made, at the surface as well as in the depths

- that observations should be conducted over certain areas of the territory which had not hitherto been investigated
- that hydrographic investigations should be carried out during the intervals between the cruises.

Unfortunately these proposals were addressed directly to the leaders of hydrographic research in the member countries. This procedure caused some trouble to Knudsen who had chaired the meeting. As stressed by Otto Pettersson in letters to Knudsen, such proposals, which would mean a complete change of the existing programme, should have been addressed to the responsible authority of the organization, i.e. the Council (Pettersson, 1904e, 1904f). Krümmel too referred to what he called the unhappy meeting of assistants. He strongly criticized that the meeting suggested how the data should be handled in the hydrographic department of the Council, the Service Hydrographique, and be published in the Bulletin. This, he said, was clearly beyond the competence of the meeting and an encroachment on the task given to Knudsen by the Council; what the assistants decided about this did not matter at all. In such matters Knudsen alone was a greater authority than all the assistants taken together. Krümmel added that if Knudsen had prompted this himself he had acted undiplomatically (Krümmel, 1904). These manifestations made Knudsen modify his report on the meeting.

At the Council Meeting in July 1905, Knudsen reported to the Hydrographical Section on the meeting of the assistants (Anon., 1905b, p. 28). The recommendations were discussed in connection with a number of proposals by Knudsen. In a paper he pointed out that the object of the hydrographical investigations was to learn the general or average hydrographical situation, first and foremost temperature, salinity, and currents, at each place and at each depth, as well as the changes with time of these quantities. The question was to what degree the seasonal cruises would throw light upon these problems. While they supplied good material for the determination of the mean salinity and of the average deviation from the mean, the salinities, and the currents deduced from them, changed so rapidly and irregularly that the seasonal cruises could not give a picture of all the important changes. With regard to temperature, the seasonal cruises had contributed but little to the determination of average values, amplitudes, and phase shifts at each place and at each depth. For both temperature and salinity there was obviously a need for observations at shorter intervals. Knudsen thought that this could be obtained without increased expenses and work of the research vessels and he put forth some suggestions for a programme: in the Baltic a satisfactory system of observations might be obtained by limiting the number of stations and instead having more frequent expeditions. In the Belt Sea and the Kattegat the seasonal cruises perhaps might be replaced by frequent observations carried out by fishery protection vessels etc. In the Skagerrak and the North Sea a few fixed stations might be selected for alternate investigations by the interested countries. If, moreover, hydrographical observations would be made in connection with biological and fishery investigations, and if merchant vessels could be enlisted in the observation service to a much higher degree, a satisfactory system of observations could be obtained. If, furthermore, appropriate instruments for making sub-surface observations underway were available, much would be gained (Knudsen 1905c, p. 38).

Perhaps Knudsen did not express himself with sufficient care at that occasion. In any case the Scottish delegate D'Arcy Thompson (1860-1948) pointed out that there was a risk that Knudsen's words be taken to mean

that the methods on which we have been working are bad and unsatisfactory, and I see a danger of their being used by persons, who are unsympathetic towards our work, or who

have little knowledge of hydrography, in such a way as to create prejudice against the International Cooperation. [...] If it were to be said that your words mean that we can draw no sound conclusions from such work as has hitherto been done, even as regards the broad elementary facts of the hydrography of the North Sea, what reply would you make to such a statement as that? (Thompson, 1906a)

D'Arcy Thompson must have become aware that the Council and its activities, especially the hydrographic ones, were not particularly popular in some circles.

Knudsen replied that his remarks had been written to call attention to aperiodic variations and not to show the advantages or failures of the methods used by the Council. He would consider it unfair if his words were interpreted to say that no sound conclusions could be drawn from the work carried out. To the hypothetical question raised by D'Arcy Thompson, the answer would be that the investigations had given important results in many respects. Knudsen enumerated some of the results. For instance, the elementary facts of the hydrography of the North Sea were now so well known that it was reasonable to look somewhat more to the details, especially the aperiodic variations (Knudsen, 1906a). D'Arcy Thompson was satisfied that Knudsen's explanations were precisely on the lines that he himself had anticipated, and he felt that they would remove any risk of misunderstanding (Thompson, 1906b).

In any case, the Council agreed to Knudsen's proposal and requested that the representatives of the participating states endeavour to arrange for hydrographic cruises between the dates of the regular seasonal cruises, either according to the complete programme or a reduced one, with the understanding that the regular seasonal cruises should still be carried out with as little modification as possible. Knudsen was requested to undertake the necessary correspondence with those responsible for the hydrographical work in the various countries. In support of this project Knudsen started an "intelligence service". He felt that because the research at sea was no longer limited to the four seasonal cruises, there was a need for collecting information about the hydrographical programmes planned in the member countries and for distributing this information to those interested. The idea was to keep the cruise leaders informed about the investigations planned for the next few months. This might lead to some coordination of the investigations. Knudsen's intelligence service was welcomed by the hydrographers. The English Ernest Holt, for instance, wrote that the service was of the greatest utility, and he expressed the hope that Knudsen would be able to continue it (Holt, 1905). Unfortunately, however, it gave rise to some controversy with the General Secretary (Smed, 1999).

### **Temperature data from measurement on telegraph cables**

It was evident that even some additional cruises would by no means give a continuous picture of the hydrographic situation. For the surface layer, this might to some degree be remedied by routine observations from commercial vessels. Some information about the temperature of the bottom water might be obtained by measuring the electrical resistance of the telegraph cables, because the resistance depends upon the temperature of the bottom water. This is the idea behind a decision by the 1st Preparatory Conference at Stockholm that one of the tasks of the Central Bureau would be

to make in connection with the investigations application to the telegraph administrations for the purpose of obtaining determinations from time to time of the changes in the resistance of the cables which cross the areas in any direction (Anon., 1899, p. 13).

This formulation was repeated at the 2nd Preparatory Conference at Christiania (Anon., 1901, p. 22). The idea obviously came from Otto Krümmel, for he in a letter to Knudsen stated that he considered himself its spiritual father and had done so for 12 years (Krümmel, 1905). Apparently no action had been taken in this matter until Krümmel drew attention to it in the letter just mentioned. Here he pointed out that in the Belt Sea and the western Baltic *continuous* observations were necessary if information about the changes in the bottom layers were to be obtained, because the changes there could be very fast. Investigations on the section Arkona-Trelleborg in August 1904 had, in fact, shown a complete change of the temperature and salinity layering during 30-40 hours. Such changes might, of course, be tracked by observations from lightships. Unfortunately, however, there was no such vessel at a strategic position. So in order to get something continuous, if not salinity then at least temperature, it was necessary to resort to measuring the resistance of the telegraph cables as often as possible. A little pointedly, Krümmel added that he would have talked about this idea at the recent meeting of the Hydrographical Section if the meeting had not wasted so much time upon the polemics Nansen *versus* Pettersson. However, no special resolution was necessary, he stressed; reference to the Christiania decision was sufficient. It authorized Knudsen to direct negotiations with the cable administrations, and Krümmel invited Knudsen to get started. Krümmel added that because Knudsen was an excellent electrician he would soon be able to find out what was possible in this respect!

Knudsen did follow up upon this. A month later he wrote to the leader of the Danish Telegraph Administration on the matter (Knudsen, 1905d). The response was positive, and Knudsen informed Krümmel that he had now made some experiments on cable measurements. In the first instance he considered it worth while to determine the mean temperatures of the cables by direct measurements with thermometers to have good base values (Knudsen, 1905e). Measurements on the cables in the inner Danish waters Knudsen considered as of minor importance. So the interest was concentrated on the cables across the North Sea. The difficulty was that these cables, owned by the Great Northern Telegraph Company, were in permanent use. Someway, however, Knudsen must have succeeded in making Great Northern interested in the matter; for at the Council Meeting at Hamburg in March 1906 he presented a paper on the subject, based upon measurements carried out by the telegraph company on three cables across the North Sea (Knudsen, 1906b, pp. 40-44). Knudsen stated that the Danish Hydrographical Laboratory, of which he was the chief, would endeavour to procure measurements from a total of 16 cables. This project does not seem to have materialized, however.

### **Mean Charts. Rearrangement of the Bulletin**

As intimated above, Knudsen was of the opinion that there was now sufficient material for the determination of the average salinity at each standard station and observation depth. He therefore proposed to the meeting that average values be calculated on the basis of the observations then available. The averages would be used for the construction of isohalines in charts for the different depth levels and on representative sections. Because it would be useful to know how large a deviation of the salinity from the average might be expected, the mean deviation would also be indicated in the charts and sections. Knudsen presented a sample chart, which showed how the elaboration of the hydrographical material would appear. The Council adopted Knudsen's proposal, and the Bureau was requested to prepare and publish the charts and sections mentioned (Knudsen, 1905f, p. 42). This task was carried out during the following year (Knudsen and Smith, 1906, pp. XXVI-XXX with 15 plates).

The extension of the hydrographic investigations to cover also the periods between the seasonal cruises made Knudsen propose a rearrangement of the Bulletin. It would now also

contain the observations made in the intervals between the seasonal cruises. All hydrographic station data would be presented in tables, and partly also graphically in sections. Serial data from light-ships and lighthouses would be included in the Bulletin if the salinity had been determined titrimetrically. Under the same conditions, all surface observations (temperature, salinity, and currents) should be published *in extenso* (Knudsen, 1905g, p. 44). This change in the Bulletin was accepted by the Council.

From July 1905 the Bulletin then underwent a number of changes. because it was no longer limited to the observations made at the seasonal cruises, its title was changed to *Bulletin trimestriel des résultats acquis pendant les croisières périodiques et dans les périodes intermédiaires*. The previous first part of the Bulletin was split into two parts, one of which contained a station list and meteorological data, the other exclusively hydrographic surface observations, viz. all pairs of surface temperature and salinity. Furthermore, each quarterly number of the Bulletin now contained nine charts showing the average temperature of the sea surface of the North Sea for ten-day periods. A large part of the material used in these charts had been received from the Deutsche Seewarte and from the Dutch Meteorological Institute. In accordance with a resolution proposed by Otto Pettersson and passed by the Council meeting in 1906, the Bulletin from November 1906 onwards also contained the results of hydrographic cruises worked up using Vilhelm Bjerknes' dynamical method, viz. charts showing the depths of the isobaric surfaces of 10, 20, 30, 50, 100, 200, 300, and 500 decibars. The elaboration of the curves of equal depth of the isobaric surfaces was carried out by Knudsen and his staff after some instruction by the Swede Johan Sandström (1874-1947), in accordance with the method published by Sandström and Helland-Hansen (1903).

### **Brief Statement and Review**

At the meeting of the Hydrographical Section in 1906, Hugh Robert Mill (1861-1950) of England stated that the British government desired a discussion about publication of the results of the international investigations. So the Bureau asked the Section to prepare a brief summary of the principal results. Three small groups at the meeting worked out parts of the summary, which Knudsen then collated. It was resolved to hand over the manuscript to the Bureau as soon as the authors had expressed their agreement with its form and contents (Anon., 1906, pp. 30-38). The final editing was left to Knudsen, a task that gave him some trouble. He circulated an edited version to those involved and received very many additions to it (Knudsen, 1906c). Having incorporated these amendments in a new version Knudsen circulated this, asking for speedy approval (Knudsen, 1906d). An idea of the editorial difficulties may be obtained from a letter in which Krümmel expressed his regret that the editing of the so-called Brief Statement had caused Knudsen so much trouble. Krümmel had considered it necessary to cancel some parts of the summary. He thought that "our dear colleagues" should have kept their parade horses in the stables. However, Pettersson and Wind [the Netherlands expert] would always pursue their obsessions, Krümmel found, and he continued:

What does the Gulfstream at Newfoundland concern us? What Bjerknes? What the details about the tidal currents at Noord Hinder? All this has for the point of the whole cooperation, the furtherance of the fishery questions, a very indirect importance only and it is actually dangerous to come to our authorities in the ministries with such things. Here it says: be moderate, and on the whole the "brief" summary is already much too extensive. Every further cut you may undertake, or the others propose, will have my approval (Krümmel, 1906). (From German.)



