

The Human Genome Project was a massive global undertaking that used a variety of sequencing methods to map the human genome. **Bacterial artificial chromosome (BAC)** cloning was one of them. The team randomly shredded multiple copies of the genome into overlapping DNA fragments, then inserted these chunks into BACs and allowed them to replicate. The ends of the amplified DNA were sequenced, with matching end sequences representing regions of overlap between adjacent DNA fragments. The fragments were then ordered into contiguous stretches based on these overlapping regions.

By the project's end, the team had compiled a **library of BAC clones – named RP11s – spanning the entire human genome**. Since then, RP11s have been used in thousands of research and clinical institutions, proving indispensable in a variety of cytogenetic applications.

One technique, **FISH (fluorescent in situ hybridization)**, uses fluorescent probes constructed of BAC clones complementary to a specific gene or region. When added to a DNA sample, the probe will hybridize to its target gene and give off a fluorescent signal. Extra, missing, or rearranged signals will reveal the presence of gene copy number variations, translocations, or fusions.

Microarray analysis is another application that uses BAC clones in probe construction. A microarray is made up of many DNA probes, each contained in a single microscopic well attached to a solid surface. Addition of sample DNA causes the probe to fluoresce, with the color and degree of fluorescence indicating the level of gene expression in the sample. The technique can measure the expression of thousands of genes simultaneously.

Both FISH and microarrays have demonstrated remarkable utility in the **identification of disease-specific genetic abnormalities, especially those contributing to prenatal conditions and cancers**. This has led to enormous strides in both the genetic characterization of these diseases, and the development of gene-targeted therapies to treat them.

Empire Genomics has access to the entire RP11 BAC library. This allows us to design DNA probes to identify virtually any gene or region in the human genome. Have a genetic region you're interested in? Let us help you detect it using our complete library of RP11 BAC clones.

To View Our Complete **BAC FISH Probe** Catalog

visit www.empiregenomics.com/bac-library or call (716) 856-3873

