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GLIMPSES OF THE HISTORY OF STUDIES ON THE MARINE WORMS (ANNELIDA: POLYCHAETA) OF THAILAND

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Professor Gunnar Thorson's hypothesis

The first major attempt to describe the polychaetes of Thailand began with the samples collected along the west coast of Phuket during the Fifth Thai–Danish Expedition to the Andaman Sea in 1966. A group of young Thai scientists participated along with the team of Danish zoologists headed by Prof. Gunnar Thorson.

Before the expedition was launched, G. Thorson had presented the theory of parallel animal communities. He had coined the concept that habitats at similar depths would harbour similar animals all over the world. Of course the species would differ when Denmark was compared to other countries, but the genera would occur in parallel. If, *e.g.*, the lugworm *Arenicola marina* was present in the intertidal of Denmark the parallel species in the intertidal of the west coast of USA would be the lugworm *Abarenicola pacifica*, etc.

G. Thorson was therefore very much looking forward to the Expedition to the Andaman Sea, where he anticipated to find many species which would fit into his theory of parallel communities. However, to his great disappointment he was not able to describe any animal communities, including the existence of parallel species in the Andaman Sea. Every time the grab came up from the bottom it contained a new array of species forming a never ending line of biodiversity. As a result, G. Thorson had to modify his theory. He acknowledged that it was not valid for the Andaman Sea.

At this point of Thorson's studies I learned about the fauna of Thailand while I was studying zoology at the Marine Laboratory in Elsinore headed by G. Thorson. He invited us to see a movie taken during his stay in Thailand and he talked much about the incredible number of species in the Andaman Sea.

The first Thai polychaetologist

Right after the Fifth Expedition, G. Thorson had invited two Thai scientists to work with the collected samples. One of them was Boonlert Phasuk, whom I recall sorting polychaetes and estimating biomass at the Marine Laboratory in Elsinore in 1966. For a young scientist, working pretty much alone with a high number of polychaete taxa, this must have been quite overwhelming, but Boonlert Phasuk did not give up. He was sure that if he brought the polychaete samples back to Thailand he would be able to identify and describe all of them.

However, things did not work out as he had hoped. He only managed to start the work and obtain some exchange of information with a Japanese colleague. Then, in capacity of Director of the Phuket Marine Biological Center (PMBC) and later at the Department of Fisheries in Bangkok, he got so much administrative work to carry out that the worms had to remain preserved in their containers.

They stayed there until 1992, when I persuaded him to publish the data he had from the expedition in 1966. He was aware that polychaetologists in some cases would give other names to the species he had named 26 years earlier, but the most important thing was that the polychaetes were transferred to the PMBC Reference Collection, where they now are available to scientists who might wish to carry out a revision. Boonlert Phasuk's collection is an

important part of the historical backbone of the PMBC Reference Collection (Fig. 1).

Thai–Danish collaboration initiated at PMBC

Before I started to work at the PMBC, I had previously been trained in polychaete taxonomy in 1966–67 at the Kristineberg Zoological Station, Sweden. My dedicated teacher was Anders Eliason. He loved to identify worms preserved in alcohol. If they were presented to him alive he might say "let us put them in alcohol and see what they become!". Then he could identify every species presented to him from Scandinavian waters, and he was happy to teach me all he knew.

Before coming to the PMBC, the young Thai scientist Anuwat Nateewathana had been assigned to monitor benthos in the Gulf of Thailand for the Department of Fisheries. He was impressed by the diversity and abundance of polychaetes and tried his best to identify them, but it was of course difficult because he lacked most of the relevant literature. By chance Anuwat and I were brought together in 1979, in connection with continued support by Danida (the Danish aid programme) to the PMBC, and we decided to work together to nurse our common interest in the biology and taxonomy of polychaetes.

How we worked together

First we had to find the literature needed. The library of the PMBC had a number of general books, which were supplemented with thousands of pages copied at the Zoological Museum in Copenhagen. The pages were mailed to us by Prof.

Figure 1 Boonlert Phasuk (left) and Somchai Bussarawit at the former's home in Bangkok on October 19, 2001. On this occasion Dr. Phasuk returned the bulk of the polychaete material collected during the Fifth Thai–Danish Expedition to the Phuket Marine Biological Center, as well as graciously donating a large collection of polychaete reprints to the center.

