

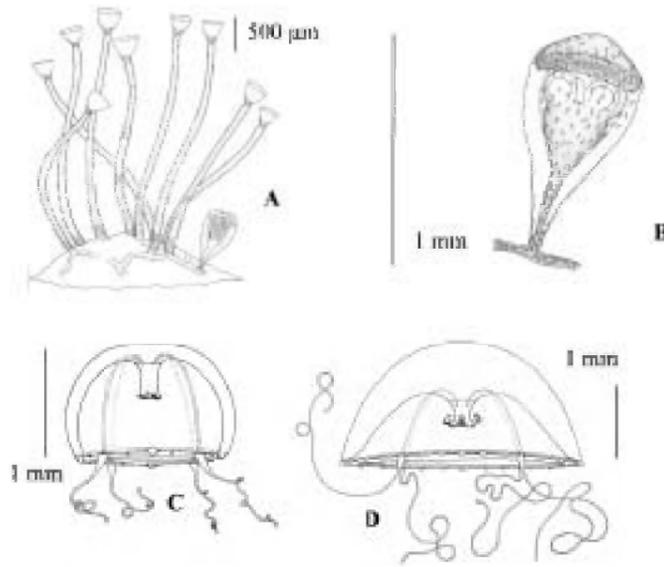
Clytia hummelincki: a one-week-old medusa.

The story of *Clytia hummelincki*

This species produces typical *Clytia* medusae (at least at release; the adult is still unknown) but the hydroid is distinct from all other *Clytia* because it has a subhydrothecal spherule, a feature typical of the genus *Campanularia* (a genus with suppressed medusae). Leloup described it from the West Indies in 1935. Other records are from South Africa, and Boero (unpublished) found it in Papua New Guinea. The species was recorded for the first time from the Mediterranean (Ionian coasts of Calabria and Apulia) by Boero *et al* in 1997 and, since then, from both the Adriatic and the Tyrrhenian seas (albeit unpublished). The species is expanding rapidly. It forms dense carpets at 1-2m depth, in full light, on rocks covered by encrusting coralline algae, especially those intensively grazed by sea urchins. The species is present in the summer, but the whole cycle is still unknown. Being present both in the Atlantic and in the Pacific, it is not clear if it entered the Mediterranean either from Suez Canal or from Gibraltar. The rapid expansion of this species of hydroid witnesses a great success of the medusa stage, since dispersal is mainly obtained by displacement with currents. Unfortunately, *Clytia* medusae are very similar to each other and are invariably identified as *Clytia hemisphaerica* by plankton ecologists, so the diversity of species is undetected.

Biodiversity (at species level) and ecosystem functioning

The ecological importance of these species, also for human purposes, resides in the feeding habits of medusae in general. Medusae feed on other plankters, from copepods to fish eggs and larvae. The medusae of *Clytia* do not reach large enough sizes to be recognised by a casual observer, but they are large enough to feed on copepods and larvae. The presence of new predators (in great quantities) in a given ecosystem might lead to changes in its functioning, as we have seen in the Black Sea with the case of alien ctenophores and fisheries. A decline in seasonal abundance of adult fish can be due to the presence of a predator of the larvae in a preceding period! We see the pattern (fewer fish) but we cannot understand the process leading to it (more predators, causing recruitment to be impaired) if



Clytia hummelincki. A: hydroid colony. B: Gonotheca with a single medusa bud. C: Newly-released medusa. D: 15-day-old immature medusa. (Drawings by Cristina Di Camillo).

we do not know the players of the game in detail. An ecosystem service (fish for our tables) can be compromised by subtle factors that are not obvious if we measure ecosystem functioning by considering just the efficiency of biogeochemical cycles.