Theodor Homén also expressed some dissatisfaction. He was especially surprised that Helland-Hansen could express himself with such certainty about the Norwegian Sea. The material available was indeed very scanty, Homén found. Knudsen and Nansen had stated that it was difficult to get anything at all out of it. So Homén did not support that part of the summary; however, he would not oppose its inclusion (Homén, 1906). H. R. Mill was anxious that the summary should not be given a too official status. He suggested that it should be treated as an expression of the views of the members of the Hydrographical Section of the Council and not as a formal resolution of the whole Council (Mill, 1906). The summary was published as an appendix to the proceedings of the Council meeting (Anon., 1906, pp. 48-61).

The "brief statement" was obviously to be considered as a short report, intended for the relevant ministries in the member countries. The hydrographers, however, felt a need for a more detailed general report on the results obtained during the period 1902-07, and the question was brought up at the meeting of the Hydrographical Section in June 1907. In the meantime Knudsen and his staff had prepared draft charts and sections showing mean temperatures and temperature variations in the North Sea. The Council decided to publish them, and if possible also the corresponding salinity charts and sections, together with a short explanation and discussion. This fitted well to a resolution, passed by the above meeting, according to which a short general review of the knowledge of the hydrographical conditions in those parts of the sea investigated by the International Council, which had been acquired during the international cooperation, should be drawn up by the Hydrographical Department of the Bureau and circulated in draft to the members of the Council before publication as a supplement to the Bulletin. The North Sea temperature charts and sections mentioned above should be appended. The review was published, in English and German, as a supplement to the Bulletin 1906-07 (Anon., 1909).

As a matter of fact a review of the currents in the North Sea should have been included in the supplement. This request dates back to the Council meeting in 1906. The termination of the five-year period of cooperation, to which the governments had committed themselves, drew nearer. This may be the reason why the Bureau in January 1906 had asked for information on problems that the various governments felt were pressing for solution. The Netherlands government laid great stress upon receiving a summary of the conditions of the currents at the surface and, if possible, also in deeper layers of the whole North Sea. In accordance with this, Cornelis H. Wind (1867-1911) of the Netherlands, at the meeting of the Hydrographical Section in 1907, proposed that all data apt to give information about the currents in the North Sea should be summarized and worked up. The Section agreed and submitted to the Council a draft resolution that instructed the leader of the Hydrographic Department of the Bureau to prepare, if possible by March 1908, a numerical and graphical account of the currents in the North Sea, and requested that the Council provide a grant to meet the expenses. It was added that the results of this investigation should be included in the above mentioned short general review. Unfortunately, however, it turned out that no money was available in the budget for this purpose. The task was then transferred to the Central Laboratory where it would be dealt with by the physical assistant, Vagn Walfrid Ekman (1874-1954). Incidentally, about that time Knudsen published some general remarks about currents and water masses of the North Sea (Knudsen, 1907a).

At the meeting in June 1907 the Council, at the suggestion of Knudsen, recommended that the national directors of the hydrographic cooperative investigations should devote attention to undertaking investigations on a large scale along appropriate lines, determining the salinity of the sea surface by modern exact methods to examine the practical value of using this procedure to fix

position at sea in foggy weather. The possible usefulness of the method in the various regions of the sea was discussed by Knudsen (1907b).

### **Changes of work after 1907**

After the abolition of the Central Laboratory in 1908, the task of producing standard seawater was assigned to Knudsen in his capacity as hydrographical assistant to the Bureau (Smed, 2005a, pp. 157-170). When it later on turned out that there was a need also for other of services afforded by the Central Laboratory, such as supply of instruments, Knudsen established a small "Laboratoire Hydrographique" as part of the Council's office (Smed, 2005b, pp. 225-246).

Beginning in the year July 1907-June 1908, the arrangement of the Bulletin was changed. The hydrographical material for a whole year was now collected in one volume, the Bulletin Hydrographique. The tables of surface data were accompanied by coloured charts showing for each of the seasons the distribution of temperature and salinity over the whole region, and more detailed charts showed the distribution of surface salinity in the North Sea. The ten-day charts of surface temperature in the North Sea were continued. The temperature and salinity observations at depth were assembled in two chapters, one covering the fixed stations, another the observations made in between. Hydrographic sections based upon the data were given as in the earlier volumes. A chapter contained the amounts of oxygen, nitrogen, and carbonic acid held by the water, together with some observations on currents. The same arrangement of the data in the Bulletin was used during the following years. The Bulletins for the years 1910-11, 1911-12, and 1912-13 contain appendices on continuous hydrographical observations carried out at fixed positions in the North Sea during a fortnightly period in each of the years 1911, 1912, and 1913. The appendices give tables recording the observations of current, temperature, and salinity together with a discussion of the results, especially with regard to the tidal currents.

Upon the outbreak of war in 1914, most work at sea was discontinued; so the flow of hydrographic data petered out. At the suggestion of the Council's President, Otto Pettersson, Martin Knudsen and his staff, consisting of Johan Gehrke and a part-time clerk, used these years to work up data received in pre-war years. On the basis of this material, together with data supplied by the Deutsche Seewarte and the Netherlands Meteorological Institute, the variation of the surface temperature in a number of areas of the North Atlantic during the years 1900-1913 was studied and the results published as tables and graphs in a special volume of the series Bulletin Hydrographique (Anon., 1919). In addition, a paper on the variations of the surface temperature in the North Sea during the years 1905-1914 was prepared and published in this series (Anon., 1922).

### **Martin Knudsen's changing functions**

Knudsen's position in the ICES office was not always easy, partly perhaps because he, besides being First Assistant to the Bureau, was also a Danish delegate to the Council. As already mentioned, he had some controversies in the Council's early years with the then General Secretary, P.P.C. Hoek. In 1920 he again had problems. To elucidate the atmosphere, it may be appropriate to go into some detail. As Knudsen explained in a confidential letter to D'Arcy Thompson, he had understood that Otto Pettersson did not wish him to continue his work in the office. Knudsen supposed that this would suit the General Secretary, C.F. Drechsel, because clerks work more steadily than men of science. Knudsen added that he had never been enthusiastic about the ideas of Otto Pettersson and especially not the plan of the Atlantic Bulletin on which they had spent so much work, so he did not wonder that Pettersson would like to get rid of him (Knudsen, 1920). D'Arcy Thompson was exceedingly sorry to hear of Knudsen's

difficulties in the office and was aware that it was not quite a new story. Perhaps as a sort of consolation he assured him that he too had his difficulties. Indeed he had felt them ever since the ICES cooperation began. Commenting on Pettersson he continued:

Otto Pettersson's attitude sometimes puzzles me. His other instincts seem to interfere with his freedom of opinion as a scientific man. He often seems to be more at home, and able to work better, with his non-scientific than with his scientific colleagues. (Thompson, 1920)

Some change in Knudsen's position did occur when the Bureau, at its meeting in March 1920, decided to replace the positions as Principal Assistants by three Editors, for hydrography, plankton, and fishery statistics respectively. Knudsen became Editor for hydrography.

In 1924 there were problems again. Johan Hjort (1869-1948), an ICES vice-president, had proposed that the Bulletin Hydrographique should be discontinued (Knudsen, 1924). This was not agreed to, so Knudsen continued as editor of the Bulletin. There were controversies with Drechsel, however. Knudsen reported to Otto Pettersson that Drechsel determinedly strove to get him out of the service of the office and would perhaps succeed, because Knudsen could not continue to endure working this way, feeling friction on all points. He said that he would much appreciate it if Pettersson could find another arrangement because he still was highly interested in international hydrography (Knudsen, 1925). In 1925, a hydrographic assistant, Otto Pettersson's son Wilhelm Irgens Pettersson (1883-1971), was engaged for one year, an appointment that was renewed twice. In this period Knudsen was Hydrographic Consultant to the Bureau. In 1928 Jacob Peter Jacobsen (1877-1946) was appointed Hydrographer, and Knudsen was invited to become Chief of the Service Hydrographique and thus to have the general supervision of the hydrographic work in the Service. Knudsen kept this post until 1948 when, at an age of 77, he wanted to be released from it.

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### References

Abbreviations used:

R: Conseil Permanent International pour l'Exploration de la Mer, Rapports et Procès-verbaux des Réunions.

P: Conseil Permanent International pour l'Exploration de la Mer, Publications de circonstance.

D.1, D.2, D.12, D.14: The letters referred to under these designations are kept in Rigsarkivet (Copenhagen), Archive no. 1935, Box numbers D.1, D.2, D.12, or D.14 as indicated.

Anon. 1899. Conférence internationale pour l'Exploration de la Mer, réunie à Stockholm 1899. (Stockholm).

Anon. 1901. 2. Conférence internationale pour l'Exploration de la Mer réunie à Kristiania 1901. Première partie. (Christiania).

Anon. 1903. R, 1(B).

Anon. 1905a. General report on the work of the period July 1902-July 1904. R, 3.

Anon. 1905b. R, 4(C).

- Anon. 1906. A brief statement of the present state and of some of the most important results of the hydrographical investigations, prepared by the Hydrographical Section of the Council, at Amsterdam, March 1906. R, 6(C).
- Anon. 1909. Short general review of the hydrographical conditions in the seas investigated by the International Council; with 23 plates representing mean values of salinity and temperature in the North Sea. Supplement to Bulletin Trimestriel 1906-07.
- Anon. 1919. Variations de la température de l'eau de surface dans certains carrés choisis de l'Atlantique pendant les années 1900-1913.
- Anon. 1922. Variations de la température de l'eau de surface de la Mer du Nord pendant les années 1905-1914.
- Helland-Hansen, B. 1904. Letter of 3 September 1904 to Martin Knudsen. In D.1.
- Holt, E. W. L. 1905. Letter of 28 August 1905 to Martin Knudsen. In D.2.
- Homén, T. 1906. Letter of 30 June 1906 to Martin Knudsen. In D.1.
- Knudsen, M. 1900. Den østislandske Polarstrøms Indflydelse paa Færøernes Klima. In: "Iagttagelser over Overfladevandets Temperatur, Saltholdighed og Plankton paa islandske og grønlandske Skibsruter i 1899 foretagne under Ledelse af C.F. Wandel, bearbejdede af Martin Knudsen og C. Ostenfeld".
- Knudsen, M. 1904a. Letter of 7 October 1904 to Otto Pettersson. In D.1.
- Knudsen, M. 1904b. Letter of 3 November 1904 to Otto Pettersson. In D.1.
- Knudsen, M. 1904c. Letter of 15 December 1904 to Otto Pettersson. In D.1.
- Knudsen, M. 1904d. Letter of 8 September 1904 to Bjørn Helland-Hansen. In D.1.
- Knudsen, M. 1905a. Havets Naturlære (Hydrografi) med særligt Hensyn til de danske Farvande. Skrifter udgivne af Kommissionen for Havundersøgelser, No. 2.
- Knudsen, M. 1905b. On the influence of the East Icelandic Polar Stream on the climatic changes of the Faeroe Isles, the Shetlands and the North of Scotland. In "General Report of the Work of the Period July 1902-July 1904". R, 4(C).
- Knudsen, M. 1905c. Some remarks on the hydrographical investigations. In R, 4(C).
- Knudsen, M. 1905d. Letter of 5 September 1905 to the Danish Telegraph Administration. In D.2.
- Knudsen, M. 1905e. Letter of 3 November 1905 to Otto Krümmel. In D.1.
- Knudsen, M. 1905f. Proposal for working out the data of the hydrographical observations. In R, 4(C).
- Knudsen, M. 1905g. Proposals for the reform of the Bulletin. In R, 4(C).
- Knudsen, M. 1906a. Letter of 18 June 1906 to D'Arcy Thompson. In D.2.
- Knudsen, M. 1906b. On the determination of temperatures by measuring the resistance in telegraph cables. In R, 6(C).
- Knudsen, M. 1906c. Circular letter of 9 March 1906 to the hydrographers. In D.1.
- Knudsen, M. 1906d. Circular letter of 24 March 1906 to the hydrographers. In D.1.
- Knudsen, M. 1907a. Some remarks about the currents in the North Sea and adjacent waters. P, 39.
- Knudsen, M. 1907b. Salzgehaltsbestimmungen des Oberflächenwassers als Hilfsmittel bei Positionsbestimmung an Bord. P, 38.
- Knudsen, M. 1920. Letter of 24 January 1920 to D'Arcy Thompson. In D.12.
- Knudsen, M. 1924. Letter of 27 September 1924 to Bjørn Helland-Hansen. In D.14.
- Knudsen, M. 1925. Letter of 21 April 1925 to Otto Pettersson. In D.14.
- Knudsen, M. and Kirstine Smith. 1906. The salinity of the North Sea and adjacent waters calculated on the basis of observations from the period August 1902-May 1905. In R, 6(A).
- Krümmel, O. 1904. Letter of 15 September 1904 to Martin Knudsen. In D.1.

