

# PROTEIN DISCOVERY AND OPTIMISATION

There are three main challenges in a protein engineering project; starter protein identification to find a starter protein that has some amount of desired functionality, protein optimisation to improve protein properties towards desired levels and patent landscape analysis to keep the IP landscape into account during the entire process.

Bio-Product's flagship product 3DM is uniquely positioned to facilitate efficient protein discovery and design. The massive amounts of high quality, integrated protein data power our tools and help make the best informed decisions to reduce time to market.

1

STARTER  
PROTEIN  
IDENTIFICATION



2

PROTEIN  
OPTIMISATION



3

PATENT  
LANDSCAPE  
ANALYSIS

"THANKS TO 3DM WE WERE ABLE TO MARKET A NOVEL XYLOSE ISOMERASE. 3DM WAS USED TO FIND A NOVEL XYLOSE ISOMERASE THAT IS MUCH MORE ROBUST THAN ALL COMMERCIAL AVAILABLE XYLOSE ISOMERASES AND 3DM WAS USED TO MASSIVELY IMPROVE IT'S SUBSTRATE PREFERENCE"

Dr. Klara Birikh,  
METGEN Oy

Results from customers show that expression rate of enzymes on custom designed panels are structurally much higher (>95%) compared to conventional methods. Mutation libraries designed with 3DM result in higher quality libraries that reduce screening efforts and increase the hit rate of proteins with desired properties. 3DM enables researchers to intelligently select proteins, residues and mutations.

# 1

## STARTER PROTEIN IDENTIFICATION

A project starts with finding the right starter protein. As it's not possible to inspect all proteins that occur in nature, a selection panel that contains a wide variety of relevant proteins is used. To find a suitable starter protein, a panel with proteins that are likely to express and optimally cover the relevant sequence space needs to be created.

Sequence panels containing intelligent diversity and maximised evolutionary spread can be built in 3DM. For example, panels targeted toward the discovery of a novel specificity can be designed with a focus on relevant protein positions likely to affect specificity. The expression rate of this panel can be optimised with extensive protein filtering and selection

options. In contrast to existing methods that naively sample the sequence space, this method allows for a focus on relevant diversity throughout the complete sequence space, thereby massively increasing the chance that a suitable starter protein will be found.

“THE PANEL DESIGN MODULE IS A REAL TIME SAVER FOR US AND IT'S EASY TO USE. THE ENZYME SELECTION ALGORITHM RESULTS IN A VERY HIGH PERCENTAGE OF EXPRESSIBLE ENZYMES STILL ENSURING GREAT DIVERSITY OF THE ENZYMES IN THE PANEL”

### 3DM

3DM is the core behind these tools. It contains large amounts of information extracted from protein structures, alignments and scientific literature for protein families. All this information is integrated and validated, and can be analysed via a variety of different methods and tools. 3DM relieves many of the burdens that researchers face in dealing with the growing amounts and complexity of data available in the life sciences.

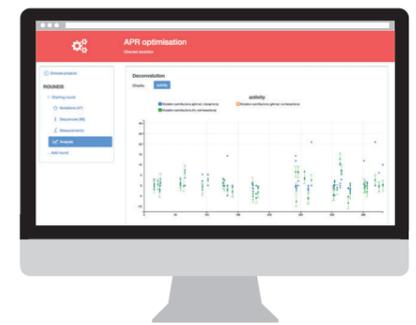
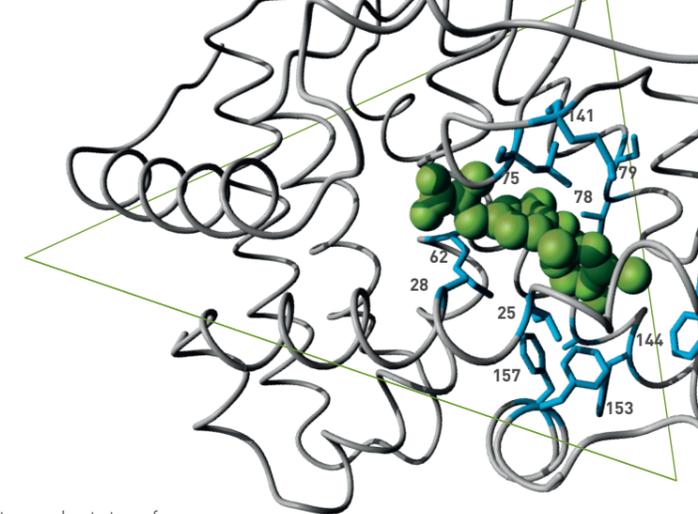


# 2

## PROTEIN OPTIMISATION

3DM provides a number of complementary methods to intelligently compose sets of variants to introduce in a protein. The full power of the tools in 3DM can be used to incorporate insights derived from proprietary analyses of super-family alignments, advanced structure-derived constraints and much more. In addition to selections based on expert insights, variant suggestions can also be provided by highly advanced predictive algorithms. All this enables maximal cooperativity

between expert scientists and state of the art artificial intelligence models. In a series of optimisation rounds, variants are systematically introduced into the protein and can be tested. Variants and their impact on protein performance can be analysed in the context of known data and structures, using acquired knowledge and novel insights.



