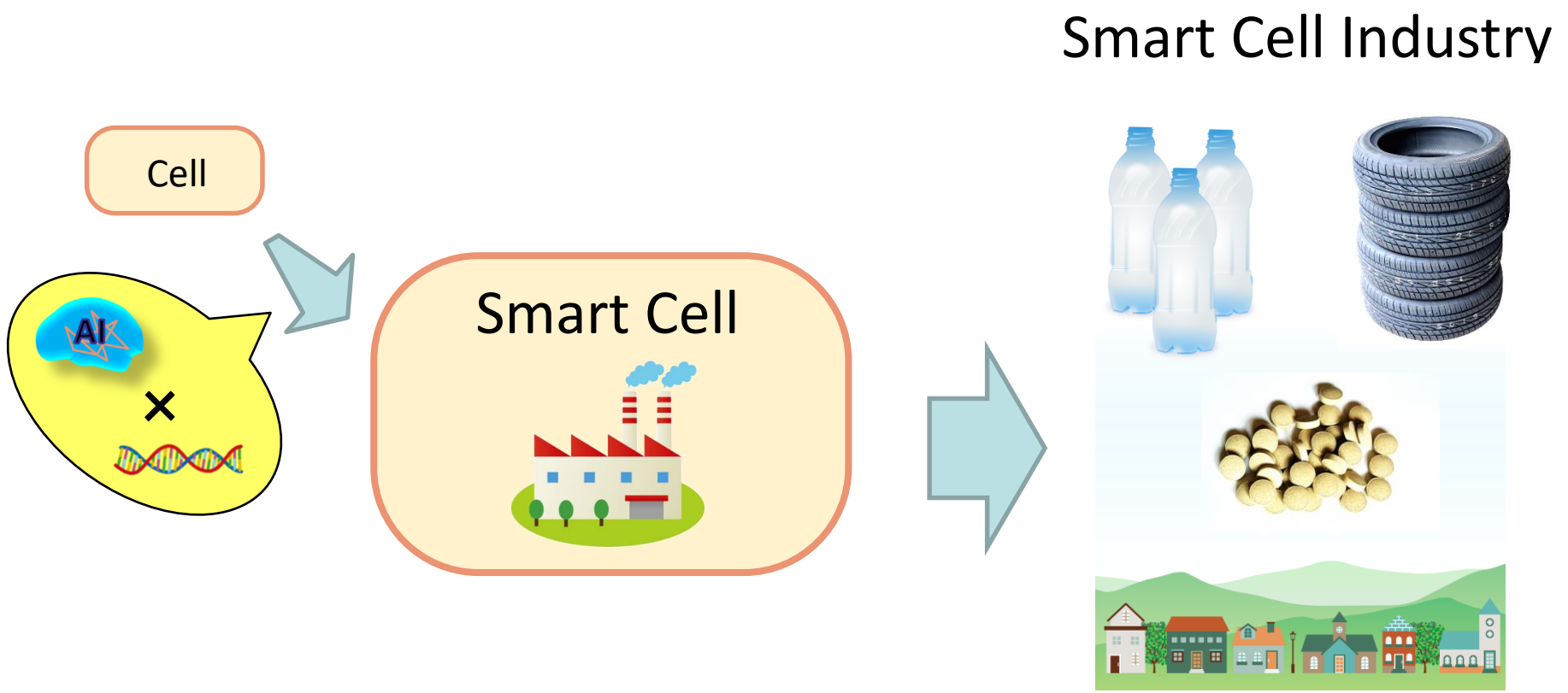
Synplogen

About us Technology

Precision, long-chain DNA.
Remarkable efficiency. No compromises.