- Krümmel, O. 1905. Letter of 7 August 1905 to Martin Knudsen. In D.2.
- Krümmel, O. 1906. Letter of 25 March 1906 to Martin Knudsen. In D.1.
- Mill, H. R. 1906. Letter of 30 March 1906 to Martin Knudsen. In D.1.
- Pettersson, O. 1902. Letter of 26 May 1902 to C. F. Drechsel. Rigsarkivet (Copenhagen), Nr.10.649, Box 425, File 1.
- Pettersson, O. 1904a. Letter of 4 October 1904 to Martin Knudsen. In D.1.
- Pettersson, O. 1904b. Letter of 8 October 1904 to Martin Knudsen. In D.1.
- Pettersson, O. 1904c. Letter of 31 October 1904 to Martin Knudsen. In D.1.
- Pettersson, O. 1904d. Note of 30 September 1904 to Martin Knudsen. In D.1.
- Pettersson, O. 1904e. Letter of 29 August 1904 to Martin Knudsen. In D.1.
- Pettersson, O. 1904f. Letter of 9 September 1904 to Martin Knudsen. In D.1.
- Sabrou, L.-G. 1904. Rapport sur la Réunion des Assistants hydrographes à Copenhague et sur les méthodes d'analyse en usage dans les laboratoires du Conseil international permanent pour l'Exploration de la Mer. Bulletin du Musée Océanographique de Monaco, No. 22. Monaco.
- Sandström, J.W. and B. Helland-Hansen. 1903. Ueber die Berechnung von Meeresströmungen. Report on Norwegian Fishery and Marine Investigations, II(4).
- Smed, J. 1989. Otto Krümmel über Nansen's Kandidatur für den 1. Generalsekretär von ICES. DGM-Mitteilungen 1/1989.
- Smed, J. 1999. Martin Knudsen's controversies with the General Secretary of ICES, P.P.C. Hoek. Unpublished manuscript.
- Smed, J. 2005a. Martin Knudsen (1871-1949) and the Standard Seawater. Historisch – Meereskundliches Jahrbuch, Band 11.
- Smed, J. 2005b. The Central Laboratory of the International Council for the Exploration of the Sea (ICES) and its Successors. Earth Sciences History, 24, 151-163.
- Smed, J. 2010. Contribution to the history of Knudsen's Hydrographical Tables. In Papers presented at ICHO-VIII.
- Thompson, D'Arcy. 1906a. Letter of 13 June 1906 to Martin Knudsen. In D.2.
- Thompson, D'Arcy. 1906b. Letter of 21 June 1906 to Martin Knudsen. In D.2.
- Thompson, D'Arcy. 1920. Letter of 31 January 1920 to Martin Knudsen. In D.12.

## ATACAMA TRENCH INTERNATIONAL EXPEDITION

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*Editorial note:* We do not normally publish strictly scientific works in *History of Oceanography*. Nonetheless, this one is included because it falls into the category of contemporary history, and because it provides a summary resource for those interested in the history of deep-sea biology.

Although it has been recognized recently that deep-sea areas might be characterised by benthic “hot-spots”, research on trenches has so far recognized the oligotrophy of these environments both in terms of available food sources and density of benthic organisms. In September 1997, an international expedition promoted by the Istituto di Scienze Ambientali Marine of the University of Genova, involving European and Chilean institutions and with the cooperation of the Servicio Hidrográfico y Oceanográfico de la Armada de Chile, was carried out on board the vessel *Vidal Gormaz* to study the benthic ecology of the Atacama Trench, which, due to the extremely high productivity of the area, could present special characteristics.

In an attempt to clarify the characteristics and structure of the benthic food web, chemical and microbiological analyses of sediments collected from the trench and other deep stations have been carried out. Despite the generally low benthic bacterial density, bacterial secondary production and enzymatic activities were comparable to those reported for the most productive systems of the world. The results are consistent with the large accumulation of phytopigments and other biochemical indicators of organic matter availability to consumers.

Such an extremely rich microbial loop is able to sustain large higher trophic level biomass and these observations are consistent with the hadal fauna found in the traps anchored over the bottom at a depth of 7800 m at 23°15'S, 71°21'W for 39 hours. It is worth nothing that in four traps on the bottom no less than 910 amphipods were collected.

All this operations were possible trough the generous cooperation of the crew and officers (R. Garcia, P. Lubascher, R. Nuñez, E. Boassi, G. Urrutia, A. Fernandez, E. Silva) and all scientific personnel: G. Albertelli (University of Genova), P. Báez (University of Concepcion), J. Cañete (University of Valparaiso), R. Cattaneo-Vietti (University of Genova), S. Ceradini (Centro Informazioni Studi Esperienze, Milano), A. Covazzi (University of Genova), N. Della Croce (University of Genova), R. Danovaro (University of Ancona), M. Fasce (S.C. Sanguineti, Chiavari), D. Martorano (University of Genova), M. Petrillo (University of Genova), H. Sievers (University of Valparaiso), C. Valdovinos (University of Concepcion).

The collected material has been studied thanks to the collaboration of the following specialists of different institutions: T. Antezana (University of Concepcion), D.S.M. Billett (Southampton Oceanography Centre), G. Boxshall (The Natural History Museum), P. Clark (The Natural History Museum), P. Curzi (University of Bologna), E. Ghirardelli (University of Trieste), R. Huys (The Natural History Museum), J.B. Kirkegaard (University of Copenhagen), J.K. Knudsen (University of Copenhagen), M.E. Petersen (University of Copenhagen), J.C. Sorbe (Laboratoire d'Océanographie Biologique CNRS), M.H. Thurston (Southampton Oceanography Centre), and W. Waegle (Ruhr-University of Bochum).

List of Publications, ATACAMA TRENCH INTERNATIONAL EXPEDITION (ATIE) arranged chronologically

Della Croce N., Albertelli G., Danovaro R., Petrillo M., Ceradini S., Covazzi A., Curzi P. (1998). Atacama Trench International Expedition (ATIE). Agor 60 "Vidal Gormaz" (1-6 September 1997)., Genova, Genoa University Press. *Data Report 54*, 20 pp

AA.VV. (1999). Atacama Trench International Expedition (ATIE). Agor 60 "Vidal Gormaz" (1-6 September 1997). Second Report. Preliminary Results, Genova, Genoa University Press. *Data Report 56*, 86 pp

Danovaro R., Della Croce N., Petrillo M. (1999). ATIE (Atacama Trench International Expedition): evidence for extremely rich and active benthic communities. *Deep-Sea Newsletter*, 28:14-15

Aydogan A., Wägele J.W., Park J.Y. (2000). New deep-sea isopods (Crustacea, Isopoda, Asellota) from the Atacama Trench. *Mitt. Mus. Nat.kd. Berl., Zool. Reihe*, 76 (2): 175-194

Thurston M.H., Petrillo M., Della Croce N. (2002). Population structure of the necrophagous amphipod *Eurythenes gryllus* (Amphipoda: Gammaridea) from the Atacama Trench (south-east Pacific Ocean). *J. Mar. Biol. Ass. U.K.*, 82: 205-211

Perrone F.M., Dell'Anno A., Danovaro R., Della Croce N., Thurston M.H. (2002). Population biology of *Hirondellea* sp. nov. (Amphipoda: Gammaridea: Lysianassoidea) from the Atacama Trench (south-east Pacific Ocean). *J. Mar. Biol. Ass. U.K.*, 82: 419-425

Sabbatini A., Morigi C., Negri A., Gooday A.J. (2002). Soft-shelled benthic foraminifera from a hadal site (7800 m water depth) in the Atacama Trench (SE Pacific): preliminary observations. *Journal of Micropalaeontology*, 21:131-135

Danovaro R., Gambi C., Della Croce N. (2002). Meiofauna hotspot in the Atacama Trench, eastern South Pacific Ocean. *Deep-Sea Research I*, 49: 843-857

Gambi C., Vanreusel A., Danovaro R. (2003). Biodiversity of nematode assemblages from deep-sea sediments of the Atacama Slope and Trench (South Pacific Ocean) *Deep-Sea Research I*, 50: 103-117

Danovaro R., Della Croce N., Dell'Anno A., Pusceddu A. (2003). A depocenter of organic matter at 7800 m depth in the SE Pacific Ocean. *Deep-Sea Research I*, 50:1411-1420

Perrone F.M., Della Croce N., Dell'Anno A. (2003). Biochemical composition and trophic strategies of the amphipod *Eurythenes gryllus* at hadal depths (Atacama Trench, South Pacific). *Chemistry and Ecology*, 19(6):441-449

Petrillo M., Giallain M., Della Croce N. (2005). Zooplankton in the surrounding waters of the Juan Fernández Archipelago. *Rev. Biol. Mar. y Oceanogr.* 40(1): 63 – 65

**THE NORTHERN SHRIMP (*PANDALUS BOREALIS*), SMALL, BUT NOT INSIGNIFICANT,  
IN MARINE RESEARCH**

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Links between scientific, professional, economic and political motives in marine science are examined in two recently published articles:

Vera Schwach, "Et rekefiske på vitenskapens grunn. Fiskeribiologi, forsøk og fangst 1895–1950", [A northern shrimp industry based on science: Fisheries biology, experimental fishing and catching 1895–1950], *Historisk tidsskrift* [The Norwegian] Historical Review], vol. 86, issue 3, 2007: 389–410 (in Norwegian with an abstract in English).

Morten Karnøe Søndergaard and Vera Schwach, "The Nordic Shrimp Industry: State Entrepreneurship, Intellectual and Industrial Structures c. 1895–1950, *Scandinavian Journal of History*, Vol. 34, issue 2, June 2009: 162–181.

