ATG:biosynthetics
Solutions
in biosynthetics

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ACDC-SC design: constructive and functional multi-gene expression design, optimization and assembly at its best ...

Fully optimized synthetic (multi-)gene constructs for heterologous pathway design/expression and other applications - with built-in capacity for re-cycling parts and components. You give us the framework specifications of your project (host, restriction sites, promoters, target compartments, etc.) - we give you the **optimized electronic multi-gene constructs** and the **physical synthetic gene constructs**.

The assembly-disassembly-substitution cloning (ACDC-SC) design principle is a **synthetic constructive approach** for building optimized artificial gene cassettes and multi-gene cassette assemblies, e.g. as are needed in **metabolic engineering** and **microbial pathway design**.

ACDC-SC allows you to **define discrete constructive elements** such as promoters, leaders, terminators, coding sequences (cds) and more (see figure, upper right). These are separated by specifically selected unique boundaries, usually restriction sites, according to your needs and specifications. This way, you can easily exchange these **modular** variant elements to elucidate their **functional effects** on gene/protein expression and, subsequently, product yield in the case of multi-gene biochemical pathways.

Smart computational calculations are key to obtaining the most suitable and efficient design. Our strong synthetic bioinformatics expertise and tools quickly provide designs that are suitable and feasible. It will let you realize your **custom-designed expression constructs**, for plasmid-based expression or integration into the host genome if required.

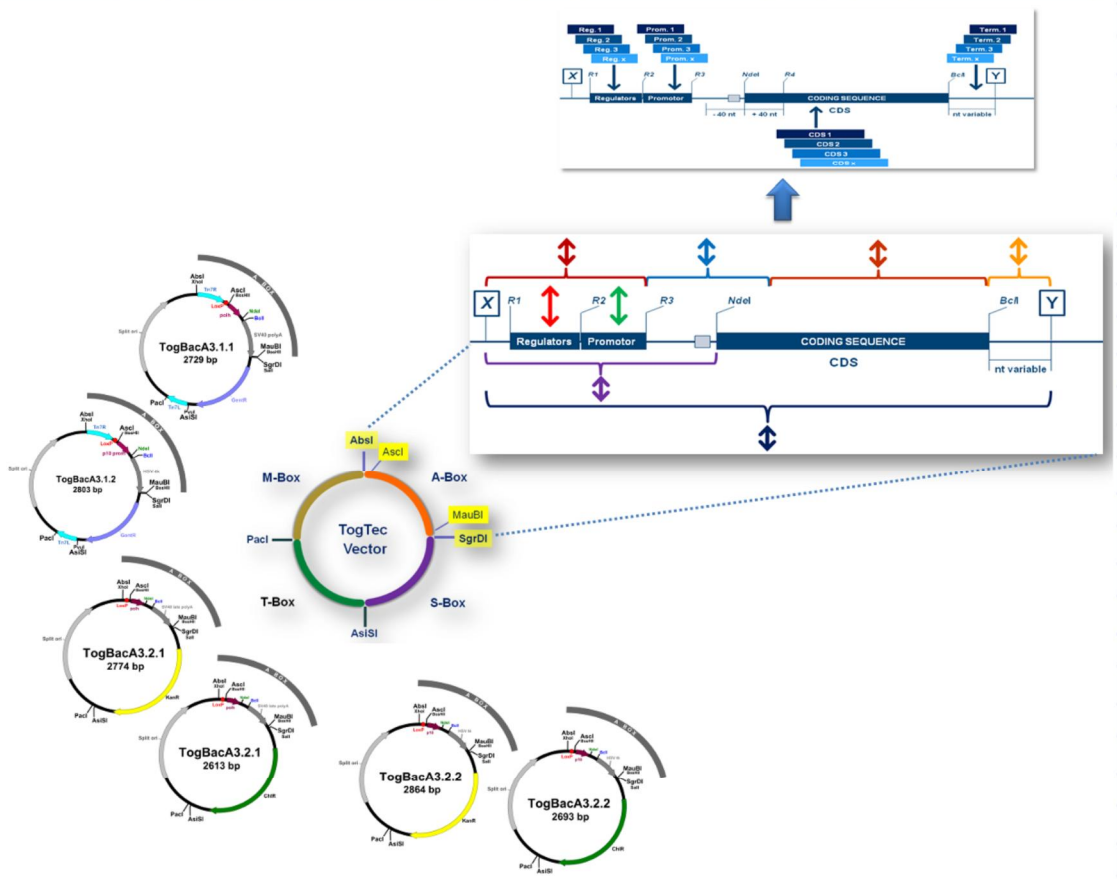

Figure 1: (Click to expand). The ACDC-SC **modular concept** is shown in the central shadowed box. Arrows indicate modular elements that can be exchanged/substituted (as shown in the upper box where variants of regulators, promoters, cds, and terminators are rendered in hues of blue) or eliminated as desired. All these modules are separated by **specifically defined unique restrictions sites** (R1, R2, etc.) and the entire cassette can be transferred using unique restriction sites X and Y. Even complete multi-gene assemblies can be excised and inserted into another design via pre-defined restriction sites not shown.

The TogTEC vector series (lower left, exemplified by the *f*LEXiBAC^{Turbo} vectors) fully accomodates the ACDC-SC design but ACDC-SC

can be implemented for any other system you wish to establish for your production host of choice.

An example of a stringent design with extensive optimization of a multi-gene expression construct is the **synthetic epothilone cluster** for which ATG performed the synthetic bioinformatic work-up (design suggestions, verifying correct gene annotation, etc.) and optimization as well as the gene synthesis.

Applications:

- metabolic engineering
- pathway design
- strain engineering
- multi-protein expression for structural biology
- synthetic scaffolds and contained / localized biosynthetic "production lines"
- protein co-localization studies in heterologous systems
- and more...

For more information or a quote, just ask our experts at
https://www.atg-biosynthetics.com/Optimizations/InfoRequestOpt.html
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