https://www.synplogen.com/

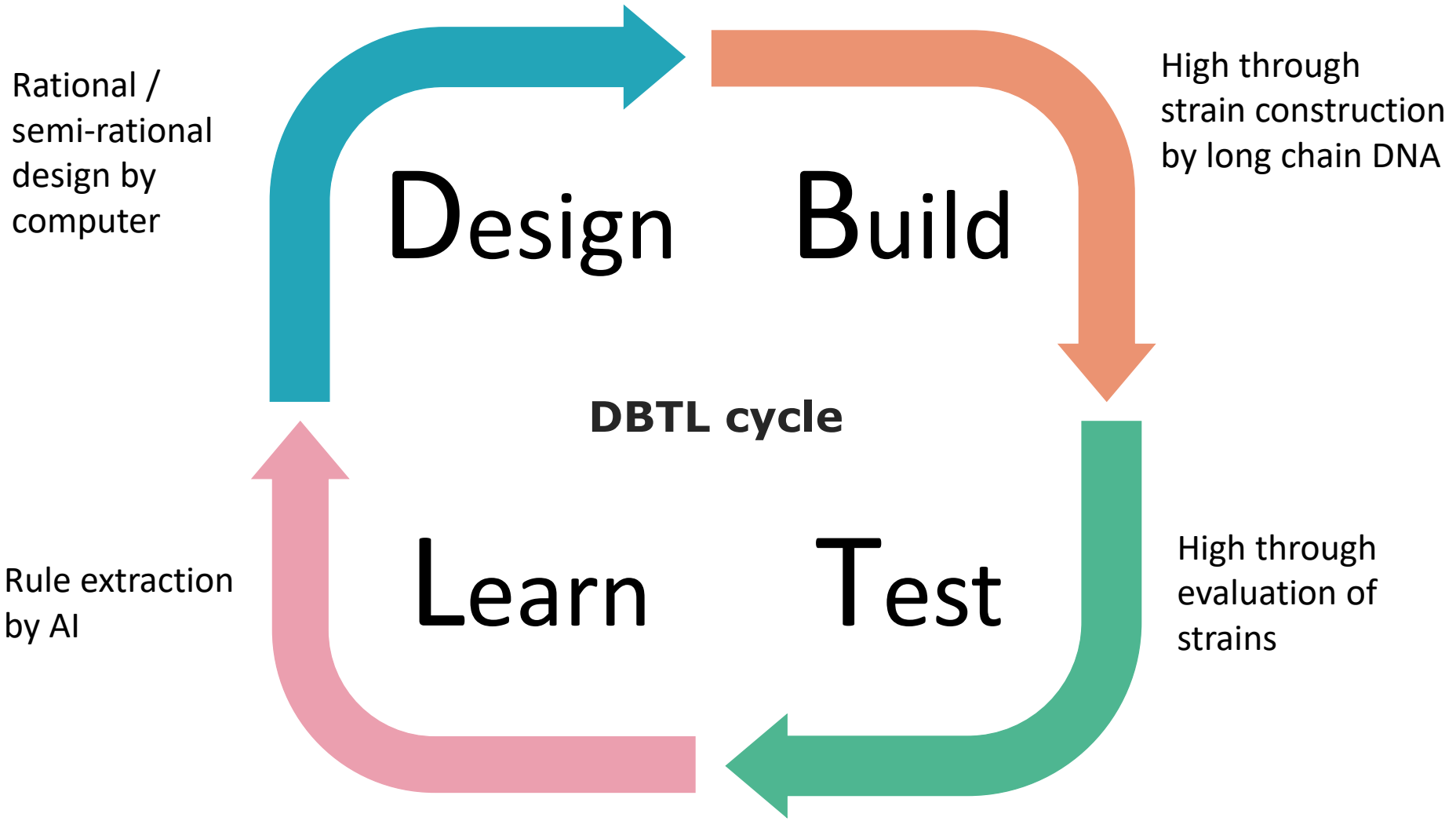
Smart Cell Industry



This figure is modified from original figure in NEDO booklet (focus NEDO, No.70).

DBTL cycle –Platform for Synthetic Biology

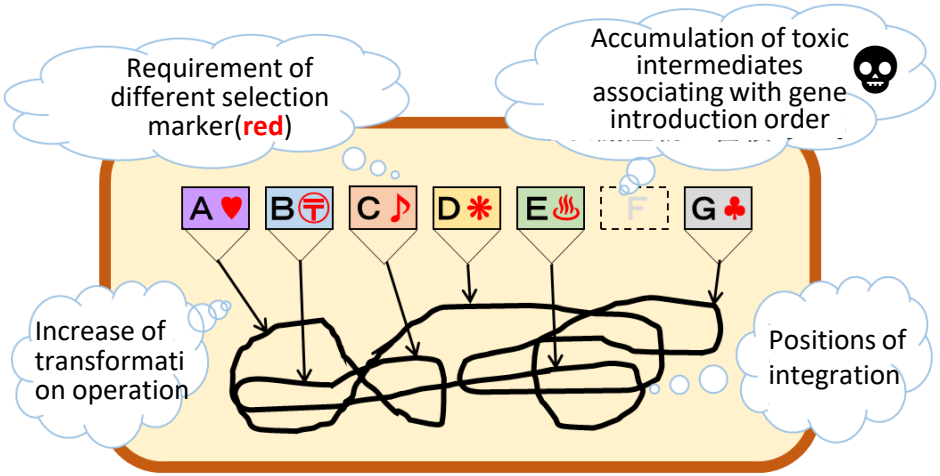
Fine tuning of multiple parameters of gene circuit in single step is almost impossible!!
Repetitive cycling of DBTL is necessary to achieve higher production



Why we need long DNA?

