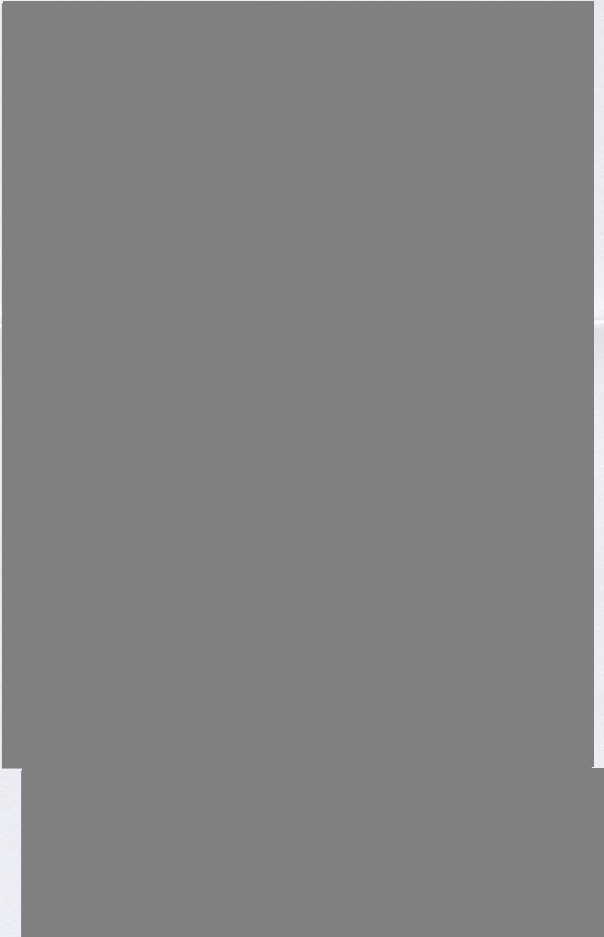


- a. Il/La candidato/a parli di come si gestisce un reagentario di laboratorio di biotecnologie molecolari.
- b. Il/La candidato/a è invitato/a a parlare di eventuali esperienze lavorative acquisite in un laboratorio di ricerca.
- c. Stralcio di una rivista scientifica in inglese da leggere e tradurre.
Review di Nature Communications del 2018 dal titolo: "The CRISPR tool kit for genome editing and beyond":
 - The genome-editing technologies and CRISPR tools have come to the current exciting stage through years of basic science research and progress from a large number of researchers. This review will present the brief history and key developments in the field of genome editing and major genome-engineering tools. However, for the most part the review will focus on the CRISPR technology. The application areas of CRISPR technology that are extending beyond genome editing, such as targeted gene regulation, epigenetic modulation, chromatin manipulation, and live cell chromatin imaging, will be particularly emphasized. Finally, it will briefly discuss current and future impacts of these tools in science, medicine, and biotechnology.
- d. Domanda di informatica di base:

Quali software utilizzerebbe nel contesto di un processo lavorativo in un laboratorio di ricerca?




- a. Il candidato/a è invitato/a ad elencare le principali norme di sicurezza di un laboratorio di biotecnologie molecolari.
- b. Il/La candidato/a è invitato/a a parlare di eventuali esperienze lavorative acquisite in un laboratorio di ricerca.
- c. Stralcio di una rivista scientifica in inglese da leggere e tradurre.
Review di Nature Communications del 2018 dal titolo: "The CRISPR tool kit for genome editing and beyond":
 - Genomes of eukaryotic organisms are composed of billions of DNA bases. The ability to change these DNA bases at precisely predetermined locations holds tremendous value not only for molecular biology, but also for medicine and biotechnology. Therefore, introducing desired changes into genomes, i.e., "genome editing", has been a long sought-after goal in molecular biology. To this end, the discovery of restriction enzymes that normally protect bacteria against phages in the late 1970s was a turning point that fueled the era of recombinant DNA technology. For the first time ever, scientists gained the ability to manipulate DNA in test tubes. Although such efforts drove a number of discoveries in molecular biology and genetics, the ability to precisely alter DNA in living eukaryotic cells came a few decades later.
- d. Domanda di informatica di base:

Come vengono raccolti, elaborati e analizzati i dati raccolti durante un esperimento?



- a. Il candidato/a esponga le principali metodiche di stoccaggio dei rifiuti prodotti da un laboratorio di biotecnologie molecolari.
- b. Il/La candidato/a è invitato/a a parlare di eventuali esperienze lavorative acquisite in un laboratorio di ricerca.
- c. Stralcio di una rivista scientifica in inglese da leggere e tradurre.
Review di Nature Communications del 2018 dal titolo: "The CRISPR tool kit for genome editing and beyond":
 - Initial targeted gene disruption studies in eukaryotic yeast cells followed with breakthrough work by Capecchi and Smithies in mammalian cells. Their studies demonstrated that mammalian cells can incorporate an exogenous copy of DNA into their own genome through a process called homologous recombination. Such targeted gene integration into the genome provided unprecedented power to characterize the functional roles of various genes in model organisms. However, the feasibility of this approach had several limitations. Firstly, the rate of spontaneous integration of an exogenous DNA copy was extremely low (1 in 10³–10⁹ cells). Secondly, the integration rate depended on cell types and cellular states. Finally, and most critically, the approach could result in random integration of the exogenous copy into undesired genomic loci at a frequency similar to or higher than that of the target site.
- d. Domanda di informatica di base:

Ha esperienza nella gestione di database per archiviare e recuperare informazioni dal laboratorio?



