In memoriam Jacobus Cornelis (Koos) den Hartog (1942-2000), marine naturalist

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Jacobus Cornelis den Hartog was born on 17 April 1942 in Broek op Langedijk. He read biology at Leiden University from 1963 to 1970. He worked at the Caribbean Marine Biological Station on Curaçao from 1971 to 1973, where he studied Caribbean sea anemones. From 1973 he worked in the National Museum of Natural History in Leiden, where he became curator of Coelenterata in 1975. For 25 years he was an active member of the marine research group of the museum and as such he participated in 15 expeditions and was involved in several smaller fieldwork projects, in the Atlantic Ocean as well as in the Indo-W Pacific region. The taxonomy of sea anemones, Actiniaria as well as Ceriantharia and Corallimorpharia, were the main subject of his studies. However, he was a real naturalist and took an interest in several other subjects and groups. As such he published, e.g., on different types of associations, the food of sea turtles and birds, sea birds in particular. He produced several lavishly illustrated papers for the general public. In recent years Den Hartog became a devoted editor of the (serial) publications of the museum. A list of his scientific papers is attached to this paper. He passed away on 7 October 2000.

Jacobus Cornelis (Koos) den Hartog was born on 17 April 1942 in Broek op Langedijk in the province of North Holland, the Netherlands. The family soon moved to the coastal town of Den Helder, where his father became a bank manager. His life as a marine biologist started at a very early age, even before he could walk. His eleven years older brother Kees, who later became a biologist as well, took him with him during his excursions to the dunes, beach, dikes and coastal marshes near Den Helder, dragging him in a small cart when Koos was still to little to walk. He kept an interest in the coastal fauna during his years in high school and published his first paper (on *Blennius*) at an age of 16. This was followed by several other notes in the Dutch beachcombers journal 'Het Zeepaard', including the first paper on sea anemones in 1960: the first record of *Corynactis viridis* in the Netherlands.

Den Hartog studied biology at Leiden University from 1963 to 1970. After the basic general studies he concentrated on his favourite sea anemones. He hesitated between ecology and taxonomic studies, so he tried to combine them as in fact he did all his life. At the Netherlands Institute for Sea Research he studied the influence of temperature and salinity on the growth of a sea anemone. In the Plymouth Marine Laboratory he studied the variety and reproduction of *Sagartia troglodytes* as well as the nematocysts of 16 species.

After having obtained his masters degree he managed to get a fellowship for studies on sea anemones in the Caribbean. With his wife, fellow-student Ruth M. van Ter Tholen, and their first son Mark he settled at the Caribbean Marine Biological Sta-

Fig. 1. The curator surrounded by books and samples.

tion on Curaçao in 1971. There I met them for the first time in 1972, when I stayed with my family in the same guesthouse. At that time it had become apparent that it would be difficult for Den Hartog to execute the research project, with a focus on ecology, as proposed originally. Scuba diving and work with life specimens in an aquacultural setting were essential components of the work, but because of problems with his ears scuba diving became impossible and moreover he had developed an allergy for sea anemones. In consultation with the research foundation and with the Leiden museum (in particular Prof. Willem Vervoort) the goals of the research project were changed. The research became more focussed on taxonomy and zoogeography.

Den Hartog finished his fieldwork on the Netherlands Antilles in October 1973. He donated his enormous collection of Caribbean sea anemones to the Leiden museum and started working on it in a room next to mine, which lead to almost daily contacts between us for more than 25 years. He immediately became an active member

of our marine research group. His fellowship ended on 1 August 1975, when he was appointed curator of Coelenterata. Meanwhile he became more and more convinced that an isolated study of Caribbean sea anemones was in fact impossible. Material from other parts of the Atlantic and from the Indo-Pacific had to be included and type specimens had to be re-examined. First he borrowed additional specimens from other museums but he preferred to study the species in the field first. He always wanted to know more about their variation, ecology and behaviour. He took a great interest in mutualism, particularly symbiosis. The fact that this became an important aspect of research in our group until the present day, is in no small measure due to his enthusiasm. Regrettably this fieldwork had to be confined to the littoral zone and the shallow sublittoral, at least for him personally. He did not find it too much of a handicap because he became an extremely skilful snorkel diver and was not hindered by the limited time scuba divers can stay in the water. Moreover scuba diving colleagues assisted him by making underwater photographs and extracting specimens from the sea floor (fig. 2). Of course they also brought specimens from deeper water.

Fig. 2. Skin diving on Indonesian coral reef in 1984.