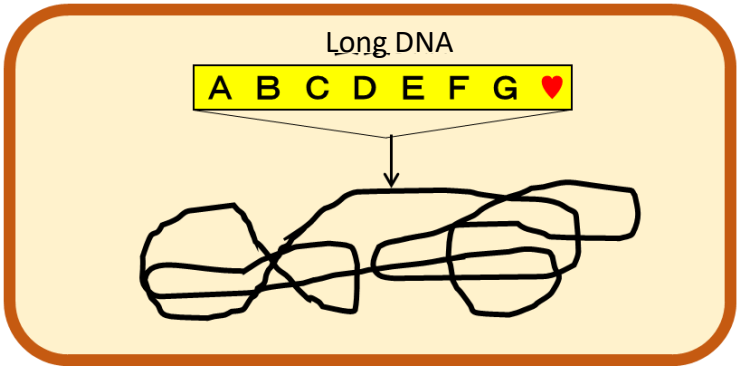
Long DNA contributes to reduce both money cost and time cost for designer organism construction

Conventional genetic manipulation



takes much money and time

Long DNA strategy



finishes within one-step

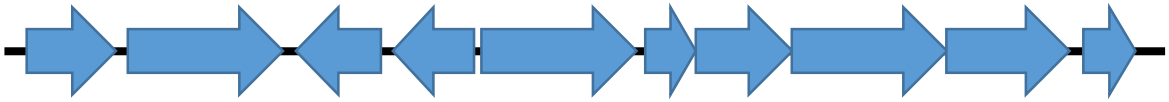
Tsuge, K. and Itaya, M. Seibutsukougakukaishi 93: 527–529 (2015) (Japanese)

What is the size of “Long DNA”

We focus on size range of 10 to 50 Kb at initial business
But we are developing method to construct up to Mega-size DNA

How many genes in 10 kb DNA ?

Prokaryote

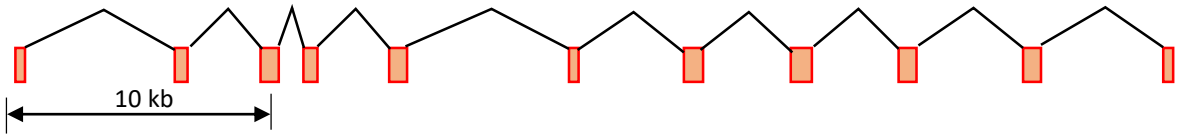


Averagely 10 genes / 10 Kb

Lower Eukaryote

Averagely 5 genes / 10 Kb

Human



Averagely 1 gene / 53 Kb

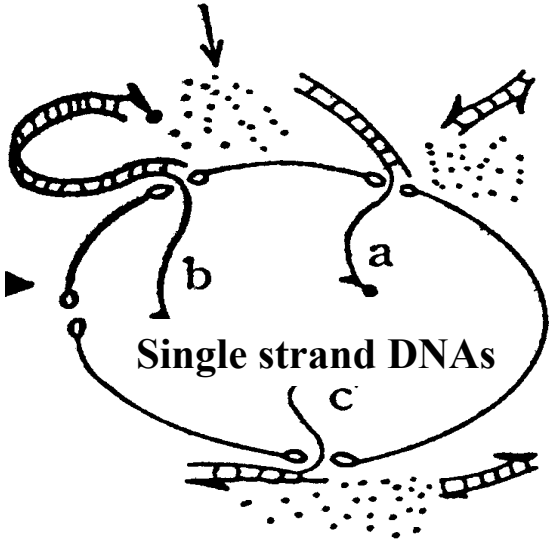
We use *Bacillus subtilis* for long DNA construction

B. subtilis is good at large DNA manipulation

Natto (Japanese traditional food)

Safe bacteria

Natural transformation

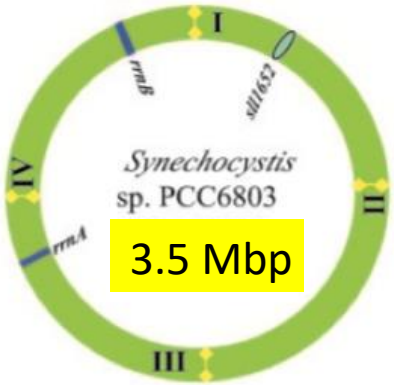


Canosi, U., et al. MGG 181, 434-440 (1981)

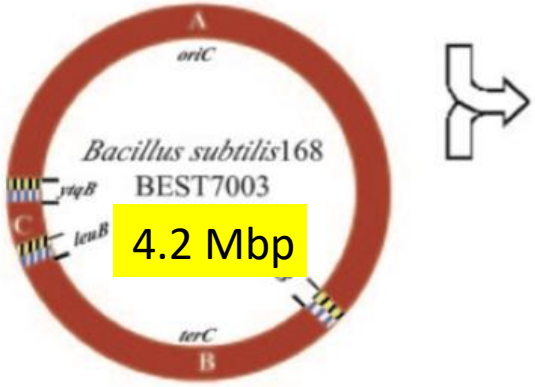
First instance of hybrid genome of 2 bacteria

