**Host organism**

The host organism is the cell in which the recombinant DNA is introduced. To date, host organisms include bacteria, fungi, and animal cells.

***E. coli* as host**

There are several reasons E. coli became so widely used and is still a common host for [recombinant](https://www.thebalance.com/tools-for-protein-engineering-375522) DNA. The common strain used are BL21 and ROSETTA.

**Genetic simplicity**

Bacteria make useful tools for genetic research because of their relatively small genome size compared to eukaryotes. E. coli cells only have about 4,400 genes. Also, bacteria, including E. coli, live their entire lifetime in a haploid state (having a single set of unpaired chromosomes). As a result, there is no second set of chromosomes to mask the effects of mutations during [protein engineering](https://www.thebalance.com/specific-activity-its-importance-in-protein-isolation-375578) experiments.

**Growth rate**

E. coli grows rapidly at a rate of one generation per twenty minutes under typical growth conditions. This allows for preparation of log-phase (mid-way to maximum density) cultures overnight and genetic experimental results in mere hours instead of several days, months, or years. Faster growth also means better production rates when cultures are used in scaled-up [fermentation](https://www.thebalance.com/what-is-fermentation-375557) processes.

**Safety**

 Except for the particular harmful strain (O157:H7), the normal organism from the flora of the gut is safe to handle under suitable microbiological environment.

**Well understood genome**

The E. coli genome was the first to be completely sequenced (in 1997). As a result, E. coli is the most highly studied microorganism. Advanced knowledge of its protein expression mechanisms makes it simpler to use for experiments where expression of foreign proteins and selection of recombinants is essential.

**Ability to host foreign gene**

Most gene cloning techniques were developed using this bacterium and are still more successful or effective in E. coli than in other microorganisms. As a result, preparation of competent cells (cells that will take up foreign DNA) is not complicated. Transformations with other microorganisms are often less successful.

**Easy to handle**

Because it grows so well in the human gut, E. coli finds it easy to grow where humans can work. For example:

* It's most comfortable at body temperature.
* E. coli lives in the human gut, which means it's not fussy about its food. Essentially, it is happy to consume any type of predigested food.
* It can grow both aerobically and anaerobically. Thus, it can multiply in the gut of a human being or animal but is equally happy in a petri dish or flask.