Creative Biolabs is a leading service provider of phage display library construction and screening. In a phage display library, a variety of peptides, small antibodies (e.g. scFv and Fab) or proteins are displayed on the surface of filamentous phage (M13, fd, and f1 strains) as fusion proteins with one of the coat proteins of the phage virions, while the genetic materials encoding the peptides/proteins are housed within the virions. Using a binding-based process called biopanning, a small number of phages that display proteins/peptides specifically binding to a target of interest can be rescued from a phage library that usually displays a repertoire of many billions of unique peptides/proteins. Finally, the peptides/proteins displayed by the selected phages can be identified by phage amplification and DNA sequencing.

**Phage Display Technology**

**Phage Display Systems in Creative Biolabs**
- **M13 Phage Display**
  - pVIII-fusion display: major coat protein fusion, display 2700 copies of foreign protein
  - pIII-fusion display: minor protein, display 1-5 copies of foreign protein
  - Most popular option for phage display, has been applied in many different research areas.

- **T4 Phage Display**
  - Larger genome DNA which enables larger insertions
  - Dual display: two different molecules can be displayed separately on HOC and SOC
  - Both N- and C-terminal insertion available

- **T7 Phage Display**
  - Time saving: T7 phages have a shorter lifecycle than filamentous phages and lambda phages.
  - Optimized biopanning: as T7 phages are resistant to extreme conditions, a variety of agents can be applied in screening procedures in contrast to alternative phages.
  - Complementary to M13 phage, widely used for cDNA library.

**Library Construction Service in Creative Biolabs**

**Phage Display Library Types**
- Antibody library (immune, naïve, semi-synthetic, synthetic)
- Peptide library (linear, cyclic)
- Protein scaffold library
- cDNA Library

**Mutagenesis Strategies for Library Construction**
- **Trimer codon method**
  - Mutations are introduced at the codon level rather than at individual bases
  - No codon bias, no frame shift, no stop codon
  - Defined AA composition at each position

- **Kunkel-like oligonucleotide-directed mutagenesis method**
  - Degenerate codon method

**Library Screening Service in Creative Biolabs**

**Tailored Biopanning Strategies:**
- **Solid-phase screening**
  - Phage libraries are selected by flowing through a solid surface with the immobilized target.
- **In-solution screening**
  - Isolating binders recognize naïve targets. The target-binder interaction is carried out in solution with subsequent capture by the appropriate method.
- **Cell-based screening**
  - It is suitable to select peptides/antibodies for cell surface receptors, such as GPCR and ion channel-linked receptor.
- **In Vivo screening**
  - Isolating novel peptides as the functional markers of new receptors or novel drug target candidates.

**Applications of Phage Display Technology**
- Function peptide discovery
- Therapeutic antibody discovery
- Monoclonal antibody discovery from a variety of species includes: human, monkey, llama, camel, shark, alligator, mouse, rat, hamster, guinea pig, rabbit, chicken, dog, bovine, goat, sheep, and ferret.
- Antibody humanization
- Antibody affinity maturation

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