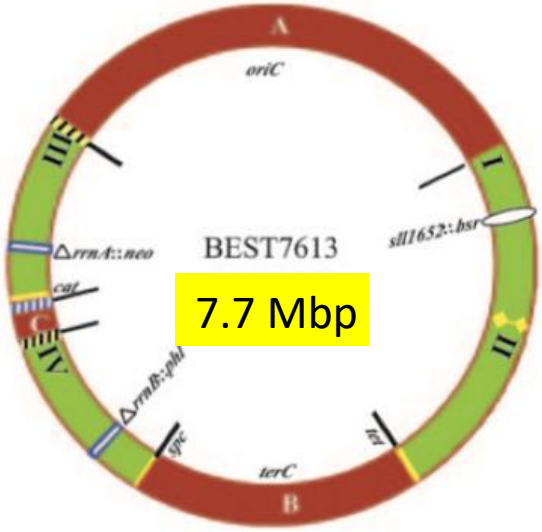
Itaya, M., Tsuge, K., Koizumi, M., Fujita, K. *PNAS*, 102, 15971-15976 (2005)

Mbp-cloning feasible



Bottle ship construction manner





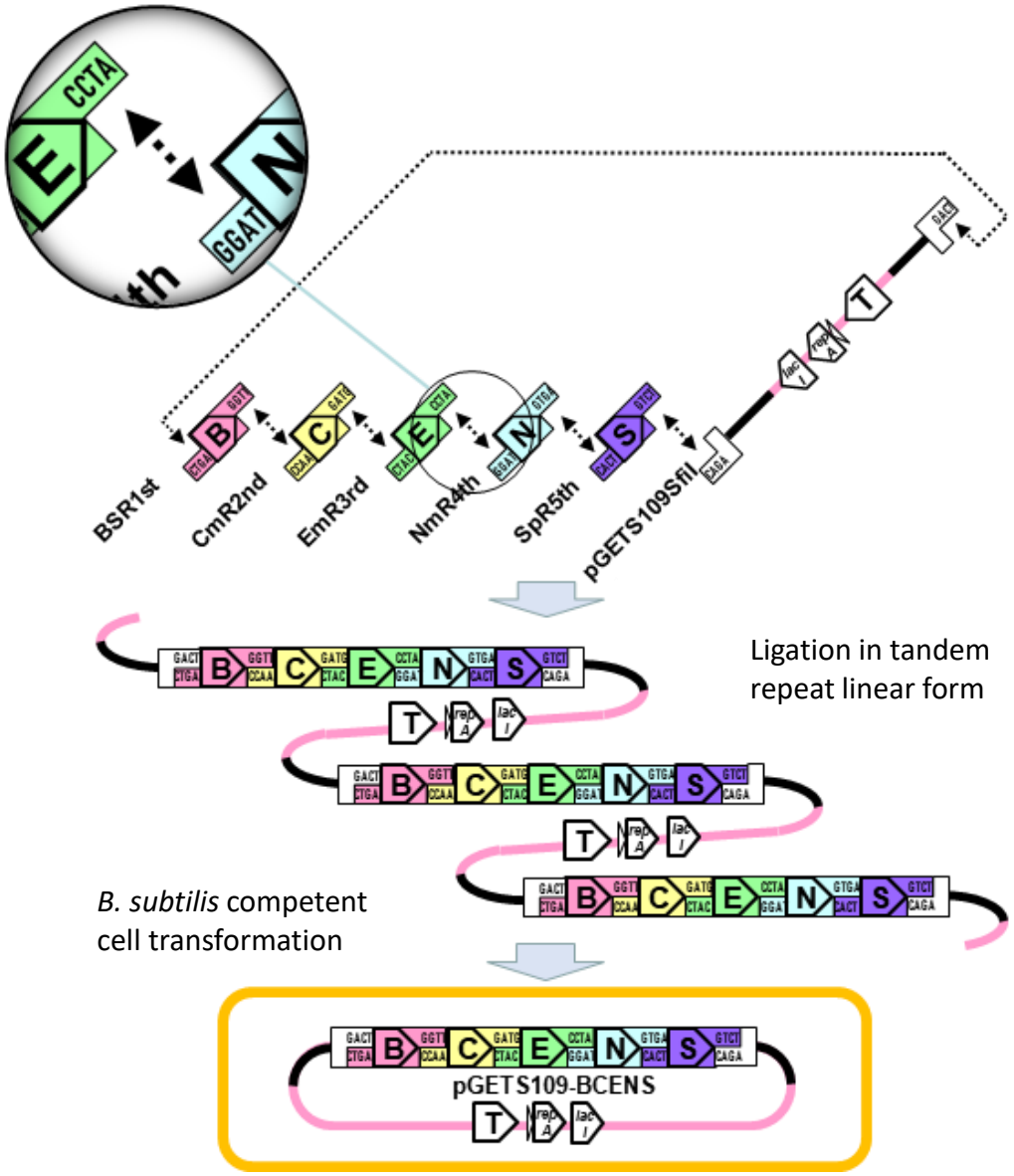
Key technology: OGAB method (1st Gen.)