In 1976 we started a new research programme in the southeastern part of the North Atlantic, the CANCAP-project. It focused on zoology, botany and palaeontology of the areas around the Canarian-Capeverdian Basin, including coastal research in all archipelagos in the region. Ultimately in twelve years time we made eight expeditions, mostly on board the research vessel Hr. Ms. *Tydeman*. Den Hartog took an active part in all of them, mostly as co-chief scientist. Of course he himself concentrated on the coastal benthos, particularly sea anemones and relatives. He worked along

Fig. 3. Shore party leaving r.v. Tyro. Koos (left) with colleagues Jeroen Goud (middle) and Bert Hoeksema (Seychelles, 1993).

the coast of most islands in the region, often from the shore, and if he could he stayed there for several days because he also took a great interest in birds. All uninhabited islands in the region have sea bird colonies. In addition to the CANCAP-expeditions he organized collecting trips to the Azores (1979), Ascension and St. Helena (1983) and Senegal (1982, 1983). He also took part in an expedition with r.v. *Plancius* to the Orinoco delta and the Caribbean in 1986. The European fauna was not totally neglected: visits were made to the marine stations of Plymouth, Roscoff and the Faeroes. The Den Hartog family preferred holiday trips to the Mediterranean region and several times these gave an opportunity to spend at least some time to study the local fauna, from the Atlantic coast of France to Crete.

Den Hartog was convinced that many more sea anemones than we now are aware off have a circum-(sub)tropical distribution and that the Atlantic and Indo-Pacific species should not be studied in separately. Therefore he very much wanted to extend his field studies to the Indo-Pacific region. The first opportunity arose in 1984, when the museum participated in the Snellius-II expedition in Indonesian waters. On board r.v. *Tyro* we could visit several locations in eastern Indonesia, the world centre of marine biodiversity. The results of this expedition determined the planning of our research group and from 1990 on we focused our fieldwork on the Indo-West Pacific. We participated in the land-based Rumphius Memorial Expedition on Ambon in 1990. Our last shipboard expedition took place in 1992 and 1993 on board r.v. *Tyro*. As part of the Netherlands Indian Ocean Programme we studied the oceanic reefs of the Seychelles (fig. 3). Den Hartog also took part in the three

subsequent land-based expeditions to northern Sulawesi (1994), Ambon and Seram (1996) and Cebu, Philippines (1999).

The taxonomy of sea anemones, Actiniaria as well as Ceriantharia and Corallimorpharia, was the main subject of his studies. This is by no means an easy subject and consequently there are not many experts worldwide. You need to be a more than average microscopist and micro photographer and indeed Den Hartog developed these skills to perfection. For best results you need good quality material. Therefore he always did his utmost to prepare and fix his specimens during the fieldwork. As mentioned before he concentrated on coastal species. Over the years we acquired a good collection of deep sea species as well but I could not persuade him to study those, probably because he could not study them in a living or at least fresh condition and fix them properly. There was only one exception, some abyssal Corallimorpharia, but then this was definitely a favourite group. He dedicated some of his largest and best papers to the Corallimorpharia, which he had collected and studied ever since 1971 (1980a, 1993c).

Den Hartog was asked several times to assist in the compilation of local marine fauna's, including identification guides. This type of work is very time consuming so he could not always do this, although he found it an obligation as one of few experts, noteworthy are his contributions to the fauna of Bermuda (1985b), Indonesia (1997a) and the western Indian Ocean (1997c).

He always tried to study the anemones in the living state, either in the field in their natural habitat or in aquaria. He not only did this in order to describe and photograph the animals properly but also to study their behaviour. He was particularly interested in associations with other animals such as symbiosis. Some results of his studies were published in papers on crustaceans and molluscs living on or with sea anemones (1984b, 1990a, 1991, 1995c, and 1997a)). During the fieldwork in the Indo-Pacific he put quite some effort in observations on clown fishes, in particular their quantitative distribution among clownfish anemones. Data on his observations in the Seychelles were published (1997d).

It looks a bit strange that he also became involved in the study of the food of sea turtles. However, because of the work of the former director Prof. L.D. Brongersma, the Leiden museum has a history of studies on the biology of these animals. Little was known about their food, particularly during their long pelagic wanderings because then they feed mainly on gelatinous plankton. These prey species can only rarely be recognized in stomach contents, but Den Hartog discovered that numerous nematocysts are present, indicating that coelenterates may be the most important food items for pelagic turtles. This more or less forced him to study the poorly known cnidom of pelagic groups, notably Siphonophora and Scyphozoa (1980b, 1984c, 1984d).

