

Personalia

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A passion for PNA: Peter E. Nielsen on his 50th anniversary

Initially, I heard about Peter and peptide nucleic acid (PNA), the great molecule that he created with his colleagues in 1991, the same year that I moved from industry back to academia. Soon after this, I started the PNA-based project and Peter invited me in 1992 to make a short visit from Moscow, where I worked at the time, to his Copenhagen laboratory to finish the project. A few months later, I rejoined his group, this time for a year. After a productive and enjoyable study on PNA in Copenhagen, I moved to Boston, where I continued my PNA-related research. Thus, I am familiar with PNA virtually from its inception and collaborated with Peter in the study of this exceptional molecule for a decade.

A few words on PNA: it is a synthetic DNA and RNA mimic composed of a polyamide (pseudopeptide) backbone and standard or modified nucleobases. Because of some unusual attributes, PNA has increasingly innovative biotechnological applications, which could not be performed with common oligonucleotides. Further, PNA has potential in the design of gene therapy drugs and nucleic acid diagnostics^{1,2}.

The recent publication of the first book on PNA² marks an important event: the transition of the emerging

PNA technology from infancy to maturity. The second book covering the PNA research and applications³ will soon be published by Humana Press.

Having started the original PNA research, Peter remains a key figure in this field by actively collaborating with many recognized scientists worldwide.



Peter Eigil Nielsen

Peter Eigil Nielsen was born on 7 August 1951 in Copenhagen, Denmark. In 1976, he graduated from Copenhagen University holding an MS in biochemistry. Over the next two years, Peter Nielsen has worked as a research fellow at the University of California at Berkeley (CA, USA). Peter then returned to Denmark to study

for his doctoral thesis and he got a PhD in Chemistry from Copenhagen University in 1980. He then stayed at this university as a research fellow and then senior fellow until 1991. Peter then took the position of Associate Professor at Biochemistry Department, where he currently teaches Danish students and is now full Professor.

In the same year, he established the Research Center for Medical Biotechnology at the Panum Institute (Copenhagen), which was later transformed into the Center for Biomolecular Recognition. In 1992, he was one of the founders of PNA Diagnostics (Copenhagen, Denmark), a company that aimed to develop PNA probes for diagnostic and monitoring purposes. Between 1997 and 1999, he served on the Board of Directors of the company until it was sold to DAKO. In 1998, Peter co-founded Pantheco (Copenhagen, Denmark). The primary goal of this company is to generate, by employing the PNA technology, new generations of antimicrobials, and antisense and antigene drugs.

Peter is the recipient of two prestigious awards: the Novo Nordic Foundation Prize (1997) and the Lundbeck Foundation Prize (1997).

In addition to PNA, Peter E. Nielsen is well known for his contribution to other fields such as DNA structure, origins of life, bioorganic synthesis, photochemistry

and photobiology. However, PNA remains his greatest passion in science. Peter once said: 'I like PNA as my own baby.'

As well as studying PNA, Peter intensely promotes this research by publicizing his achievements at various scientific meetings and in numerous reviews. He is a consultant of several PNA-related firms: three of the companies first involved in researching PNA are ISIS Pharmaceuticals (Carlsbad, CA, USA), PerSeptive Biosystems (Applied Biosystems, Foster City, CA, USA) and PNA Diagnostics (Copenhagen, Denmark; now acquired by DAKO A/S, Glostrup, Denmark).

Keeping in mind the therapeutic potential of PNA and the urgent need of new antimicrobials because of the increasingly widespread resistance to antibiotics acquired by many dangerous pathogens, Peter and partners have recently set up a new biotech company, Pantheco (Copenhagen, Denmark). The goal of this enterprise is to create, by employing the PNA technology, new generations of drugs that can avoid these problems of resistance.

A year ago, Peter told me that it is hard to sit simultaneously on several chairs, referring to his vice-presidency at Pantheco, professorship at Copenhagen University, directorship at the Center for Biomolecular Recognition (The Panum Institute, Copenhagen) and his editorial duties for numerous scientific publications. Still, he successfully succeeds in his management of this, mostly for the love of PNA, and I applaud his enthusiasm.

Note that Peter is not a 'book-worm' at all: I know that he likes traveling around the globe (he has fished in Alaska and now he dreams of Tahiti or Fiji islands) and gardening at the backyard of his Kokkedal house (he once grew, and proudly gave me, a tasty

squash). In addition to many other human merits such as attractive friendliness, quick wit, great mind, huge capacity for work, ability for leadership, remarkable inventiveness and unlimited imagination, Peter has one more, rather intriguing ability: to always look young. Knowing him for almost ten years, I can say that

Peter's boyish and youthful fervor essentially have not changed with time.