Ordered Gene Assembly in *Bacillus subtilis*

Tsuge, K., Matsui, K, Itaya, M.
Nucleic Acids Res. 31,e133 (2003)
Patent No. 4479199 (Japan) Synplogen

Assembly method using *B. subtilis* plasmid transformation system

- **Assembly completes in one-step**
- **High efficiency and fidelity**
- **No limit on fragment size**
- **Feasible for up to 15-fragment assembly**

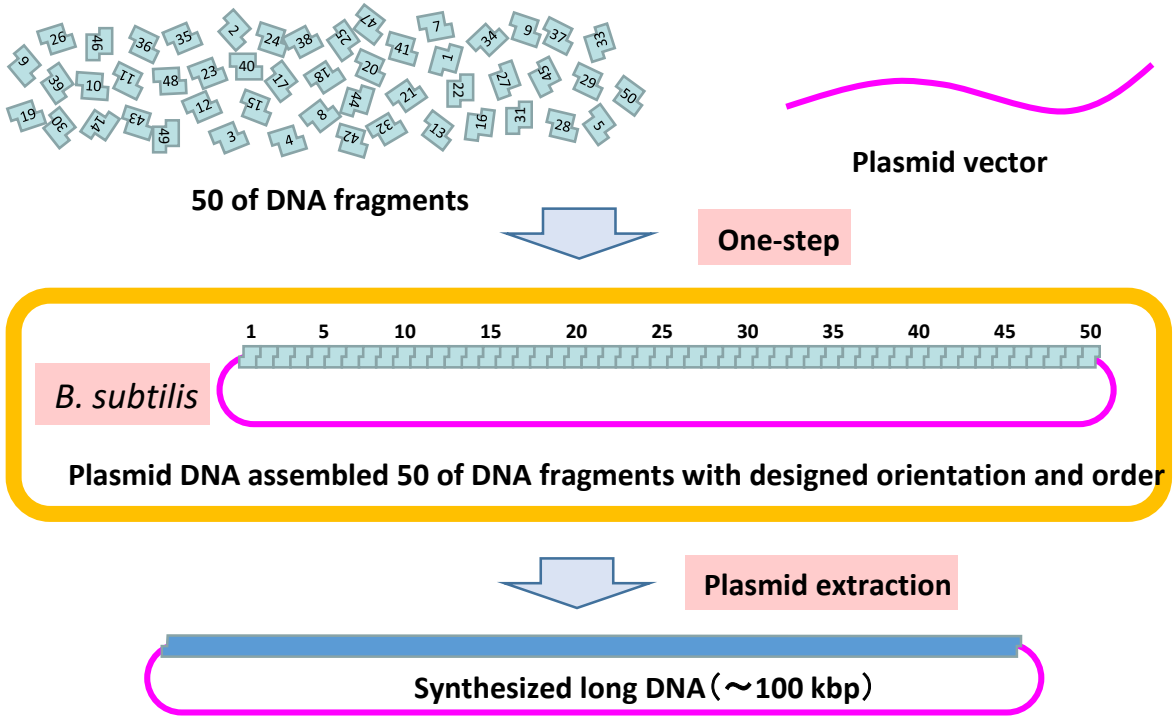


Automation system for 2nd Gen. OGAB

By adjusiting size of material DNA fragments strictly, gene assembly of more than 50 fragments is feasible

Tsuge, K. et al. *Sci. Rep.*, **5**, 10655 (2015)