The case in both articles is the emergence of a fishing industry based on the resource of the northern shrimp (*Pandalus borealis*).<sup>1</sup> The analyses are mainly based on archival findings, contemporary scientific reports and statistics. The research question is the influence of marine research for the growth of the shrimp industry and vice versa; the importance of the investigations on shrimp for the development of a marine science. The period examined stretches from ca. 1900 to about 1950, and the location is mainly Norway and the neighbouring Nordic countries, but the articles also include an outlook on attempts to export a cluster of scientific knowledge, experiences, technology and political thinking to Russia and the USA. The articles exemplify the many ways prominent marine scientists were eagerly engaged in developing a "new" fishing industry. Readers familiar with the early history of marine science directed towards the fisheries and the International Council for the Exploration of the Sea (ICES) will recognize many names of prominent scientists in the articles.

An overall conclusion is that the fishing industries in the Nordic countries were receptive to the findings of science, particularly since they offered the promise of opening a new fishing frontier. The leading political and societal elite class perceived scientific knowledge as an appropriate instrumental tool for economic and social modernization. Natural scientists involved in the work directed towards this sector's research activity saw themselves as cultural and economic entrepreneurs, whose work promoted capitalism and shaped a modern society. But on the other hand, the engagements for the industry did not seem to have had any impact on ongoing

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<sup>1</sup> Northern shrimp are known by a variety of local names: deepwater shrimp, Alaskan pink shrimp, northern red shrimp, and great northern shrimp. Throughout this paper, unless otherwise stated, the term "shrimp" is applied to *Pandalus borealis*. The distinction between "shrimp" and "prawns" is often blurred, and to make the text clear, the term "shrimp" is preferred.



research such as models and development of theories for a more profound understanding of the populations of fish stocks and of the causes of fluctuations in the schools.

In article number one, “A northern shrimp industry based on science”, the interaction between marine research and modernization processes in the Norwegian management of the sea fisheries is analyzed. The article examines how and when the investigations, the mapping of the resources and the experimental fishing began. I emphasize the role of marine researchers, giving in particular weight to the influence of the zoologist and Director of Fisheries Johan Hjort (1869–1948). The accidental discovery of large amounts of shrimp in the Christianiafjord (now Oslo fjord) in 1896 was a corollary of other fisheries research. The shrimp was a bycatch of scientific investigations, not thrown overboard, but seen as a valuable “new” resource for the fishing industry by Hjort and his Danish peer, C.G.Joh. Petersen (1860–1928). The fisheries biologists helped to develop an industrial shrimp industry by mapping the resources, conducting experimental fishing, and by constructing suitable fishing gear. Central to the transfers of knowledge and experience was the close interaction between scientists and fisheries experts and fishermen and later on industrialists.

I also point out that the rise and gradual success of the shrimp industry in Norway and in general was not only contingent upon investigations done by marine researchers, but also on three specific interlinked economic and cultural elements. First, shrimp were a “new resource” offering great potential earnings in a low-competition field of fisheries. Second, a growing upper- and middle class in major North American and North European cities sought means to distinguish their consumption from the masses. Shrimp fitted this desire for distinction well. They were a scarce and expensive commodity, signifying exclusivity; the demand was of such character that the industry could expect to continue to expand supply without any deterioration of prices and incomes. However, this was not a universal condition. In both Russia and Iceland, shrimp were considered unfit for human consumption, a stigma that would be maintained in decades to come. Hence, the cultural specificity of the local environment played a part in the early establishment of the shrimp industry. Third, there were limited barriers to entering the shrimp fishery: the necessary investments were modest and, perhaps more important, shrimp was seldom considered competition to the large commercial fisheries for cod, herring, mackerel and sprat, nor to the socio-economic structure of the coastal fishing industry.

The prevalent perspective in article number two, “The Nordic Shrimp Industry,” is the growth of the shrimp industry viewed mainly in a Nordic context. We describe the diffusion of the Norwegian model for mapping, experimental fishing and export of an adequate fishing-gear<sup>2</sup> to Sweden, Denmark and Iceland. By the outbreak of World War II, the shrimp industry in the Nordic countries stretched from Iceland in west to the Norwegian county of Finmark in the north and to the Skagerrak in the south. We argue that this diffusion is not fully explained as a simple spread from one port or one country to another. The transmission was contingent upon two significant common attributes. The barriers to transfers of knowledge and technology between the Nordic economies were low, this showing a common industrial culture, social norms, political and legal systems. The transfers also depended upon continued interaction between the state, scientific elite, fishers and later on industrialists. All the Nordic states through their marine researchers and fisheries management played a significant role in the evolution of the shrimp fishing and processing industry, although in many instances small-scale private initiatives can

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<sup>2</sup> The shrimp trawl was a scientific trawl, modified for commercial fishing by Johan Hjort, his assistant Alf Wollebæk and local fishermen. Alf Wollebæk, “Ræker og rækefiske” In *Aarsberetning vedk. Norges fiskerier*, vol. 1, 1903: 189–196.

legitimately be considered as precursors to full-scale state involvement. While state entrepreneurship was a persistent feature, the character of its engagement shifted.

### *Exporting knowledge and technologies outside the Nordic sphere*

To underline the importance of the political, industrial and cultural setting, the effects of a tentative export of shrimp fishing knowledge and fishing gear to the northern coast of Russia and the eastern coast of the USA is analysed.

In 1897 Nicolai Knipovic (1862–1939), the Russian colleague of Hjort and Petersen, on a visit to Scandinavia picked up on their results, and subsequently bought a “Petersen otter-trawl” for use in the Murman Scientific-Fishery Expedition.<sup>3</sup> Knipovic undertook various types of experimental fishing and allegedly ended up catching substantial quantities of shrimp.<sup>4</sup> Unfortunately, Knipovic’s efforts came to nothing, since neither knowledge nor technology was put into permanent employment in the Russian area. The explanation for this may be that in 1901 Knipovic was forced to withdraw from the Expedition following a dispute with the steering committee. His withdrawal was rooted in the committee’s questioning of the usefulness of Knipovic’s investigations in facilitating the needs of the fishermen.<sup>5</sup> Knipovic obviously lacked the political influence of his Norwegian peer. In addition poverty made it difficult for the Pomor fishermen on the northern shores of Russia to buy new types of fishing gear, and no adequate social and economic structures to support private or public entrepreneurship were at hand.<sup>6</sup>

In contrast to the early Russian experience, the introduction of a more mature scientific knowledge and also fishing tools to the Gulf of Maine thirty years later was a success. In 1934 Hjort visited his friend and colleague Henry B. Bigelow (1879–1967), who was the director of the new Woods Hole Oceanographic Institution on Cape Cod. Bigelow and Hjort had first met in 1914, when Hjort sailed to the Eastern coast of Canada to head the The Canadian Fisheries Expedition.<sup>7</sup> Hjort’s scientific objective then was to test his theory on the existence of strong and weak year classes of cod and herring, and the natural causes for fluctuations in distant water fisheries, with ecological conditions comparable to those in Norwegian waters. Twenty years later, Hjort decided to test whether he would find Northern shrimp in the Gulf of Maine, an area with very similar natural conditions to those along the Norwegian coast. A second parallel exists. Hjort’s objective during his earlier enquiries had been to undertake basic biological investigations, while promoting modernisation in Canada’s cod and herring fisheries. In the 1930s he reiterated these objectives except that the focus had switched to the shrimp industry.<sup>8</sup> Conscious of the requirements for success, Hjort was accompanied by a trawl skipper with considerable experience in shrimp trawling. Moreover, Hjort had fishing gear for shrimp trawling

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<sup>3</sup> Danish National Archives, F.27–265, Danmarks Fiskeri- og Havundersøgelser, Dansk Biologisk Station, A.1, kopibog, 1889–98, C.G. Joh. Petersen til Landbrugsministeriet 23.10.1897, 17.2.1898, C.G. Joh. Petersen til det russiske generalkonsulatet 18.2.1898; A.2 Kopibog 1898–1910, C.G. Joh. Petersen til Landbrugsministeriet 24.1.1899. For an overview of early Russian fisheries investigations in the Barents Sea see: Julia Lajus, “Foreign Science” in Russian Context: Murman Scientific–Fishery Expedition and the Russian participation in early ICES activity”, *ICES Marine Science Symposia 215*, 2002: 64–72.

<sup>4</sup> Wollebæk, *Ræker og rækefiske*, 1903: 200.

<sup>5</sup> Lajus, “Foreign Science in Russian Context”, 2002: 69.

<sup>6</sup> A.P. Engelhardt, *A Russian province of the North*. London (Archibald Constable), 1899: 45–50.

<sup>7</sup> Please see, Jennifer Hubbard, 2006. *A Science on the Scales. The Rise of Canadian Atlantic Fisheries Biology 1898–1939*. Toronto (University of Toronto Press): 67–89; Vera Schwach, *Havet, fisken og vitenskapen. Fra fiskeriundersøkelser til havforskningsinstitutt*, Bergen (Havforskningsinstituttet), 2000: 179–181.

<sup>8</sup> Johan Hjort and Johan T. Ruud, "Rekefisket som naturhistorie og samfundssak", *Fiskeridirektoratets skrifter*, Vol. V, no. 4, 1938: 116.

shipped from Oslo to New York.<sup>9</sup> These preparations seemingly paid off. Thus, Hjort and Bigelow's co-operative scientific effort revealed rich fishing grounds, and in 1938 Hjort received newspaper clippings about a developing shrimp industry in Maine.<sup>10</sup>

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<sup>9</sup> National Library of Norway, department of manuscripts, Ms. 4<sup>0</sup> 2911, XIXA, J. Hjort to H.B. Bigelow 19.6.1935; Hjort, *Rekefisket som naturhistorie og samfundssak*, foreword.

<sup>10</sup> NB, Ms. 4<sup>0</sup> 2911, XIXA, H.B. Bigelow to J. Hjort 11.3. and 31.3.1938, 21.3.1938 copy of transcript from John H. Welsh dated 31.3.1938.

## PIONEER OF SOUTH AFRICAN OCEANOGRAPHY REMEMBERED

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The history of the marine sciences in South Africa is highly unusual in at least one respect (Lutjeharms, 2006). The roots of the subject are not shrouded in the mists of time as in many other countries, but a very specific commencement date can be identified.

In the 1890s the Department of Agriculture of the Cape Colony decided to appoint a trained marine biologist to establish the fisheries potential of the waters around this coast (Brown, 1997). In 1896 Dr John D. Gilchrist arrived from Scotland to take up this post, the first person in South Africa to take a definite scientific interest in the sea. This is therefore justifiably considered the starting date of the subject in South Africa.

Gilchrist brought a trawler from abroad, renamed the *Pieter Faure*, and proceeded to investigate the local waters. Within a year he discovered the rich fishing grounds for sole on the Agulhas Bank and commercial trawling commenced shortly afterwards. Without doubt those that had appointed him felt their own good judgement fully confirmed. Gilchrist went on to lay the foundation for what was later to become the Sea Fisheries Research Institute, the marine interest of the South African Museum in Cape Town (Summers, 1975) as well as that at the University of Cape Town. Failing health forced him to retire as Professor from this university in 1926 and he died in the same year.

Gilchrist strongly believed in the unity of the ocean sciences and tried to integrate the results of his faunal discoveries with environmental factors. In his presidential address to the South African Association for the Advancement of Science (Gilchrist, 1923), for instance, he emphatically stressed the importance of physical oceanography to an understanding of the marine fauna. On cruises he insisted that temperatures and salinities be measured at each trawling station (Gilchrist, 1902) and he employed innovative methods to map currents by means of drift bottles (Gilchrist, 1904).