Loss of expertise

If killer whales, toxic dinoflagellates, ctenophores or frondose algae become suddenly abundant where they were previously absent or rare, their presence is immediately recognised. We do not need taxonomists to perceive such newcomers; they (or their effects) are so obvious! But nature is subtler than this. Tiny creatures of apparently no importance can have strong ecological impacts and drive ecosystem functioning in "strange" directions. We are ready to face the obvious and/or the expected, and our "predictions" work when the expected occurs, but we are less ready to perceive subtle changes in biodiversity. Their subtlety, however, might be the prelude to changes that are not subtle at all, and that makes our "predictions" very weak. Knowing the effects without knowing the causes is not a good strategy if we want to provide knowledge that leads to better management. We cannot dream of being able to manage jellyfish blooms, but at least we can detect their impact and realise that some changes in ecosystem functioning are linked to them, and not to other causes. The much-invoked ecosystem approach should lead to understanding of how ecosystems function and thus allow their goods and services to be managed. Unfortunately, there are no automatic ways to recognise species, there are no machines in which to throw a sample and produce a nice species list (and their relative abundances), having pressed a button. But this is not a good reason to disregard this information. Such things require highly specialised human expertise...and continuous monitoring, especially in periods of great change, like this one.

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Congratulations

We would like to extend our congratulations and appreciation to **Prof Ferdinando Boero** who has received the Albert I Prince of Monaco Award and Manley Bendall Award 2005 from the Comité de Perfectionnement of the Oceanographic Institute in Paris for his contribution to the field of oceanography.

FEATURES

Aquatic Invasions

Dog whelks in Dutch coastal waters

By **Johan Craeymeersch**
Mieke Rietveld

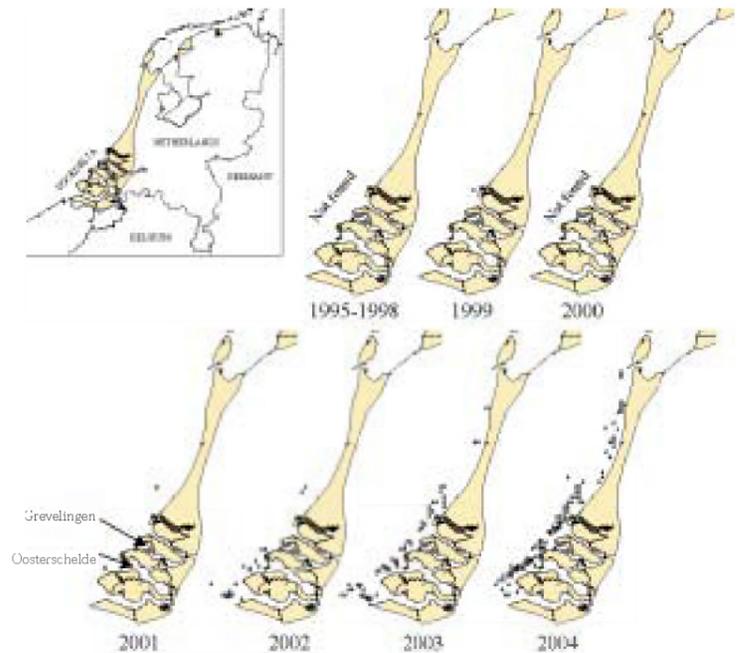
THE CENTRE FOR Shellfish Research of the Netherlands Institute for Fisheries Research (RIVO) carries out yearly surveys for distribution mapping and stock assessment of the most commercially important species: mussels (*Mytilus edulis*), cockles (*Cerastoderma edule*) and trough shells (*Spisula subtruncata*).

Since 1995, 800-1,000 stations in the coastal area (up to 12km offshore) have been sampled, using a trawled or modified dredge, annually in spring. These surveys provide information on spatio-temporal variations in density, biomass and stocks of commercial species, but also result in a time-series of abundance and biomass data of another 25 infaunal and epifaunal species.

One of these species is the dog whelk, *Nassarius*. In the period 1995-2000 only a single specimen was found, near the harbour of Rotterdam. Since then the number of observations of dog whelk has increased, and the species is extending its distribution northwards (see figure).