WO 2015/111248 Synprogen

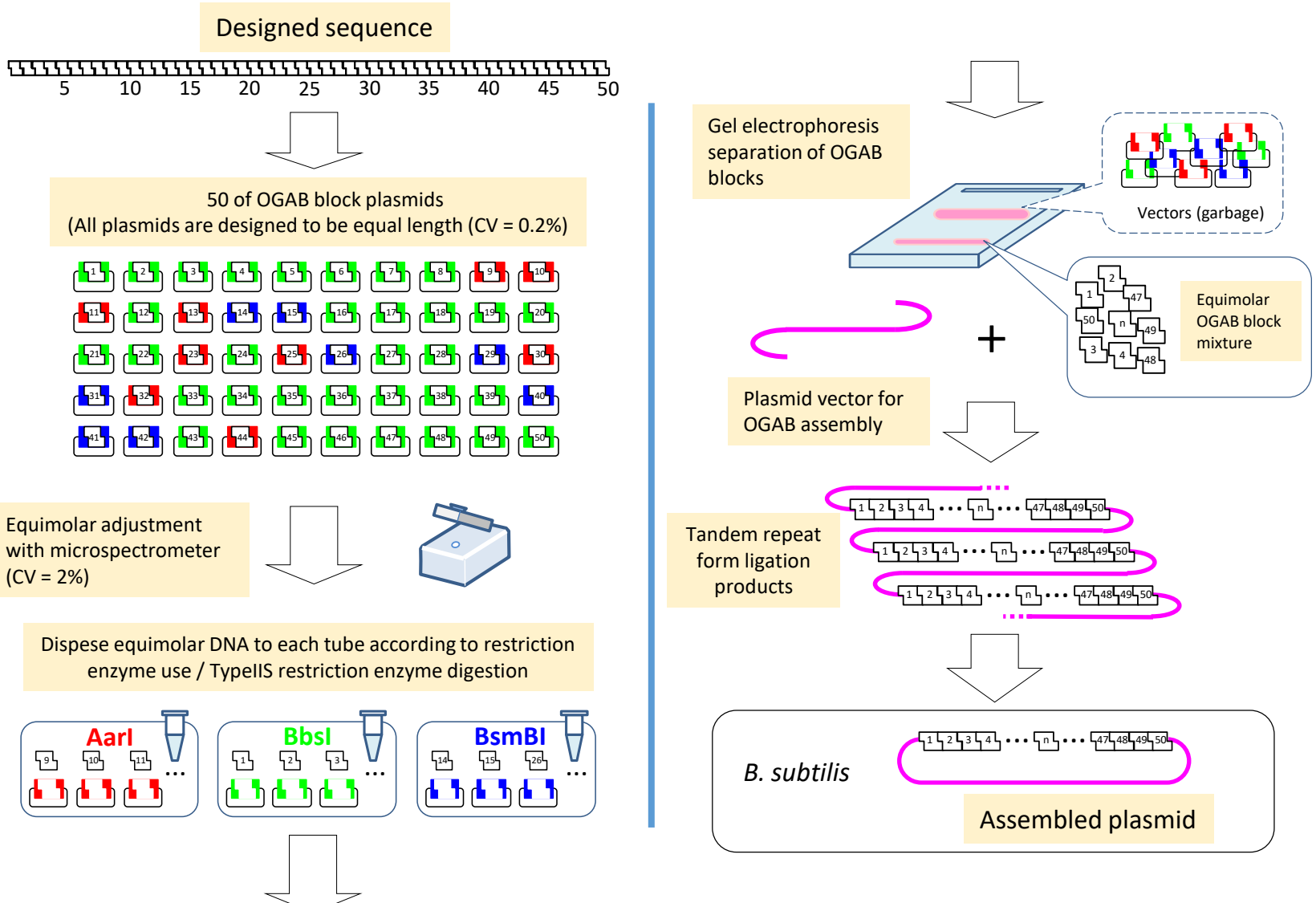


- **Feasible to construct ～100 kb DNA with designed sequence**
- **Very precise DNA compare to other method**
- **Construction finishes with in one-step**
- **Automation friendly**

Detail of 2nd Gen. OGAB method

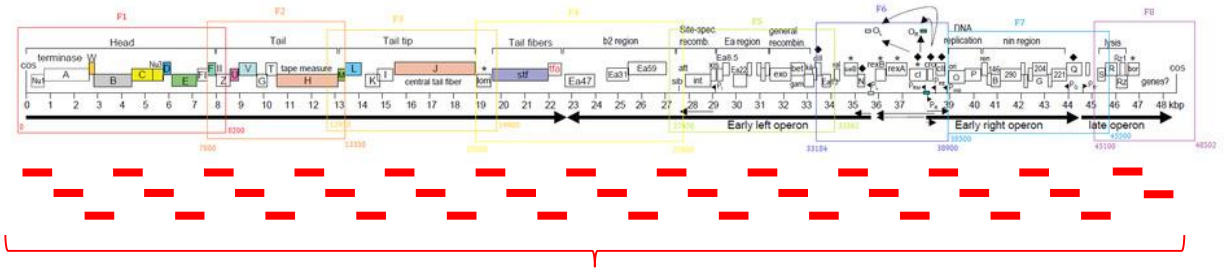
Rationally simplified with elevated reliability

Tsuge, K. et al. *Sci. Rep.*, **5**, 10655 (2015).