To commemorate the arrival of Gilchrist, as well as the start of the marine sciences in South Africa, centenary celebrations were held in 1996 in Cape Town. These included the issuing of a special postage stamp, exhibitions at the local aquarium as well as the organisation of a well attended symposium. The proceedings of the latter were published in 1997 (Payne and Lutjeharms, 1997) in which the history of the last century in all the marine sciences was to be described. The aim furthermore was that the role of Gilchrist in all these disciplines was to be traced, but this came about in only a few cases (e.g. Lutjeharms and Shannon, 1997). Most contributors concentrated on the developments in their respective fields over the past few decades. At the time the whereabouts of the grave of Gilchrist was not known and a suggested wreath-laying ceremony therefore could not take place. Even a visit by his son, John Gilchrist

from the USA, to Cape Town in 1997 to learn more about his father's exploits did not result in establishing where John D. Gilchrist had been buried.

In 2009 the second author and his students were able to find the grave above St James, overlooking False Bay near Cape Town. This has led to a resurgence of interest in Gilchrist's life and work. We hope to publish a more definitive article on John D. Gilchrist -the scientist and the man - soon.

### References

- Brown, A.C. (1997). John D.F. Gilchrist and the early years of marine science in South Africa. 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. 2–16 and *Transactions of the Royal Society of South Africa*, **52**(1): 2–16.
- Gilchrist, J.D.F. (1902). Observations on the temperature and salinity of the sea around the Cape Peninsula. *Marine Investigations in South Africa*, **1**: 181–216 + 10 plates + p. 238.
- Gilchrist, J.D.F. (1904). Currents on the South African coast, as indicated by the course of drift bottles. *Marine Investigations in South Africa*, **2**: 101–113.
- Gilchrist, J.D.F. (1923). The South African seas. *South African Journal of Science*, **20**(1): 1–27.
- 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.
- Lutjeharms, J. R. E. (2006). *The Agulhas Current*. Springer-Verlag, Heidelberg, 329 pp.
- Payne, A. I. L. and J. R. E. Lutjeharms (editors) (1997). *A Century of Marine Science in South Africa*. Sea Fisheries Research Institute, Royal Society of South Africa, 252 pp.
- Summers, R.F.H. (1975). *A History of the South African Museum, 1825–1975*. A. A. Balkema, Cape Town, 245 pp.

## A TRIBUTE TO DEBORAH DAY

Deborah Day has retired as Archivist of the Scripps Institution of Oceanography. This is a loss to the research community in the history of the marine sciences and to many of us personally, for Deborah's knowledge, commitment to our work, and her personal kindness have affected a full generation of scholars working on the history of marine sciences, in American history, and on the history of the State of California. Following are some tributes from colleagues – but first a few words from me about what Deborah has meant to me and my research.

I first met Deborah in the early summer of 1987 when I stepped off the plane in San Diego to do some real archival research for my newly-minted study of the history of physical oceanography. A curious loner, George McEwen, had come to my attention, and a little digging revealed that I could learn more about him at SIO. Characteristically, Deborah met me at the airport and took me to my hotel in La Jolla. Characteristically too, she was on hand in the Archives the next morning to introduce me to the material I needed – whether I knew it or not! That was the beginning.

Since then we have worked together in a variety of ways – during my many stays in La Jolla for research, including a full year's sabbatical leave and a three-month research fellowship, as members of the executive of the Commission of Oceanography (now the Commission of the History of Oceanography), as fellow-participants in congresses and meetings (including one memorable one within eyeshot of a polar bear in Barrow, Alaska), and as visitors to the Mission of San Luis Rey. Most recently we have worked together on a paper – a collaboration that was long overdue, but all the more appreciated for that, on the early twentieth century biologist Charles Atwood Kofoid. Professionally, this all meant so much – but personally it has come to mean even more, for friendship can and should outrank scholarship in the order of things. (Eric Mills)

Now let a few colleagues – a sampling of many – add their words.

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Since graduate students don't get much full-postage, obviously-not-book-catalog mail sent to their departmental addresses, the letter from UCSD caught my eye. I didn't spend much time wondering, because I could not begin to guess what it might be. Instead, I tore open the envelope and slid out the stiff stationery paper. To my mounting amazement I began reading a letter from Deborah Day. It was part fan mail, part analytical review of my recently-published article in *Isis*. In the letter, Deborah explained better than I could have how my work contributed to the field of history of oceanography. Most astonishingly to me at the time, she treated me as a colleague and essentially invited me to join with her in the community of scholars who became my closest intellectual compatriots. I was (am) lucky to have several wonderful mentors (including the editor of this newsletter!), but this was different. Although Deborah went on to mentor me quite a bit, she was the first non-graduate student colleague I felt I had.

Deborah has proven to be as wonderful a colleague as she first seemed. I know I am not the only one to have benefited, while working in the archives at Scripps, from her ideas, probing questions, and depth of knowledge. The time I spent there as a Ritter Fellow, almost a decade ago, continues to shape my scholarship today. Many historians recognize and deeply appreciate

her contribution in the form of the now famous and beloved Scripps archives. I would like to salute the value she added to the papers that comprise the archives through her knowledge and her willingness to share it. Most of all I would like to express appreciation to Deborah for her generous and enthusiastic support of not only the history of oceanography but also of the historians who are her colleagues. (Helen Rozwadowski)

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I would like to add some of my own observations. Deborah was not a trained historian nor an oceanographer, yet she was able to create one of the most impressive oceanographic archives in the world at Scripps. But even more than that, she has always been an incredible resource for historians of science. Whenever I had a question that had even a remote tie to Scripps, Deborah was my “go to” source. And she never disappointed. Furthermore, she frequently attended and participated in many history of oceanography meetings. Never a “shrinking violet,” Deborah’s insights always contributed to the quality of those meetings. She will be greatly missed at Scripps, although she will continue to play an active role in many of our scholarly and personal lives. (Keith Benson)

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Deborah is not a geologist, nor a historian, but an archivist. She received her bachelor’s degree in history from the University of Massachusetts in 1973, and then her M.L.S. from Simmons College in 1977. The critical fact about Deborah, however, is that for more than two decades she served as the Archivist of the Scripps Institution of Oceanography, where she amassed one of the best, if not the best, collections in the history of 20<sup>th</sup> century earth science.

Archivists are critical to what we do: without them, we would not have the documents that are the raw material—the data and evidence—upon which our historical work depends. In this sense, all archivists are essential to all historians, but Deborah stands out as particularly worthy of praise and recognition. As an archivist, she was been extraordinarily proactive in ensuring the preservation, organization, and accessibility of the papers of many of the most important earth scientists of our generation- scientists like Roger Revelle, Bill Menard, Carl Hubbs, Bill Nierenberg, and many others. But she did more. She also pursued the collections of other, less well-known scientists, who are not household names, but whose careers reflect historically important patterns and developments, like Margaret Robinson, who ran the bathythermograph unit at SIO in the 1950s-70s, compiling atlases of world ocean temperatures, or Easter Cupp, who was fired from SIO during the 1930s, largely, it would appear, because she was a woman. Deborah went to houses, talked to widows, retrieved papers from under guest room beds, and more. She worked to de-classify records, and to obtain FBI files on SIO scientists who were investigated by the FBI. She was remarkably diligent in ensuring that these collections were adequately catalogued, raising funds from NSF, AIP, and other sources to ensure that this work was done in a timely and intelligent manner. And she went to considerable lengths to put finding aids and other historical information on the web to ensure maximal availability.

Carolyn Rainey, assistant archivist at SIO, estimated that hundreds of persons used the SIO archives for research in the history of earth science during Deborah’s tenure; many more have

accessed this material electronically in the past few years. Any good archivist could (and perhaps should) do what Deborah has done, but most do not. Deborah stands out as a remarkably dedicated archivist who has made an enormous difference to the preservation of historical materials in the earth sciences by virtue of her drive and determination—and therefore, materially and directly, to advancing the history of geology and oceanography.

There is more. Deborah did not merely collect papers, she actively informed historians of the work she was doing, so that they knew what materials were available, and informed archivists of the importance of earth science so that they did not neglect relevant materials from their own institutions—both here and abroad. Together with Eric Mills, she compiled a world-wide bibliography of the history of oceanography, and she published a number of articles discussing issues in historical preservation about which historians need to be well informed. In short, she did not simply wait in the archives for papers and historians to arrive, but pursued and prodded them both! There are many professional historians who could not have done *their* work without *her* work. Many books, including my own, could not have been written without the historical resources whose preservation Deborah has ensured. (Naomi Oreskes)

## NEWS AND EVENTS

### **The Next International Congress of the History of Oceanography**

ICHO-IX, the Ninth International Congress of the History of Oceanography, will be held in Athens, Greece, in 2012, probably from 4-8 July. The local organizer is Dr George Vlahakis, who will make more information available soon. He may be contacted at [gvlahakis@yahoo.com](mailto:gvlahakis@yahoo.com).

### **American Oceanography at Mid-Century**

A conference at Oregon State University, Corvallis, 14-15 May 2009, to celebrate the 50<sup>th</sup> anniversary of the university's Department of Oceanography (now the College of Oceanic and Atmospheric Sciences). Speakers and titles included:

Naomi Oreskes (University of California at San Diego): *The Crucial Experiment That Wasn't: Acoustic Tomography of Ocean Climate.*

John Byrne (Oregon State University): *Opening Remarks*

Craig Biegel (Florida State University): *A Visionary at Work – Wayne V. Burt, the Early Years at Oregon State University.*

Keith Benson (University of British Columbia): *The “Upwelling” of Biological Oceanography at Oregon State University.*

Eric Mills (Dalhousie University): *The Abyss: Resurrecting Deep-Sea Biology in the Mid-Twentieth Century.*

Helen Rozwadowski (University of Connecticut): *How the Sea Became a Frontier: the Metaphorical Context for Oceanography in the 1960s.*

Ronald Rainger (Texas Tech University): *Diverging Trajectories. Columbus Iselin, Roger Revelle, and the Impact of World War II on American Oceanography.*

Jacob Darwin Hamlin (Clemson University & OSU): *Gaming World War III at Lowestoft: Marine Scientists and Post-Thermonuclear Survival.*

Peter Neushul & Peter Westwick (University of California at Santa Barbara): *Is There Surf? Wave Measurement and Wave Riding.*



The programme also included a tour of the OSU's O.H. Hinsdale Wave Research Laboratory in Corvallis and its Hatfield Marine Science Center on the coast in Newport.

A publication containing the presented papers is in preparation.

### **Commemorating the *Hudson-70* Expedition**

The Canadian *Hudson-70* Expedition, leaving Halifax on 19 November 1969 until its return there on 16 October 1970, involved an extensive scientific programme by a total of 122 scientists in the Atlantic, Southern, Pacific, and Arctic Oceans along a 55,000 nmi. course. During the cruise, *Hudson* circumnavigated the Americas and made a complete transit of the Northwest Passage. Hundred of scientific papers and two popular books (Alan Edmonds. 1973. *Voyage to the Edge of the World*. Toronto: McClelland & Stewart; Peter Wadhams. 2009. *The Great Ocean of Truth: the Hudson-70 Voyage Around the Americas* (in press)) resulted from it.