Until recently all specimens were recorded as *N. reticulatus*, the netted dog whelk. In the southwestern part of the Netherlands, it is recorded from the Oosterschelde and in Grevelingen Lake (see the EurOBIS site at MARBEF www.marbef.org/data and the ANEMOON foundation website www.anemoon.org). In the first decades of the last century the species was common in eelgrass beds in the Wadden Sea, but disappeared with the disappearance of eelgrass in the 1930s. In the same period, there were a few reports of beached live specimens (Dekker, 2004). Dekker also mentions a recent record on the Dutch coast (March 2004).

Several authors consider *N. reticulatus* as a complex. Following reports on the morphological, genetic and ecological differences between *Nassarius reticulatus* sensu strictu and *Nassarius nitidus* (Rolán and Luque 1994; Sanjuan *et al* 1997), the separation of the two species is nowadays accepted (see e.g. CLEMAM, ERMS). According to Dekker (2004), all specimens reported in the southwest of the Netherlands (Grevelingen Lake, Oosterschelde) are *N. nitidus*. We expected the species in the coastal waters to be *N. reticulatus* s.s., as *N. nitidus* seems to be restricted to saltmarshes and bays and is never found along open coasts



Distribution records for *Nassarius* observed between 1995 and 2004 in the Dutch coastal waters by the Netherlands Institute for Fisheries Research (RIVO).

(Rolán, pers. comm.; Gofas, pers. comm.). In the last six months, we collected specimens from Grevelingen Lake and from coastal waters. Following Rolán and Luque (1994), we indeed identified specimens collected in Grevelingen as *N. nitidus*. On the southwest coast there is apparently a mixed population of *N. nitidus* and *N. reticulatus*. All specimens from the central and northern coast were identified as *N. nitidus*. All dog whelks in Belgian coastal waters were identified as *N. reticulatus* with the exception of a shallow dock in Oostende (Kerckhof, pers. comm.). In the UK, Ireland and Germany, *N. reticulatus* and *N. incrassatus*, the thick-lipped dog whelk, have been reported. According to most authors, the distribution of *N. reticulatus* ranges northwards to northern Norway. Others consider *N. reticulatus* as more or less Mediterranean-Lusitanian with its northern distribution limit at the southern British Isles, while the species in northern Europe is *N. nitidus* (pers. comm. of Warén in Hansson (1998).

One of the main objectives of MarBEF Data Management is to integrate species distribution information into one massive data system. This database will be the European contribution to the Global Ocean Biodiversity Information System, EurOBIS. It is, therefore, fundamental that all ecologists identify species correctly. We think that, because of the new taxonomic

insights and the reported distribution records, there is an urgent need to check recently-collected specimens on a pan-European level. Here is a role for MarBEF's Taxonomy Clearing System; integration between taxonomists and ecologists would ensure correct, up-to-date species identification.

Regardless of the species actually found during our surveys, our time-series points to (re-) establishment of the dog whelk in Dutch coastal waters. Historical data are, unfortunately, rare and not easily accessible. Historical records are restricted to a few records of beached animals in the first two decades of the last century, reported as *N. reticulatus*. We are not aware of records between 1920 and 1995, although we could only check literature from the seventies onwards. We hope that MarBEF can finally succeed in identifying and incorporating historical data sets into an integrated database. This will take many years, but the present data clearly demonstrate the need for such a central database.

The uncertainty about taxonomic identifications and distributions also has implications for the interpretation of the observed distributional changes in Dutch coastal waters. For the sake of this discussion, we assume that *N. reticulatus* is a southern species, that *N. nitidus* has occurred in the North Sea up until now (besides *N.*



Razor-shell covered by egg capsules of dog whelks (photo © RIVO).

incrassatus) and that all species historically reported as *N. reticulatus* actually were *N. nitidus*.

