**Opening Lecture**

**00.1**

**Intellectual property in the natural sciences**

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Along the road from a scientific discovery, through the invention and production processes, up to and including the consumer, one should always keep patents in mind. This stems from the crucial fact that the investment involved in the implementation of a new invention requires the simultaneous delineation of intellectual property rights. Regardless of our personal views on the matter, patenting is a common practice in the natural sciences worldwide and cannot be ignored. In relation to the natural sciences, the total sum of their positive and negative aspects is reflected in modern biotechnology. Its intensive development is the result of effective collaboration between various disciplines: biochemistry, biology, chemistry, genetics, the technical sciences, agriculture, medicine and pharmacology and many others. Law is increasingly important among those not mentioned, and with it arises the necessity of cooperation between the natural scientists and lawyers. This cooperation requires the breaking of many barriers, including nomenclature and conceptual schemes. Nevertheless, only through the acquaintance with legal terminology can scientists communicate with lawyers so as to teach them molecular and technological fundamentals of modern solutions in the natural sciences. Lawyers must themselves understand the terminology and conceptual paradigm of the natural sciences.

Polish regulations pertaining to intellectual property rights are contained in the act entitled “Industrial property law” (June 30, 2000; Journal of Acts. 2003, No. 119, Par. 1117, with subsequent modifications). This legal norm is in accordance with the regulations of the European Union and the Munich Convention, and makes it possible to patent both a process and a product. The realisation of the patent process, however, meets many obstacles. It is also very long and costly when one makes applications in several countries. Polish patent legislation has been modified with an amendment pertaining specifically to biotechnological inventions extended patent protection to live organisms and their fragments. It should be underscored that the use of patented solutions in research and teaching applications so as to exclude commercialisation does not infringe patent rights.

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**Parnas Lecture**

**00.2**

**Listening to silent mutations**

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The regulation of gene expression is thought to be dominated by upstream and downstream non-coding sequences. But recent experiments suggest that sequence elements within coding regions may be equally important for regulation. We have shown that the accumulation of silent mutations in mammalian genes can change mRNA levels by several orders of magnitude. Similar results have been reported for the expression of viral and transposon genes in mammalian cells. Silent mutations are also known to affect translation, splicing, and most recently, protein conformation.

We have developed an experimental platform to systematically quantify the effects of synonymous sequence variation on gene expression. It consists of a library of synthetic genes that all encode the same amino acid sequence (GFP), but contain extensive variation in their synonymous positions. Applying this tool to *E. coli*, we show that the GC content near the 5' end of genes strongly affects expression. Surprisingly, the adaptation of codon usage to cellular tRNA pools is less important. Further experiments with the library will allow high-throughput identification of regulatory sequence motifs, and increase our understanding of the evolution and function of synonymous mutations.

**Reference:**