The *Hudson-70* Expedition will be commemorated at the Bedford Institute of Oceanography, Dartmouth, Nova Scotia, from 17-18 November, including public lectures by Peter Wadhams (Cambridge University), the only member of the scientific staff aboard during the whole cruise. On November 17 there will be tours of the ship, a commemoration ceremony, a harbour tour aboard *Hudson* and two of the Wadhams presentations. The following day there will be a morning seminar devoted to the cruise, and later in the day an account of a year aboard by Peter Wadhams. On November 19, *Hudson* will leave on its next scientific cruise. [*Editorial note*: The ship is nearing the end of its long and very distinguished life, which began in 1963: the Canadian government has announced a programme of ship replacement, including the aging but able *Hudson*.]

For information, see <http://www.bedfordbasin.ca/Hudson-70/>.

### **History of Oceanology at Kaliningrad**

The 4<sup>th</sup> International Conference on the History of Oceanology was held in Kaliningrad, Russia, from 24-28 September 2009. Presentations, and the papers in the publication *The History of Oceanology: Papers of the 4<sup>th</sup> International Conference* are as follows:

Ch. 1. O. Goushchin, J. Stont: *The Chronicle of the Meteorological Observation Network on the South-East Baltic Coast*.

Ch. 2. V. Boyarskikh, L. Butkova, I. Domina: *The Role of the Scientific Research Fleet in world ocean exploration*.

Ch. 3. R. Abramov: *Outstanding Sea Explorers and Oceanologists: Unknown Pages. On the 75<sup>th</sup> Anniversary of Meteorology for Ship Handlers (publication of two documents about the life of C.M. Benua (Benoit))*.

Ch. 4. I. Boikina: *Pressing Problems of Preservation and Exploitation of Historical Ships. Preservation Experience of the Archeological Finding "Ship of the XIX Century."*

Ch. 5. D. Dominin, B. Chubarenko, E. Gurova: *Approach to the Assessment of Sustainable Development of the Baltic Sea Coastal Zone*.

[*Editorial note*: see the book review in the next section for publication details]

### **Books for Kaliningrad**

The library of the late David van Keuren is in the Museum of the World Ocean in Kaliningrad. Additions to that library, in memory of David, and contributing to the resources of the Museum, are always welcome. They may be sent to Keith Benson for forwarding: Keith R. Benson, 13423 Burma Road SW, Vashon Island, WA 98070, USA.

### **Vitiaz Anniversaries**

On 12 September 2009 celebrations of the famed research vessel *Vitiaz*'s four anniversaries were held in Kaliningrad, coinciding with a meeting of the Academic Council of the Museum of the World Ocean, including scientists who worked on *Vitiaz*. The topic discussed by the Academic Council was "Has the Epoch of the *Vitiaz* finished?"

### **North American Society for Oceanic History (NASOH) – *Maritime Environments***

The North American Society for Oceanic History announces its annual meeting, 12-16 May 2010 at the University of Connecticut, Avery Point, and the Mystic Seaport, under the title "Marine Environments."

The world's attention has focused on the marine environment. Continued concerns over depleted fish stocks, piracy, changing climate, global shipping policies, and the safety of merchant mariners and port communities have converged to remind scholars, policy-makers and citizens that we ignore our relation to the marine environment at our peril. Each of these ties between human societies and the marine environment has deep historical roots. On the theme "Maritime Environments", the NASOH, the Council of American Maritime Museums (CAMP), and the National Maritime History Society (NMHS), seek papers exploring the scholarly context of these contemporary crises in the world's oceans. We encourage all interested scholars, especially historians, marine environmental historians, museum professionals, archeologists, historical ecologists, and graduate students to submit proposals for papers examining the marine environment. Individual papers are welcome, but full sessions with three papers and a chair are preferred. Proposals should include a brief 500-word abstract of papers, plus a one-page abstract for sessions, and biographies of 200 words for each participant.

Direct specific questions to the Program Committee co-chairs, Matthew McKenzie ([matthew.mckenzie@uconn.edu](mailto:matthew.mckenzie@uconn.edu)), Brian Payne ([bjpayne@odu.edu](mailto:bjpayne@odu.edu)), or Vic Mastone ([victor.mastone@state.ma.us](mailto:victor.mastone@state.ma.us)). Deadline for submissions is 31 January 2010.

### **News from Alexandru Bologa**

Dr Bologa has in press an article with co-author S. Nicolaev, "Devoltarea institutionala a cercetarii marine in Romania" ("Institutional development of marine research in Romania"), to be published as pages 632-649 in *Dobrogea 1878-2008: Orizonturi deschise de mandatul european*. Constanta: Ed. Ex Ponto.

### **News from Walter Lenz**

Recently Dr Lenz has published "Wilhelm Brennecke, Pionier der südozeanischen Tiefenzirkulation, und seine Rolle beim desaströsen Ende der zweiten Deutschen Südpolar-Expedition 1911/1912" (with summary in English and French) in *Deutsches Schiffsarchiv* 31: 412-420.

His paper (with Matthias Heyman and Robert Marc Friedman) "How global warming stimulated ocean research in Germany" was presented during the XXIII International Congress of the History of Science and Technology, 28 July-2 August 2008 in Budapest.

### **Further Information on *Calypso***

Rogier Charlier sends additional information on Jacques Cousteau's ship *Calypso*, which was dealt with in *History of Oceanography* 20 (2008). "*Calypso* was U.S. built, with Oregon wood! It became a British minesweeper; Cousteau took over her command in 1951. She collided with a barge in the harbour of Singapore and sank; that was in January 1996, 13 years ago... It

cancelled a planned Yellow River expedition. It took more than two weeks to lift her. She was then towed to France, and rusted in La Rochelle from 1998 on. ... She was sold by a member of the Guinness family for €1 to U.S.-owned Carnival Lines to be refitted in the Bahamas at a cost of between US\$1,300,000 and 1,600,000. Thanks to a family feud, the deal fell through.....Last news came from television station France 2 in 2008: *Calypso* is now in Concarneau being entirely overhauled thanks to donations. She was then scheduled to be fit within 18 months, thus by mid-2010.”

## BOOK REVIEWS AND NOTICES

Debaz, Josquin. 2005. *Les stations françaises de biologie marine et leurs périodiques entre 1872 et 1914* par Josquin Debaz, Ecole des Hautes Etudes en Sciences Sociales, Centre Alexandre Koyré. Paris, 2005, 562 pages. (Doctoral thesis in French, **French Marine Biological Stations and their Scientific Periodicals (1872-1914)**, now on line: <http://tel.archives-ouvertes.fr/tel-00380587/fr/>)

Essay review by Selim Morcos (28204 Kenton Lane, Santa Clarita, CA 91350, USA – [selimmorx@aol.com](mailto:selimmorx@aol.com))

‘Marine biological stations’ was one of the main themes of the Eighth Congress of the History of Oceanography (ICHO VIII), held in the Stazione Zoologica Anton Dohrn, Naples, in June 2008. There were several discussions on the historical background and policies that accompanied the creation of the marine stations, some of which were well researched in the doctorate thesis of Josquin Debaz. I advised the participants of this study, despite its limited access as an academic dissertation, submitted to the Centre Alexandre Koyré, an internationally recognized institution for history of scientific disciplines including the history of natural history (sciences) since the 16<sup>th</sup> century. Recently this dissertation became accessible on line.

From the earliest oceanographic expeditions to the foundation of marine stations and the beginning of modern oceanography, marine biology had risen to take an essential place in life sciences, while flourishing within the interdisciplinary approach of biological oceanography. The new practices in biology and the need for fresh specimens led biologists to abandon the natural history cabinet for the laboratory.

French marine stations were among the first built in Europe. According to an interesting table by the author on the dates of founding the marine stations in the world until 1924, Ostende (Belgium) came first in 1843. During the first 40 years (1843-1883), 22 stations were built, six of them French: Arcachon (1867), Roscoff (1872), Wimereux (1873), Villefranche-sur-Mer (1880), Le Havre (1882) and Banyuls-sur-Mer (1883). These were closely followed in 1888 by Endoume (Marseille). With the exception of Le Havre, these stations continue to exist as active institutions. Most of them had, since the early years, their own periodicals, some of which may not exist today, at least in their original form. The first part of this study is devoted to the birth of marine biology, the creation of marine stations, and the reasons that led to their founding. The evolution of the social image of the ocean is noted. The author claims that until the beginning of the 18<sup>th</sup> Century, the ocean was a place of destruction and battles, of monstrous unknowns, but then the sea became the place for healing and beginning of life. This was followed by the progressive arrival of biologists on the shore at the end of the 17<sup>th</sup> to the end of the 18<sup>th</sup> centuries as

represented by the case of Count Marsigli and the maritime zoological journeys of the early 19<sup>th</sup> century (for example, Henri Milne Edwards and Victor Audoin). Naturalists made the shore, the one at Messina in particular, the place to be. The essential role of biological stations in late 19<sup>th</sup> century zoology became evident. The author provides an interesting account of the history of the French marine stations, their foundation, their development and their diverse nature, with special attention to those publishing scientific periodicals, for example, Arcachon, Banyuls-sur-Mer, Endoume (Marseille), Roscoff and Wimereux.

The main theme of the second part of the thesis is the periodicals published by the marine stations and how they evolved. Industrialisation and interest in periodicals in the second half of the 19<sup>th</sup> century, the increase of scientific production and the need for a better response time of publications explain the bloom of scientific journals during this period. An introductory study gives an analysis of historical and sociological background of the scientific periodicals and the scientific press in general. The publications of the French stations (and those of the Naples station) are examined, taking into consideration the different editorial strategies adopted by the stations in creating and developing their journals. Some periodicals were a response to local needs, for example the *Annales du Musée d'Histoire Naturelle de Marseille* and the *Travaux* of the station of Arcachon, whereas others adopted a global strategy promoting a scientific school, for example the *Archives de Zoologie Expérimentale et Générale* and the *Bulletin Scientifique*.

The third and last part of the study, entitled 'The zoology and the zoologists across their journals' deals with the authors. Firstly, a quantitative analysis shows the influence of authors on the editorial policy of the journals. A study of the correspondence of Henri de Lacaze-Duthiers, the editor-in-chief of the *Archives de Zoologie Expérimentale et Générale*, with his contributors, illustrates the relations between authors, their publications, and the periodical's staff. On the other hand, sociability is an interesting topic in the publishing world. Here the author provides analysis of three points: the relationship between Lacaze-Duthiers and the publisher of the *Archives*, the network of influence and information developed by Lacaze-Duthiers, and the art of scientific polemic

The study ends by an analysis of how periodicals were instrumental in the construction of French biological schools. Two major problems of late 19<sup>th</sup> century were diffused through marine stations periodicals: theory of evolution, and experimental theories. At the end of the 19<sup>th</sup> century, after the works of Darwin and Haeckel, the transformism controversy came back after about 40 years of silence. Marine stations were the scientific institutions where most of the transformists emerged, and some of their periodicals, like the *Bulletin scientifique*, were dedicated to this field. The evolutionists raised theories associating natural selection and transmission of inherited characters in a more epigenetic way. Marine station periodicals also promoted experimental biology, but with a conflict between two opposing theories of experimentation. Physiologists followed Claude Bernard's rules, mainly at the Arcachon station, whereas zoologists followed Chevreul's "a posteriori" experimental theory". In fact, the journals of the marine stations played a significant role in the construction of heuristic schools in late 19<sup>th</sup> C. French biology: the "a posteriori" experimental one, struggling against Claude Bernard's experimental theory, and the French neo-lamarckian transformist one, associating natural selection and transmission of inherited characters

Henri de Lacaze-Duthiers (1821-1901) emerges from this study as the unique figure, the "Mandarin" in the transformation of marine stations and experimental biology. He commanded a great influence as a professor at the Sorbonne, president of the Academy of Sciences, founder of the marine stations of Roscoff and Laboratoire Arago at Banyuls-sur-Mer, and as editor of one of the leading journals of experimental and general zoology. He exchanged complimentary

messages with Charles Darwin and was described by Anton Dohrn the founder of the Stazione Zoologica, Naples (1872) as “the famous French zoologist, my special competitor”

It is worthwhile to note that the text of the thesis is supported by tables, figures and a rich list of bibliographical sources including sections on marine stations, scientific journals, biographies and transformism. This may provide an easier access to the French text. (Reviewed by Selim Morcos - [Selim.Morcos@aol.com](mailto:Selim.Morcos@aol.com))

**Rentetzi, Maria. 2008. *Trafficking Materials and Gendered Experimental Practices. Radium Research in Early 20<sup>th</sup> Century Vienna*. New York: Columbia University Press. 279 pages. Illustrations only on [www.gutenberg-e.org/rentetzi](http://www.gutenberg-e.org/rentetzi). ISBN 978-0-231-13558-0 (book) and ISBN 978-0-231-50959-6 (e-book).**

Review mainly on Hans Pettersson’s role as an esteemed group leader in Vienna in the 20s, and later providing for his female Viennese collaborators an opportunity for professional stability in foreign countries, often Sweden, before and during the Nazi years.