For *N. reticulatus*, the colonisation of coastal waters could be explained as one typical for southern species spreading northwards as climate change warms coastal waters. In Belgium, the netted dog whelk has been quite common since 1993. The winters of 1995-96 and 1996-97 diminished the Belgian population but recovery has been reported since 1998 (Rappé, 2003). For *N. nitidus*, the change in distribution is not simply a northwards spreading. The species could have spread initially from the Grevelingen or the Oosterschelde and further distribution could be due to warmer water in the last couple of years. For both species, profit from changes in climatic conditions might be indirect, e.g. through decreased predation pressure on larvae. Higher water temperatures advance reproduction and hatching of many marine species while shortening the – risky – planktotrophic period. Decreased predation on larvae might also be due to a decrease in large carnivorous zooplankton, as has been suggested for Grevelingen Lake (Lambeck, 1982). Whether this is the case in the southern North Sea, we don't know, but the zooplankton species composition has certainly been altered by climate change (Beaugrand *et al.*, 2002).

In 4-5 years, the dog whelk has spread from the Belgian border about 200km northwards. It is strange that *N. reticulatus* was common in Belgian coastal waters for about 10 years before it was first recorded in Dutch coastal waters. Even more so, as the capacity of *N. reticulatus* for dispersion is high: the species hatches as free-swimming veliger larvae, which drift as plankton for 2-3 months. Furthermore,

Nassarius reticulatus has no distinct sediment preferences, which increases its colonisation potential (Rasmussen 1973; Kuhl Morgen-Hille, 1963). Unlike sandy shore-dwelling gastropods that need to attach their egg capsules to a relatively stable substratum, *N. reticulatus* prefers certain seaweeds, but in the absence of weed or when weed is scarce, capsules are deposited on rocks and other available hard substrates (Barnet *et al.*, 1980). In the Dutch coastal zone, empty shells of razor clams might be a good substratum, as supported by recent observations. Since its introduction in 1979, *Ensis directus* has rapidly spread along the European coast. In Dutch waters it is nowadays one of the most common shells. It is likely that a combination of availability of empty razor-clam shells and higher temperatures has facilitated the spread of nassariids along the Dutch coast.

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Marine-B listserver

To facilitate communication of the project aims to as broad an audience as possible, and to disseminate the results of the project, the **Marine-B** (Marine Biodiversity) electronic mailing list is being utilised by MarBEF.

To join the list

This process will generate a piece of mail inviting you, as the owner, to add yourself to the list. Send an email to: listserv@listserv.heanet.ie and leave the subject line blank. In the main part of the mail, type in the command:-
subscribe MARINE-B <firstname surname>

Make sure that you do not add a signature at the end of the mail. You will then receive a message saying you are subscribed to the list.

To send mail to the list

When you want to send mail to the list, just enter MARINE-B@listserv.heanet.ie in the 'To' field and your mail message will be distributed to the people who have signed on to the list.

If you wish to check the list archives, go to:
<http://listserv.heanet.ie/marine-b.html>.

The website <http://www.lsoft.com/> may be useful if you wish to get further information about listservers and the running of the list.

If you have any problems, please email Olive Heffernan (olive@ecoserve.ie).



R Hofrichter, ImagDop

FEATURES

Historical Perspectives

HMAP: History of Marine Animal Populations

An interdisciplinary research programme using historical and environmental archives to analyse marine population data before and after human impacts on the ocean became significant

By Anne Husum Marboe

THE HISTORY OF Marine Animal Populations (HMAP), the historical component of the Census of Marine Life (CoML), aims to improve our understanding of ecosystem dynamics, specifically with regard to long-term changes in stock abundance, the ecological impact of large-scale harvesting by man, and the role of marine resources in the historical development of human society.

Since the earliest historical records, man has harvested a variety of different animals from the oceans. The effects of this activity on marine populations have been of increasing interest over the last century. While ecologists have traditionally aimed to identify the current conditions of many of the animal populations affected both directly and indirectly by harvesting, much less focus has been given to the status of affected populations in earlier times. A historical reference point of marine populations against which modern populations can be compared is necessary in order to determine how ocean ecosystems are changing with respect to human impact and even climate change. HMAP addresses this issue through multidisciplinary studies integrating marine ecology, history and paleo-ecology. This innovative combination of research methods and analytical perspectives offers a unique approach to testing theories of the effects of both man's activities and natural environmental changes on our living marine resources.