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Bent Muus, who also took part in the Fifth Thai Danish Expedition.

Now we could start the work, so we collected worms on mud flats in Phang-nga Bay, in mangroves, and from coral reefs. It was exciting for both of us because we both loved to work with the worms. When we sat in the laboratory with the preserved material sorted into families and genera, the hard work of finding the proper species name could begin. Anuwat had a steady hand and good eyes so he would begin the process of identification by cutting individual parapodia from a specimen, orienting them on an object slide, and handing them over to me. Then I would make drawings of lobes, setae, and other details aided by a camera lucida mounted on the microscope. When I had finished my drawing we would discuss whether all details were captured on paper before we went on with the next parapodium. Then followed comparisons with the literature until we finally obtained consensus about the species. I recall the excitement when we first agreed that we had found a new species. However, new species soon turned out to be more common than the known ones, and this implied a lot of work we did not anticipate to begin with.

Anuwat made notes, drafted parts of manuscripts, and I got the job of making final drafts and drawings of all the worms and their morphological details. When a paper was considered ready for publication we carried out a final comparison with the specimens before it was mailed to referees.

An essential aspect of working together was that I could read and translate most the old literature, often published in French, German, Latin or Scandinavian languages. Modern literature is usually published in English, but some important papers are printed in Japanese, Russian and Chinese, languages unavailable to both of us. It is not that easy to describe a new species and make sure that it has not already been described by somebody else. Therefore, we are both indebted to polychaetologists in many countries who gave us constructive criticism when we started to describe new species. It is of course important that the style and terminology of a paper are in accordance with international practice.

Methylene blue staining as a tool in taxonomy

In my early days as a zoologist, I worked with the collections of the Zoological Museum in Copenhagen, where I noticed that the retired polychaetologist Elise Wesenberg-Lund had a bottle of methylene blue solution at her dissection tray, which was still standing in her room. Unfortunately I never had a chance to ask her what she used it for, but I suspected it was used to highlight details of the morphology since her illustrations were rich in details. I told Anuwat about this, and we decided to try it. It turned out to be a tremendous success. Suddenly we could clearly see many details under the dissecting microscope we were unable to see before, so it became a standard to dip the worms in methylene blue before we started to identify them. The advantage with methylene blue was that it would dissolve again in alcohol so that the worms would regain their original pale colour, allowing pigments and eyes to be studied.

The first decade of collaboration

The close co-operation of Anuwat and me regarding polychaete taxonomy started in 1979 and ended in 1992, when we both switched to work with molluscs. We continued to work together as we had done with polychaetes, but we found it increasingly difficult to obtain necessary funding. It was a lot easier to have projects funded on molluscs compared to polychaete studies.

During the polychaete period we presented our findings (*e.g.*, on nereidids) in various journals and from 1983 also at three international polychaete meetings (see references). The first meeting was conducted in Sydney in 1983. We talked about the family Nephtyidae of Thailand, both the ecology and the taxonomy. In 1986 we participated in the second meeting in Copenhagen, where we presented our studies on the ecology and taxonomy of the family Magelonidae. The third meeting was in Long Beach, USA in 1989, where we presented our results on the ecology and taxonomy of the genus *Prionospio* in the family Spionidae. We both participated in the fourth meeting in France in 1992, and Jorgen Hylleberg in the fifth meeting in China 1995, but without presenting papers because polychaetes had been replaced by molluscs at that time.

The time after 1992

In 1995 Danida decided to give a final grant to the PMBC with a view to conclude the co-operation with the Center and to mark the many years of joint research. The PMBC started with the idea of establishing a joint Center during the Fifth Thai–Danish Expedition in 1966. The idea had materialised in 1968 and continued with only a brief interruption to the conclusion in 2000.

During the final phase, the Zoological Museum in Copenhagen continued the taxonomic work at the PMBC with Danny Eibye-Jacobsen being responsible for polychaetes. He organised the Thai–Danish BIOSHELF Polychaete Workshop at the PMBC in 1997 with the participation of international specialists.

In March 2000 Danida granted a PhD scholarship to Ms. Charatsee Aungtonya of the PMBC Reference Collection so she could specialise in polychaete taxonomy. She works partly at the PMBC, partly at the Zoological Museum in Copenhagen. She will continue the studies of polychaetes at the PMBC, so at least one experienced polychaetologist can carry on the work in Thailand.

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