I wish him to stay as passionate and enthusiastic for science and business as he always was and still is at his 50th anniversary. Coincidentally, in a few months there will be another anniversary: ten years of PNA!

- 1 Nielsen, P.E. (2000) Peptide nucleic acids: on the road to new gene therapeutic drugs. *Pharmacol. Toxicol.* 86, 3–7
- 2 Nielsen, P.E. and Egholm, M., eds (1999) *Peptide Nucleic Acids: Protocols and Applications*, Horizon Scientific Press
- 3 Nielsen, P.E., ed. *Peptide Nucleic Acids: Methods and Protocols*, Humana Press, (in press)

Unraveling DNA: 60th birthday of Maxim D. Frank-Kamenetskii

It is hard to believe that I know this man and have worked with him for 30 years: I met Maxim in September 1971 while I was a student of the Moscow Physical-Technical Institute, where he was the Assistant Professor of Biophysics. Two years later, I started my first research project with Maxim as my supervisor. His major research interests by this point were mainly in the field of DNA research, namely in the biophysics of the DNA molecule.

Science is a tradition in Maxim's family: his grandfather and father were recognized worldwide (the former for environmental studies and the latter for contributions to chemical- and astro-physics); his late wife, late brother, sister, brother-in-law, and now his son, are all scientists too. Yet, Maxim derived his inspiration for science, especially his passion for DNA, not only from his family but also from the famous book *What is Life?* by Erwin Schrödinger, which, as Maxim recalled, encouraged him to study modern biology.

He is best known for his important contributions to the field of DNA topology (DNA knots and supercoiling), the study of unusual DNA structures (helix-coil and B–A transitions, H-form, intermolecular triplexes, quadruplexes,

dendrimeric nanoconstructs), peptide nucleic acid (PNA) research and the design of innovative DNA diagnostics. Maxim also contributed, as a scientist with broad interests, to quantum chemistry, photochemistry, molecular spectroscopy, polyelectrolyte theory, the study of fractals and neuronal networks.



Maxim D. Frank-Kamenetskii

Maxim D. Frank-Kamenetskii was born on 7 August 1941 in Gorky (Nizhny Novgorod), Russia. He obtained his PhD degree in high-energy physics from the Moscow Physical-Technical Institute in 1967. In the same year, he started working as a staff scientist at the Radiobiological Dept of

the Kurchatov Institute of Atomic Energy (Moscow) which was transformed subsequently into the Institute of Molecular Genetics. In 1979, Maxim took up the post of Head of the Laboratory of Theoretical Biophysics. Ten years later, he was appointed as the Head of the Dept of Molecular Biophysics at the Institute of Molecular Genetics, and Chairman of the Molecular Biophysics Chair at the Moscow Physical-Technical Institute.

After emigration to the USA in 1993, Maxim serves as the Professor of Biomedical Engineering and co-Director of the Center for Advanced Biotechnology at Boston University (Boston, MA, USA). Maxim D. Frank-Kamenetskii is a member of the Russian Academy of Natural Sciences and is listed in the Marquis Who's Who in Science and Engineering and Marquis Who's Who in America. He is a member of the editorial boards of many scholarly journals. Besides science and teaching, his avocation is tennis.

In 1983 he wrote, in Russian, *The Most Important Molecule*, a book that describes the physicochemical, biotechnological and medicinal aspects of DNA for the general public. Over 300,000 copies of

this book have been sold in the author's native Russia, becoming especially popular among students with interests in modern medicine and the life sciences. Translations of the book were also published in Slovak, Georgian, Italian, French and English (a revised and an updated English version was issued in the USA in 1997 with the title *Unraveling DNA* and has become a top-ranking publication in its class).

Maxim Frank-Kamenetskii's present research interests focus mostly on the now flourishing field of biomolecular and biomedical engineering: basic and applied (medicinal, biotechnological and diagnostic) aspects of duplex-DNA interactions with a variety of PNAs (DNA and RNA synthetic mimics). Based on his broad erudition, Maxim also consults several biotech and pharma companies. Furthermore, he teaches biomedical-engineering students the molecular biology and biophysics of biopolymers, DNA structure and function, thermodynamics, statistical and quantum mechanics and higher mathematics. With such an encyclopaedic knowledge, it is no surprise to note that, according to Eastern horoscope, Maxim is a serpent – a symbol of wisdom!

Maxim has many disciples, who have become recognized experts in the biomedical and biotechnological industry and life sciences, and I am sure they will join me in congratulating him on the occasion of his 60th anniversary.