“3DM ALLOWS AN EASY-TO-USE DESIGN OF „SMALL, BUT SMART“ MUTANT LIBRARIES SUBSTANTIALLY SAVING TIME AND EFFORTS TO IDENTIFY DESIRED IMPROVED ENZYME VARIANTS”

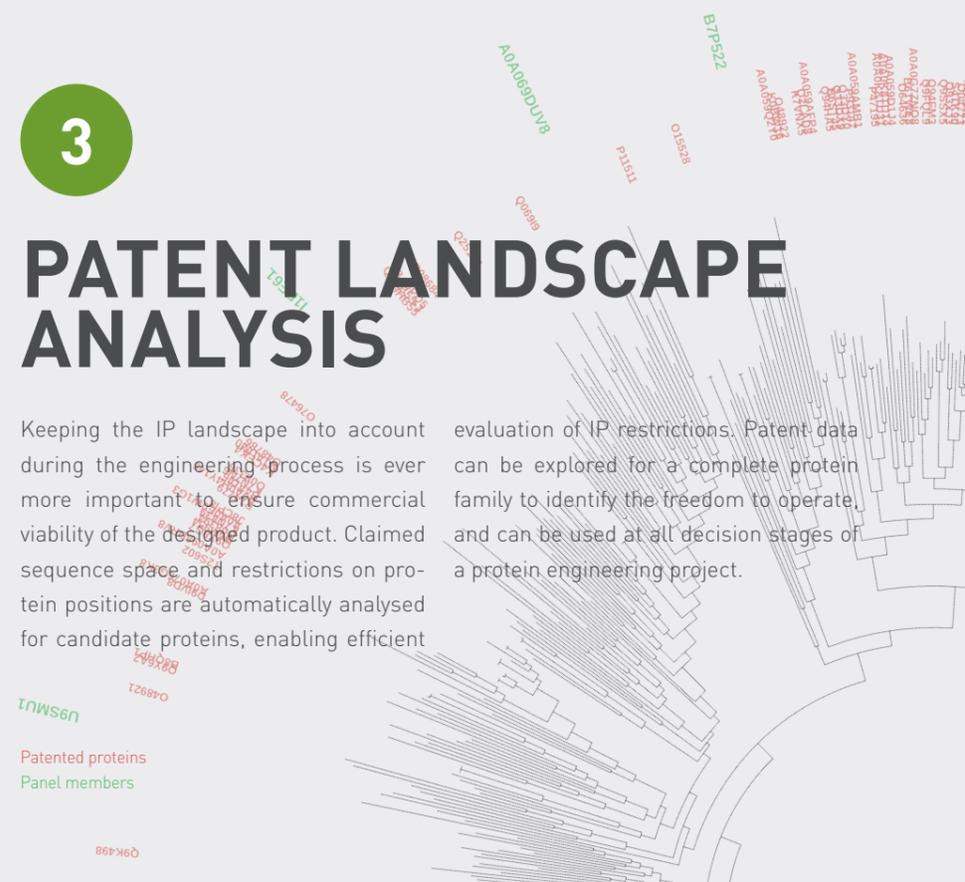
Prof. Uwe Bornscheuer, Greifswald University

# 3

## PATENT LANDSCAPE ANALYSIS

Keeping the IP landscape into account during the engineering process is ever more important to ensure commercial viability of the designed product. Claimed sequence space and restrictions on protein positions are automatically analysed for candidate proteins, enabling efficient

evaluation of IP restrictions. Patent data can be explored for a complete protein family to identify the freedom to operate, and can be used at all decision stages of a protein engineering project.





# BIO-PRODUCT: PROTEIN DATA EXPERTS

Bio-Product is a Dutch company focused on delivering solutions for scientific research in the field of protein engineering, molecular design and DNA diagnostics. We apply novel approaches to data mining, storage and analysis of protein (superfamily) data and combine these with state-of-the art analysis methods and visualization tools.

## WHAT WE OFFER

- Smart mutant-library design
- Patent landscape analysis
- Enzyme panel design
- Protein family data integration
- Intuitive analysis suite
- Directed evolution
- Protein engineering consultancy
- 3DM Courses

---

“3DM IS A GREAT TOOL FOR ANALYSING PROTEIN FAMILY DATA. ALL DATA AND ANALYSIS TOOLS ARE CONNECTED. THINGS LIKE FINDING MUTATION DATA FROM THE LITERATURE OR VISUALISING SUCH DATA IN A STRUCTURE IS VERY EASY WITH 3DM. A REAL TIME SAVER”



Interested? Contact us & try our demo!  
For more information regarding these tools,  
visit [bio-product.com/protein-engineering](https://bio-product.com/protein-engineering)

**Bio-Product BV**  
Nieuwe Marktstraat 54E  
6511 AA, Nijmegen  
The Netherlands

P +31 (0)24 845 7988  
M +31 (0)6 5354 8336  
KvK 09182358  
BTW NL819377089B01