Den Hartog has always been a keen bird watcher and photographer and years ago he filmed as well, e.g. the courtship behaviour of grebes. He considered ornithology merely as a hobby, but this became rather more serious when we started visiting the Atlantic islands. These have interesting endemic bird fauna's but from the marine perspective almost all of them are important breeding areas for oceanic birds as well. Our expeditions gave opportunities to visit remote islands and this resulted in papers on the ornithology of the Selvagens islands (1984e), the Cape Verde islands (1984e, 1987a, 1990b, c, 1993b), the Azores (1981c, 1983) and St. Helena (1984a).

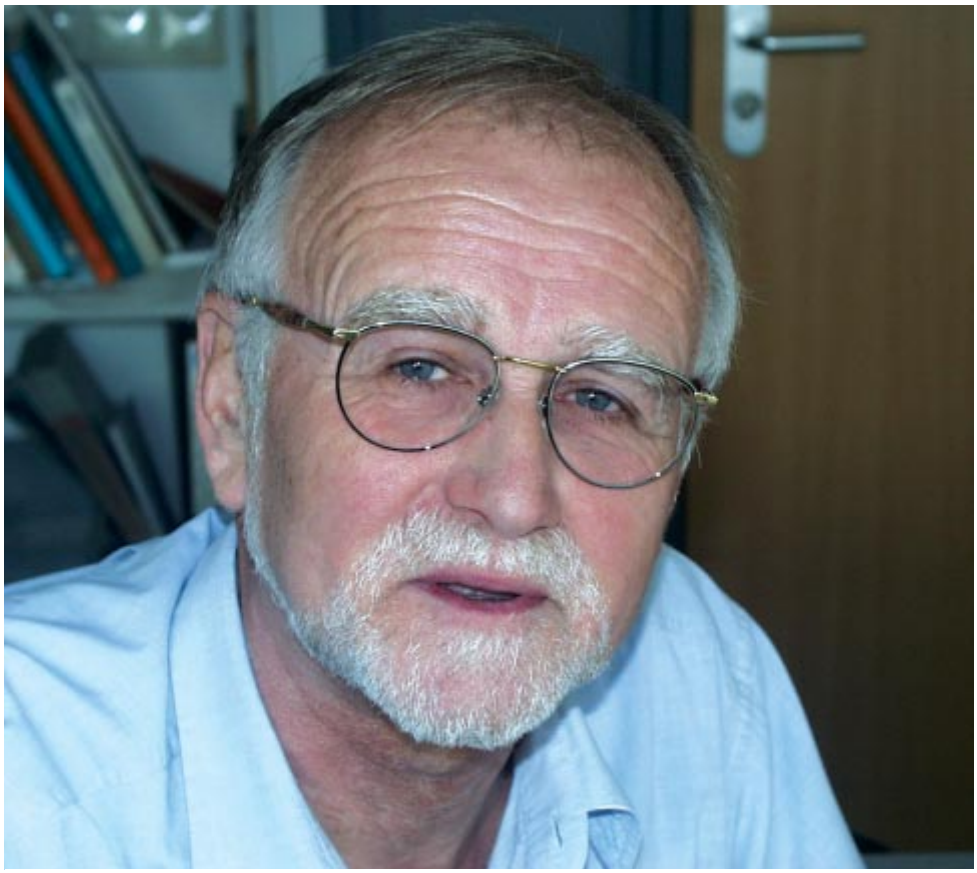

Fig. 4. Recent portret.

In the eighties Den Hartog put quite some effort in the production of papers for the general public, as a by-product of our journeys to the Atlantic islands. He was a skilled (bird)photographer so these papers could be lavishly illustrated with his own photographs. These papers were published first in 'Artis', journal of the Amsterdam zoo and later in 'Dieren', journal of the Amsterdam and Rotterdam zoos.

Den Hartog will of course be remembered as a scientist who published papers on several fields of research but also as an editor of the journals of the museum and separate books. In recent years he put major editorial efforts in three large volumes: Proceedings of the 6th International Conference on Coelenterate Biology (Leiden, 1997), Commemorative volume for the 80th birthday of Willem Vervoort in 1997 (Zool. Verh. Leiden 323, 1998) and the special volume on the occasion of my own retirement (Zool. Verh. Leiden 334, 2001), for which I am particularly grateful. Regrettably these enterprises resulted in several of his own manuscripts not being finalized. His departure was too soon and too sudden. Meanwhile two papers were completed by co-authors and hopefully other colleagues will edit some other almost complete papers.
Koos passed away in Leiden on 7 October 2000.

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