Essay review by Artur Svansson, Department of Earth Sciences: Oceanography, P.O. Box 460, SE-405 30 Gothenburg, Sweden – [arsv@gvc.gu.se](mailto:arsv@gvc.gu.se)

In November 2000 I received an email from Greek Historian Maria Rentetzi , who informed me that she was working

on history of physics and especially on women physicists who worked at the Institute for Radium Research in Vienna. Hans Pettersson worked at the same institute and assigned to several women some tasks to carry on at Bornö station of oceanography...I am wondering if there are any archives of that period (1920-1938) and whom I could contact to address some more specific questions.

In my reply I gave her the address of Hans Pettersson’s daughter Agnes Rodhe, who in 1999 published Hans Pettersson’s diary written when he visited William Ramsay’s laboratory in London 1911-12. Working myself on a monograph on Hans’s father Otto, I knew that Agnes Rodhe knew much about her grandfather and still more about her father’s stays in Vienna in spite of the fact that she, being born 1920, was very young at the time she was there with her parents.

About one year later Agnes Rodhe, visiting Gothenburg, and I, on September 22, 2001, met Maria Rentetzi in my home, where she interviewed us. Agnes Rodhe had brought with her most of her many Vienna photographs, which Rentetzi copied on my scanner. The day before Rentetzi had copied letters at the University Library; for instance very many between Hans Pettersson and Berta Karlik and Elisabeth Róna. Some letters between Hans Pettersson and his relatives, especially his sister Emilie, written in Swedish, she got from Agnes Rodhe in English-translated versions.

During the book’s coming into being, Agnes Rodhe and I got proofs to correct; in this, my task concerned Hans Pettersson as oceanographer and his relations to his father. Elisabeth Crawford and I were preparing Otto Pettersson’s letters 1884-1929 to Gustaf Ekman for publication (in 2003 in Swedish). Hints there on Hans’s Vienna years caused us to refer to Stuewer’s article of 1985 “Artificial disintegration and the Cambridge-Vienna controversy” (pp. 239-307 in Peter Achinstein & Owen Hannaway, editors, *Observation, Experiment, and Hypothesis in Modern Physical Science*. Cambridge, MA: MIT Press). Our statement that

Hans Pettersson's work in Vienna aimed, not the least, at strengthening his model for atomic artificial disintegration, which was contrary of the one formulated by Rutherford at the university of Cambridge, UK. Later it was Hans Pettersson's Model that had to be abandoned first (from Swedish)

will be further developed below.

The word "trafficking" in the book title may be ambiguous for non-English speaking people. There was early the additional meaning of "disgraceful trade". Often in modern language this can be narcotics, and in the book *Rentetzi* means that radioactive material is dangerous but hardly the narcotics of that time. When it is mentioned together with "gendered" we may misunderstand it as slave trade in human beings, particularly coupled with women, prostitution, which definitely is not the interpretation here.

Hans Pettersson is one of the key persons in the book, but he does not appear in its title or subtitle (the latter, by the way, not ambiguous at all). Hitler's rise and fall is of course a crucial part of the drama *Rentetzi* is touching upon. The positive parts of it are the fact that most, maybe all, of the Jews concerned (e.g. Blau, Rona, Meyer) survived and Hans Pettersson was happy to help some of them to stay in neutral Sweden or to move on to the USA or to other countries in the West.

Hans Pettersson's father Otto (1848-1941) was professor of chemistry at Stockholm University College 1884-1909. Therefore Hans, born in 1888, lived his first years in Stockholm. In 1892 Otto Pettersson bought Holma Estate on the Gullmar Fiord, a long narrow inlet of the Swedish Skagerrak (part of the North Sea) coast. There the family stayed in leisure times, and lived permanently after his premature retirement in 1909. Otto Pettersson wrote very many articles in chemistry, particularly together with L. F. Nilson. From 1889, however, he, together with his close friend Gustaf Ekman, started a hobby which successively grew to be more important than Pettersson's chemistry, particularly when he was among the initiators of ICES (the International Council for the Exploration of the Sea) in 1902. To fulfil Sweden's ICES obligations, Otto Pettersson and Gustaf Ekman built Bornö [oceanography] Station (on the island opposite the Holma living house), the first of its kind in Sweden. At the same time a Swedish Hydrographic-Biological Kommission, SHBK, came into being.

Hans Pettersson took his Matriculation Exam in Stockholm 1906, and began studying physics in Uppsala soon thereafter under Knut Ångström (1857-1910), specialist in thermal radiation. Ångström suggested that Pettersson write for his Licentiate Exam an article on the generation of heat by radium. The Institute had a sample of radium bromide, prepared as directed by Madame Curie. It was an experiment of Ångström's to be improved by the use of a constant temperature bath, not available before. Pettersson wrote such an article, actually his first scientific one, which in the autumn of 1911 Ångström's successor, G. Granqvist, accepted as his Licentiate Exam.

From October 1911 to August 1912, Hans Pettersson worked in London under William Ramsay, a chemistry colleague of his father who, by the way, visited Holma in 1907. Arriving in London, Pettersson had little idea of what he was supposed to work on and Ramsay suggested the construction of a microbalance, actually an improvement of his own. This was directed to weighing small amounts of chemicals in connection with radioactive work, for Pettersson, however, of little such use at that time. On the other hand, he met Ramsay's famous colleagues, for instance at meetings of British scientific societies. He also had the possibility of visiting another of Otto Pettersson's colleagues, John Murray (1841-1914), in the *Challenger* Office in Edinburgh. In a letter to another colleague, Otto Pettersson wrote that Murray asked him whether

Hans would like to investigate the radioactivity of *Challenger* bottom samples, and that Hans had left Murray a note thereon.

I think that Hans would be competent as he worked 1½ years with radium under Ångström in Uppsala. And now having been with Ramsay for 3/4 years he should be enough capable, and also I think he likes to do it. It partly depends on me if he accepts the offer. He should return home to writing his dissertation and than help me. (From Swedish).

In Hans Petterssons' *The Voyage* (1957), we read:

I was greatly tempted by an invitation from Sir John Murray to come over to his "Challenger Office" near Edinburgh in order to work up its unique collection of deep-sea deposits for radium... For pressure of other work I had, to my regret, to decline this invitation, although my interest in the radioactive problems continued very great.

As found, however, in Hans Pettersson's diary the true story was a little different. Under the date of June 9, 1912 he wrote:

Was told [by John Murray] that he had sent three of his deep-sea samples to Prof. McGregor in Edinburgh, who will analyse them after having been in the position of reading my suggestions of their processing! So it did not come my way. (From Swedish).

Back in Sweden, Hans Pettersson got a position as first assistant at Bornö Station, for all of the period 1912/13 – 1922/23. His dissertation on "A new micro-balance and its use" was presented at the Stockholm University College in April 1914. After that he got the title of Docent, that is, Assistant Professor, at the Gothenburg University College. Beginning in 1915, Gustaf Ekman donated a sum to make it a paid position, which worked until 1930, when Pettersson got the chair of oceanography in Gothenburg. From that time onward, Hans Pettersson had his institutional premises under the roof of today's University building.

In a letter to Gustaf Ekman in late 1920, Otto Pettersson recounted his day-long visit to Prince Albert of Monaco. On Otto Pettersson's suggestion that the Prince's many bottom samples should have their radioactivity measured, a secretary indicated that nobody could do it. But Pettersson replied "that in the Bornö Station we have a sensitive electrometer, so why not let my son make some tests?" In *The Voyage* Hans Pettersson writes that he received an invitation to do so, and in the fall of 1921 he and his wife Dagmar started their work in Monaco. Soon, however, he found that the resources available in Monaco were not adequate for making exact measurements. As a result,

Having there obtained samples from different cores and converted them into soluble form, I accepted an invitation from Prof. Stefan Meyer, Director of the Institut für Radiumforschung in Vienna and moved over to that city in the beginning of March 1922,

According to Stuewer (p. 247), in April 1922 Hans Pettersson opened up a collaboration with Gerhard Kirsch, one of Meyer's assistants. Pettersson immediately established himself as the leader of the pair. He secured increasing amounts of financial support for the construction of new apparatus and the furtherance of their work. From the beginning, that work departed from his original plans of bottom-core dating. He had recognized that the most challenging and exciting

branch of physics in 1922 was the study of artificial nuclear disintegration, up to then monopolized by Nobel Prize winner Ernest Rutherford and his colleagues, especially Henry Chadwick, at Cambridge. In some five publications by 1923, Pettersson and Kirsch challenged Cambridge, claiming to have found disintegrations of elements, especially carbon, that the Cambridge group never found. Pettersson went as far as to doubt Rutherford's satellite atomic model, and put forward his own explosion one involving a system of 'elastic forces under high tension'.

During the years 1922-1925, Hans Pettersson divided his time between Vienna and lectures at the Gothenburg University College. In 1925, a fellowship from the Rockefeller Foundation's Educational Board (without Cambridge's support) offered him the luxury of staying in Vienna most of the year, spending only the summers in Sweden. He got the same fellowship through 1927. Thereafter Rockefeller continued grants for 1928 and 1929 to the Radium Institute, whereas Pettersson himself got nothing.

On December 12, 1927 Chadwick came to Vienna and tested the observations by three of Pettersson's coworkers, only to disprove them. Stuewer wrote: "The entire investment collapsed to the ground in a few short days. It was a severe shock." Maria Rentetzi, however, is critical of this conclusion: "the tragic picture that Stuewer draws does not do justice to the collaboration that followed", referring to the ensuing contacts between Pettersson and his old staff for many years.

Further, Stuewer was surprised that Hans Pettersson continued for some time to maintain that carbon is disintegrable. It was unclear then which of the two competitors was right. Later, however, Pettersson may have accepted George Gamow's independent results in September 1928 from the new quantum atomic theory, including wave physics. Gamow found his computation in most satisfactory agreement with Rutherford's observations. He wrote:

On the other hand, it is quite impossible to bring the theory into agreement with the observations of Pettersson and Kirsch, which not only show numbers of disintegration ten or more times as great as Rutherford's for light elements, but also show a considerable probability of disintegration for elements as heavy as iron.