- a. Il/La candidato/a parli del supporto che un collaboratore tecnico può fornire per un miglior funzionamento di un laboratorio di biotecnologie molecolari.
- b. Il/La candidato/a è invitato/a a parlare di eventuali esperienze lavorative acquisite in un laboratorio di ricerca.
- c. Stralcio di una rivista scientifica in inglese da leggere e tradurre.
Review di Nature Communications del 2018 dal titolo: "The CRISPR tool kit for genome editing and beyond":

- Interestingly, unlike typical tandem repeats in the genome, the CRISPR repeat clusters were separated by non-repeating DNA sequences called spacers. It took more than a decade for researchers to recognize the nature and origin of these spacer sequences. During the human genome project (HGP), the genomes of many other organisms, including many different phages, were also sequenced. The computational analysis of these genomic sequences led researchers to notice key features of CRISPR repeat and spacer elements. Firstly, the CRISPR sequences are present in more than 40% of sequenced bacteria and 90% of archaea. Secondly, the CRISPR elements are adjacent to multiple well-conserved genes called CRISPR-associated (Cas) genes. Finally and most interestingly, the non-repeating spacer DNA sequences were recognized to belong to viruses and other mobile genetic elements.

- d. Domanda di informatica di base:

Ha esperienza nell'uso di strumenti di comunicazione online per interfacciarsi con altri soggetti coinvolti in un processo lavorativo di un laboratorio di ricerca?




- a. Il/La candidato/a parli delle verifiche periodiche che dovrebbero essere eseguite di routine in un laboratorio di biotecnologie molecolari.
- b. Il/La candidato/a è invitato/a a parlare di eventuali esperienze lavorative acquisite in un laboratorio di ricerca.
- c. Stralcio di una rivista scientifica in inglese da leggere e tradurre.
Review di Nature Communications del 2018 dal titolo: "The CRISPR tool kit for genome editing and beyond":
 - These observations sparked the interest of many researchers in studying the functional significance and mechanics of these CRISPR sequences. Although the idea that it could serve as a bacterial immune system started to circulate among researchers, the exact mechanism of action was not known. The key experimental evidence about the potential function of CRISPR systems came from the work of Horvath and colleagues. They demonstrated that after a viral challenge, *Streptococcus thermophilus* bacteria integrate new spacers derived from the phage genomic sequence into its genome. More importantly, the spacer sequences of CRISPR dictate the targeting specificity of Cas enzymes, which provide defense against the phage.
- d. Domanda di informatica di base:

In che modo l'informatica può migliorare la ricerca in un laboratorio di biotecnologie molecolari?



- a. Il/La candidato/a come potrebbe pianificare e gestire il suo lavoro quotidiano in un laboratorio di biotecnologie molecolari?
- b. Il/La candidato/a è invitato/a a parlare di eventuali esperienze lavorative acquisite in un laboratorio di ricerca.
- c. Stralcio di una rivista scientifica in inglese da leggere e tradurre.
Review di Nature Communications del 2018 dal titolo: "The CRISPR tool kit for genome editing and beyond":
 - These studies were immediately followed by groundbreaking publications showing that CRISPR can be adapted for in vivo genome editing in eukaryotic cells. For the first time ever, researchers had an extremely flexible tool that could be easily guided to target nearly any location in the genome by simply designing a short single guide RNA (sgRNA). Due to high editing efficiency and ease of use, researchers from diverse fields quickly adopted CRISPR technology as a method of choice for various genome-targeting purposes. Notably, since its inception as a genome-editing tool in late 2012, more than 9000 research articles have been published about it and the number of publications seems to continue to increase each year.
- d. Domanda di informatica di base:

Come può essere utilizzato il pacchetto Microsoft Office in un laboratorio di biotecnologie molecolari?



- a. Il/La candidato/a come garantirebbe la sicurezza in un laboratorio di biotecnologie molecolari durante la manipolazione di sostanze chimiche e biologiche?
- b. Il/La candidato/a è invitato/a a parlare di eventuali esperienze lavorative acquisite in un laboratorio di ricerca.
- c. Stralcio di una rivista scientifica in inglese da leggere e tradurre.
Review di Nature Communications del 2018 dal titolo: "The CRISPR tool kit for genome editing and beyond":
 - Exploring different CRISPR systems requires extensive understanding and characterization of new Cas proteins. Thus, in parallel to these studies, there are increasing efforts to re-engineer the already well-characterized Cas9 proteins. This research direction is focusing on achieving three major goals: (i) reducing the size of Cas9 nucleases, (ii) increasing their fidelity, and (iii) expanding the targeting scope of Cas9 variants. Although there has been a limited advance in reducing the size of existing Cas9 proteins, several groups have altered the Cas9 PAM (protospacer-adjacent motifs) requirements and targeting specificity. In one such study, researchers used an unbiased selection strategy to identify variants of SpCas9 and SaCas9 with more relaxed PAM sequence requirements.
- d. Domanda di informatica di base:

Quali sono i principali supporti fisici per conservare i dati in un laboratorio di biotecnologie molecolari?