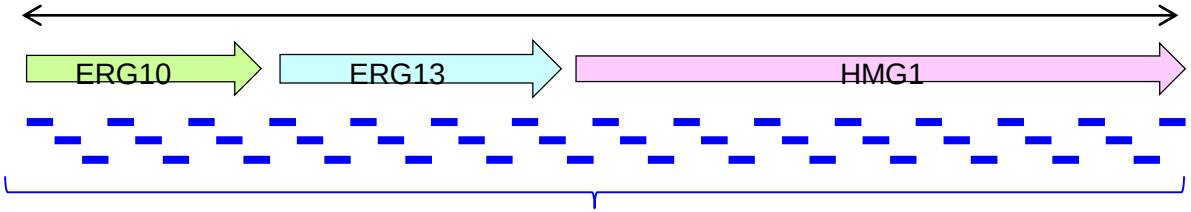
Examples of long DNA by 2nd Gen. OGAB

Lambda phage（48.5 kb）



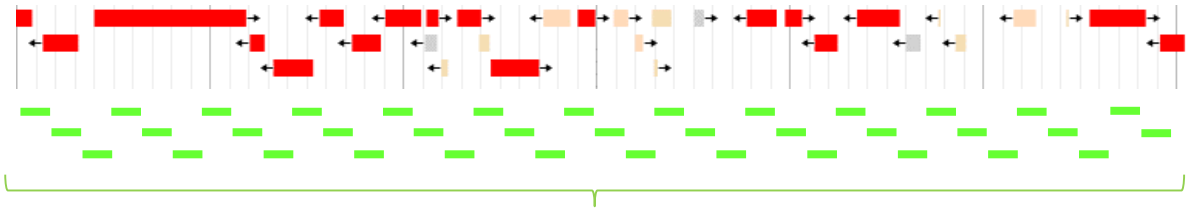
Ave. **970** bp ×**50** OGAB blocks

Artificial mevalonate operon（6 kb）



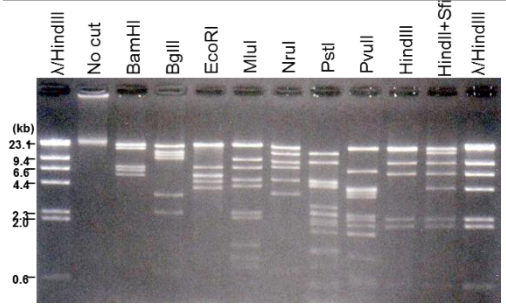
Ave. **110** bp ×**55** OGAB blocks

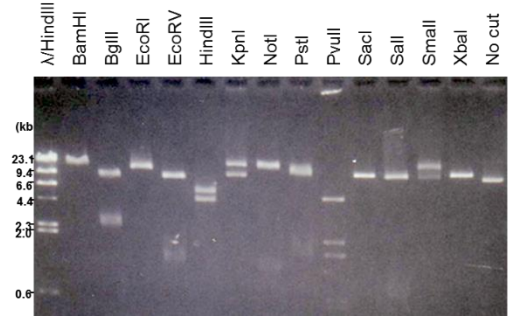
Yeast artificial genome（30 kb）

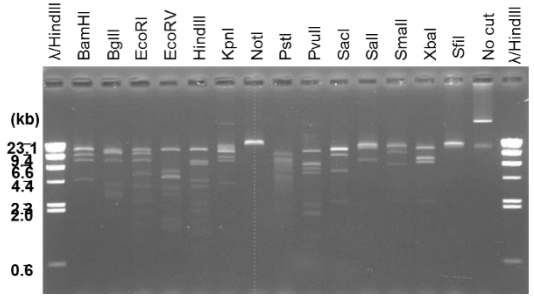


Ave. **620** bp ×**48** OGAB blocks

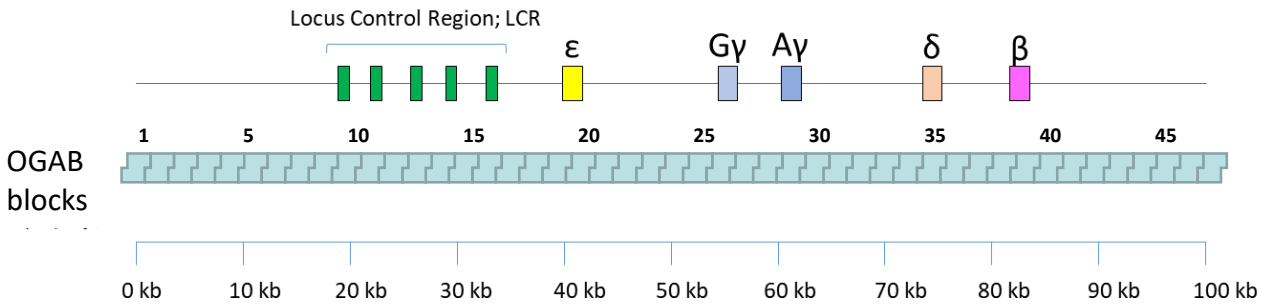
Restriction enzyme patterns



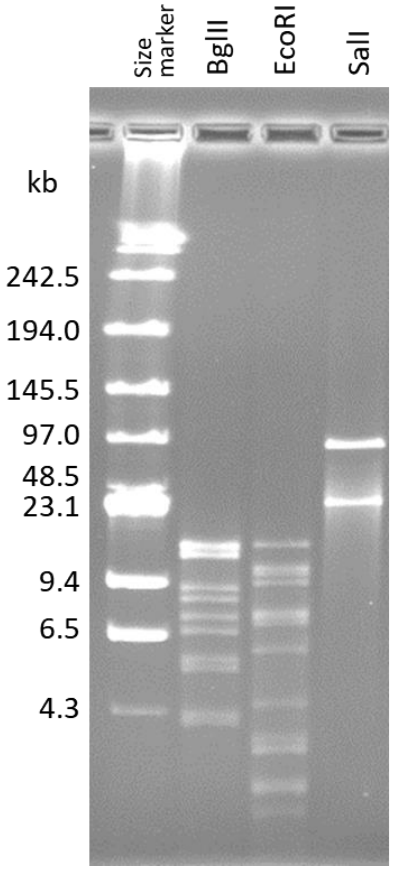




Successful re-construction of 100 kb human gene

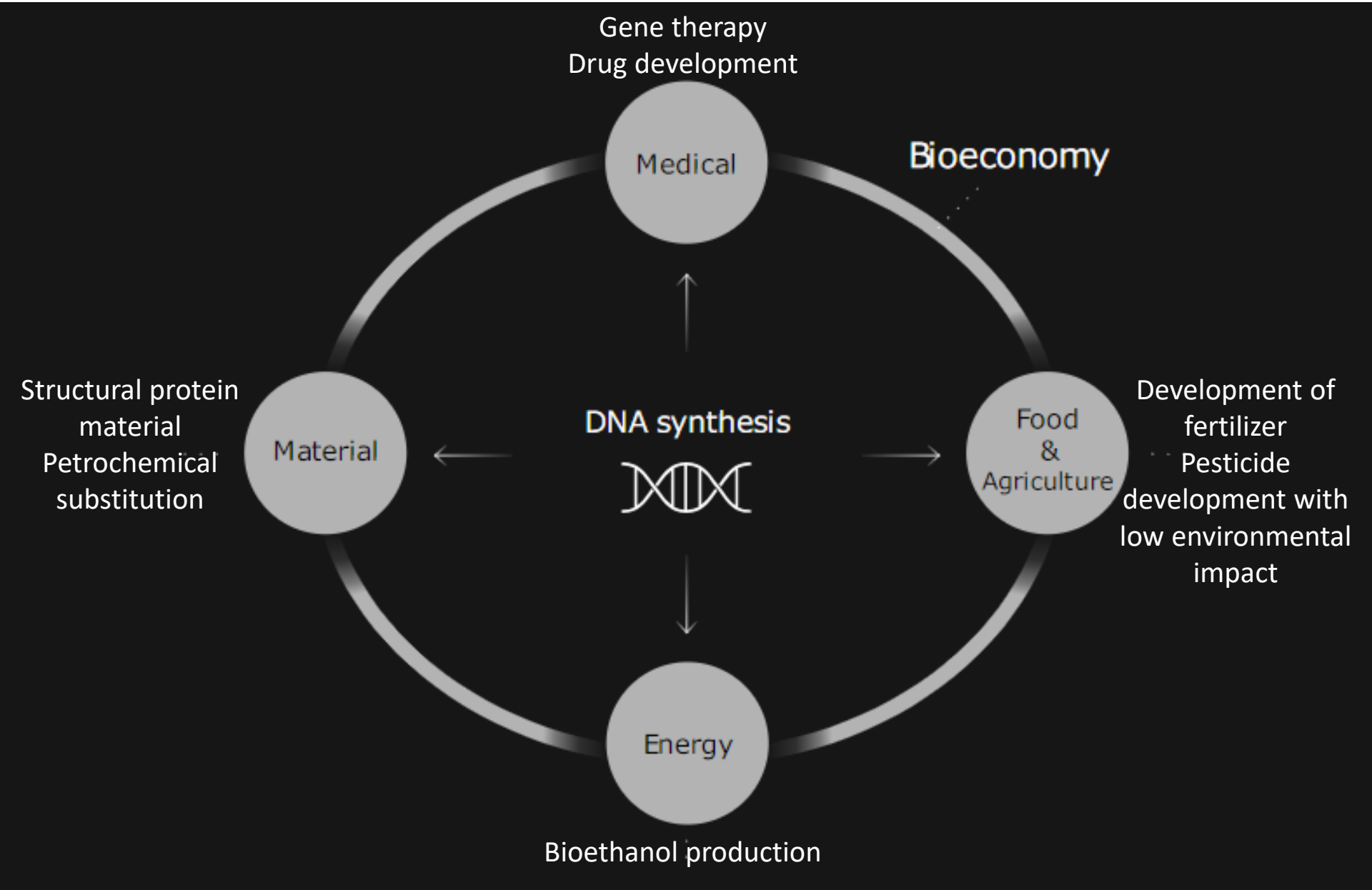


Design of human β—globin gene assembly



Pulse field gel electrophoresis of assembled plasmid DNA

Business field of Synplogen



Services

Long-chain DNA synthesis	Synthesis of long-chain DNA (up to 100 kbp)
Combinatorial DNA library synthesis	Synthesis of DNA libraries using combinatorial design
Support for developing production-use microbes	Assistance with the design and synthesis of gene clusters for the development of production-use microorganisms

About Us

Company Name	Synplogen Co., Ltd.	
Address	HQ: 1-1 Rokkodaimachi, Nada-ku, Kobe-shi, Hyoto, 657-0013, Japan Branch office: 234-1 Mizukami, Kakuganji, Tsuruoka-shi, Yamagata, 997-0052, Japan	
Founded	February 21, 2017	
Paid-in Capital	¥118 million (incl. capital reserves)	
Board of Directors	+ CEO	Junichi Sugahara, PhD
	+ Director	Akihiko Kondo, PhD
	+ Director	Kenji Tsuge, PhD
	+ Director	Kazuhiro Yamamoto
	+ Director	Yoshihiro Oshima
	+ Director	Daniel Meyer
E-mail	info@synplogen.com	