Stuewer concluded that Pettersson's explosion hypothesis suffered a severe blow, adding, however, "ironically Rutherford's satellite model did not survive either". Well, Rutherford has survived as a great contributor to the atomic knowledge, whereas, as Pettersson wrote to Karlik in 1934, "I am of course aware that I am counted out before the physicists of Europe, suspect d'être suspect." Below, it is shown that his return to the radioactive dating of bottom sediments became a stimulus for the development of that field.

In the spring of 1928, Hans Pettersson returned to Vienna once more with his family. This time he had with him a few sea-bottom sediments that he wanted to analyze for their radium content. Elisabeth Róna was assigned the task. She soon found out that the contamination within the Radium Institute was too high to permit small amounts of radium to be determined. The needed equipment was moved to the oceanographic station in Bornö in Sweden.

In 1927 or earlier, Pettersson had applied for a vacant physics chair at the Stockholm University College, but in 1928 it was given to another of the applicants, as Rentetzi has narrated. In 1929 the wealthy Swede Knut Mark offered funds for a new chair in oceanography at the Gothenburg University College. In May 1929 Pettersson was informed by the initiator, County Governor (and SHBK Chairman) von Sydow, of the Mark donation, asking whether he would accept it. His father Otto Pettersson may have been active in this, but in a letter to Gustaf Ekman



in January 1929, he still considered Hans as lost to oceanography and hoped that Martens, the present first assistant at Bornö, would be his "successor". In May 30, 1930, however, Hans Pettersson was installed as the first professor of oceanography in Sweden.

In 1935, Róna reported to Meyer that "this is an ideal institute for work." Situated in close proximity to Oslo and Copenhagen, the oceanographic institute in Bornö placed women in a convenient environment for research, and for scientific visits to Ellen Gleditsch's and Neils Bohr's institutes. When, for example, Róna worked in Bornö the summer of 1935, she visited Gleditsch in Oslo and met with her old colleague George von Hevesy, who at the time was in Bohr's institute, in Copenhagen.

It was then that Ernst Föyn, Berta Karlik, Pettersson, and Róna (cf. Föyn et al. 1939) formed a group on seawater research, joined from time to time by Gleditsch. They started by analyzing the radium content of seawater taken from Gullmarfjord and the more open Swedish sea of the Skagerrak. During the following years, Róna and Karlik spent part of their summers in Bornö analyzing sediments. (See further, Rentetzi's comprehensive text as well as Róna's 'How it came about', a real jewel – Róna, E. 1978. How it came about: radioactivity, nuclear physics, atomic energy. Oak Ridge Associated Universities, *ORAU* 137: 1-82.)

In an article (1991) in Swedish, Gustaf Arrhenius, participant in the *Albatross* Expedition 1947-48 round the world, wrote a 'retrospect' of the voyage. In a paragraph "Geochronology" he complained that Hans Pettersson, the leader of the expedition, and his Institute did not contribute to the geochronological determinations. He claimed that Pettersson was dependent on methods from his time at the Radium Institute in Vienna. That meant analyses of only radium and radon, whereas the controlling element in the sediments, as Pettersson himself first showed, was thorium 230 (ionium).

Well maybe Pettersson was tired after the Vienna years as well as the long *Albatross* Expedition. Actually in his comprehensive *The Voyage* (1957), he wrote about 'the controlling element' on page 13:

The final solution (Hans Pettersson 1937), was that the high radium content in red clay and in similar deposits from great depths is due to precipitation of ionium (the immediate parent element of radium) from seawater on to bottom where, in the course of several thousand years, its descendant radium is bred.

This is referred to and further developed in Föyn *et al.* (1939). Hans Pettersson's role grew into being an Inspirer: the *Albatross*'s long sediment cores were like a spark that set everything off, including sediment dating, and with a new name, Paleoceanography.

When receiving Rentetzi's book(s) I immediately informed the marine geologists Gustaf Arrhenius, see above, and Kurt Boström, engaged in a monograph on Hans Pettersson, about the web address of the book. Both expressed their appreciation and Arrhenius wrote:

I found it fascinating to learn so much new detail about these people, many of whom I have known personally, Rona, Karlik, Paneth, Siegbahn, Hevesy and others, and of course most of all Hans Pettersson. Much of their tragic dramas in those turbulent times I knew about fragmentarily but Rentetzi has brought out so much more detail by her intense and thorough archival research.

References not in Rentetzi's book:

Arrhenius, Gustaf 1990. Svenska djuphavsexpeditionen (deep-sea expedition) med Albatross – ett retrospektive. *Ymer* 8-34.

Crawford, E. och Svansson, A. 2003. *Neptun och Mammon: Otto Petterssons brev till (letters to) Gustaf Ekman 1884-1929*. Tre Böcker Förlag AB, 1-233.

Pettersson, H. 1937. Das Verhältnis Thorium zu Uran in den Gesteinen und im Meer. *Anz. Akad. Wiss. Wien*, 74:127-128.

Pettersson, H. 1957. The Voyage. *Reports of the Swedish Deep-Sea Expedition 1947-48*, I(1): 1-123.

Rodhe, A., (och Pettersson, H.) 1999. Ur Hans Petterssons dagbok (Hans Pettersson's diary) 1911-12. *Vikarvets Årsbok* nr 39: 27-47, inledning (introduction) av Rodhe 18-26. Lysekil.

Svansson, A. 2004. *Otto Pettersson the Oceanographer (1848-1941)*.  
<http://ioc.unesco.org/icho/article/Svansson.pdf>

Mills, Eric L. 2009. *The Fluid Envelope of Our Planet. How the Study of Ocean Currents Became a Science*. Toronto: University of Toronto Press. xii + 434pp. ISBN 978-0-8020-9697-5  
Oceans have had a mysterious allure for centuries, inspiring fears, myths and poetic imaginations. By the early twentieth century, however, scientists began to see oceans as physical phenomena that could be understood through mathematical geophysics. *The Fluid Envelope of Our Planet* explores the scientific developments from the early middle ages to the twentieth century that illuminated the once murky depths of oceanography. Tracing the transition from descriptive to mathematical analysis, this book examines sailors' and explorers' observations of the oceans, the influence of Scandinavian techniques on German-speaking geographers, and the eventual development of shared quantitative practices and ideas. A detailed account of the history of oceanography, this book is an account of the emergence of a scientific discipline. (Based on the publisher's blurb).

Stryjuk, Victor (Managing Editor). 2009. *History of Oceanology: Papers of the 4<sup>th</sup> International Conference*. Kaliningrad: Museum of the World Ocean. 294pp. ISBN 978-5-98777-041-2

This publication contains papers from the 4<sup>th</sup> International Conference "The History of Oceanology" held in the Museum of the World Ocean, Kaliningrad, from September 24-28 2007. The papers are on activities in research and educational institutions and the role of the scientific research fleet in the exploration of the World Ocean. Some chapters are dedicated to outstanding oceanologists, pressing problems of preservation and exploitation of historical ships, and contemporary ocean exploration.

*Editorial note:* see the NEWS AND EVENTS section for details of the chapters.

### **Historisch-meereskundliches Jahrbuch / History of Oceanography Yearbook, 2008.**

The 14<sup>th</sup> volume of the *Historisch-meereskundliches Jahrbuch / History of Oceanography Yearbook* (ISBN 0943-5697), dated 2008 is the latest available. This volume continues the series' record of publishing important papers on the history of the marine sciences. Contents: "A survey of the progress of man's interest in fish from the Stone Age to this day – and a look ahead"

(Walter Nellen and Jakov Dulčić); “The first joint research programme in the Baltic Sea after World War II – the Cooperative Synoptic Investigation in August 1964” (Wolfgang Matthäus); “Planning and success of the International Indian Ocean Expedition (IIOE) 1959-1965” (Bernt Zeitschel); “Wilhelm Brennecke und seine Lebensarbeit” (Otto Pettersson – originally published in Swedish in 1924).

Available from: Museum für Meereskunde und Fischerei, Katherinenberg 14-20, D-18439 Stralsund, Germany.

**Lockyer, C. & D. Pike (eds.). 2009. *North Atlantic Sightings Surveys. Counting Whales in the North Atlantic 1987-2001*. Tromsø, Scientific Committee, The North Atlantic Marine Mammal Commission. NAMMCO Scientific Publications Volume 7.**

Mainly devoted to whale surveys, but including a historical account of the use of sighting survey methods by Tim Smith: “Encountering whales: How encounter rates became the basis for managing whaling” (p. 221ff).

**Book Notice** - Laughton, A.S., W.J. Gould and H.S.J. Roe (editors). (expected April 2010). *Of Seas and Ships and Scientists. The Remarkable Story of the UK's National Institute of Oceanography, 1949-1973*.<sup>11</sup> Cambridge: Lutterworth Press. ISBN 978-07188-9230-2

Britain's National Institute of Oceanography (NIO) was founded at a time when the science of oceanography was developing rapidly, as the marine science community worldwide was freed from wartime preoccupations to both re-engage in research programmes begun before the conflict and also to follow new lines of enquiry and associated techniques that had emerged during the intervening years. NIO was a leading participant in the exciting events of the 1950s and '60s; its scientists and technicians were personally responsible for many important advances in both the theory and practical observation of the oceans, Swallow floats to name but one, and many more in co-operation with colleagues overseas. Its story is a remarkable one, and, just as remarkably, one that has never been told until now between the pages of a single volume.

This volume is not a history of the laboratory; it does not seek to assess its significance in the international scene. Rather it is a first hand account of the scientific work done there, written almost entirely by surviving members of staff who were involved in the events they describe. In fact, having been invited to contribute an introductory explanation of why, in spite of being responsible for some key developments in oceanography, such as the *Challenger* Expedition, Britain had no oceanographic research institute up to that time, and how NIO came to be founded, I am the only contributor not to have been on the staff during these years (though I did occupy a desk there for a while when beginning research on marine science of an earlier period.)

When NIO was founded in 1949 its main constituent was the Admiralty Research Laboratory's Group W, founded in 1944 to carry out research on waves. Its work is described by surviving members Michael Longuet-Higgins and M.J. ('Tom') Tucker and this section also incorporates reminiscences of other colleagues, now deceased. Biographical notes by George Deacon, who headed Group W and became NIO's first director, have also been used, both here and in an account of his earlier career with the Discovery Investigations.

Though this was not originally planned, the Discovery Investigations became part of the new organization in 1949, and work on whales and whaling was continued there for a time, as

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<sup>11</sup> Provisional title

described by Howard Roe, while Peter Foxton and Martin Angel write about the development of other aspects of marine biology at NIO.

Further sections deal with work on ocean currents, from Swallow floats to MODE, with chapters by Jim Crease and John Gould, internal waves (Steve Thorpe) and marine chemistry (Fred Culkin); wave and tidal research and its applications (Longuet-Higgins, David Cartwright and Tucker); and marine geology (Arthur Stride and Tony Laughton). The final section deals with marine engineering and instrumentation, research vessels and the infrastructure required for the scientific research.

Many themes recur in different contexts, such as the Indian Ocean Expedition of the early 1960s and the wider relevance, not always fully appreciated by its beneficiaries, of much of the work at NIO. There was the excitement of contributing to a field that was developing rapidly and hard-won successes in work in a challenging environment. There were inevitable disappointments too and changes not always felt to be for the better in the way scientific research was organized. These led to NIO becoming (a major) part of the Institute of Oceanographic Sciences in 1973. The final chapter describes this and subsequent changes leading most recently to the creation of the National Oceanography Centre at Southampton, NIO's linear successor as Britain's premier institution for ocean science. (Contributed by Margaret Deacon)