Methods and objectives

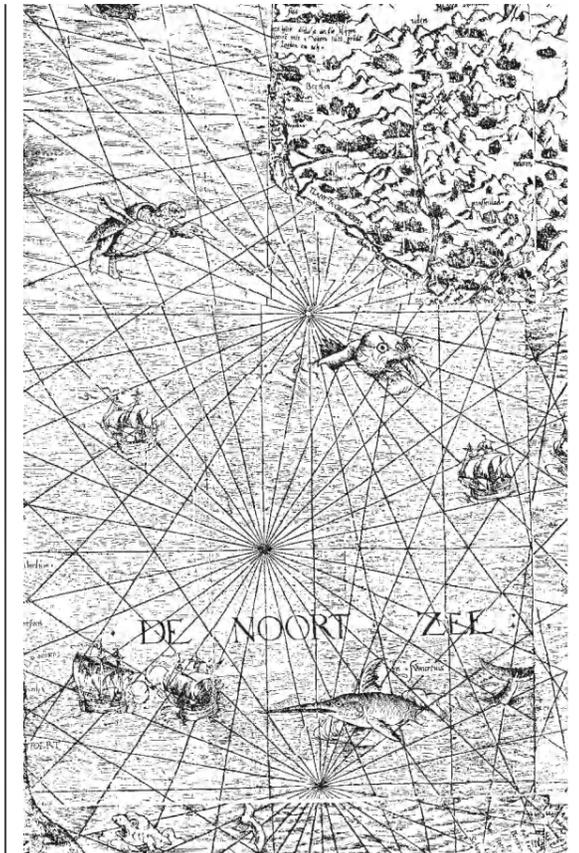
To achieve its goals, HMAP relies on the teamwork of ecologists, marine biologists, historians, anthropologists, archaeologists, paleo-ecologists and paleo-oceanographers. These integrated research teams analyse data from a variety of unique sources, such as colonial fisheries and monastic records, modern fisheries statistics, ship logs, tax documents, sediment cores and other environmental records, to piece together changes in specific populations

throughout history. The resulting long-time series will improve our understanding of the effects of human activities and environmental factors, such as climate, currents and salinity, on marine ecosystems.

HMAP implements its global mission through a case-study approach. The case studies are generally regional in scope and focus on a few species of commercial importance or habitat and biodiversity changes. Individual studies are selected on the basis that the ecosystem has been subject to fishing and that there exists sufficient historical data on catches and harvesting effort. There are currently seven case studies around the world:

- Northwest Atlantic (Gulf of Maine, Newfoundland-Grand Banks, Greenland cod fisheries)
- Southwest Pacific (Southeast Australian Shelf and Slope fisheries, New Zealand Shelf fisheries)
- White and Barents Seas (Russian and Norwegian herring, salmon and cod fisheries, Atlantic walrus hunting)
- Norwegian, North and Baltic Seas (Multinational cod, herring and plaice fisheries)
- Southwest African Shelf (Clupeid fisheries in a continental boundary current system)
- Worldwide Whaling (Historical whaling in all oceans)
- Caribbean communities (Impact of the removal of large predators).

Many HMAP projects are interpreting changes in marine populations over the past 500-2,000 years, which provides researchers of current and future conditions a baseline that extends back long before the advent of modern



An historical view of the oceans (© CMRS).

technology, or before significant human impact on the ecosystem.

HMAP will result in a better understanding of the role of marine resources in human history and of the factors controlling marine populations. The project will help improve ecological theory, which can be applied to predict the effects of human activities on marine and aquatic ecosystems.

Building a new discipline

Three HMAP Centres for the Study of Environmental History have been established at the University of Southern Denmark, the University of New Hampshire (USA) and the University of Hull (UK). These institutions act jointly as central coordinators of the project, maintaining research focus, identifying and aiding the implementation of priority research projects, ensuring synchronisation among the individual studies, and serving as points of contact for the media and the public.