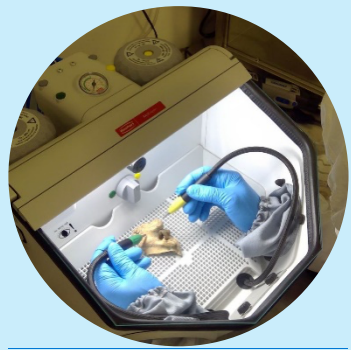
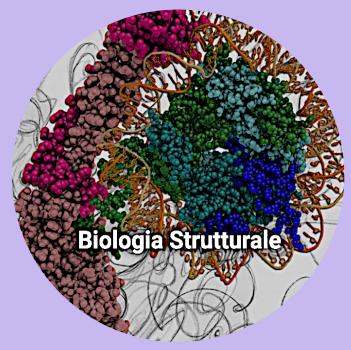


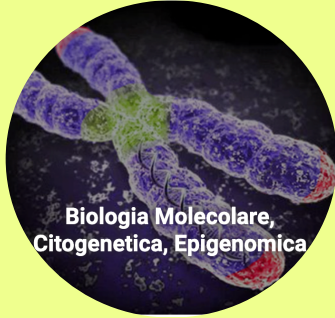
INSTRUMENTATION AND EXPERTISE OF DBB LABORATORIES

| 17 AREAS OF RESEARCH |                                                                                     | 38 LABORATORIES |                                                        | COORDINATOR        | RESEARCH TOPIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 40 RESEARCH COMPETENCIES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 12 FACILITIES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 80 INSTRUMENTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| 1                    |    | 1               | Bioinformatics and Big Data                            | Francesco Lescai   | <i>The Laboratory of Computational Genomics at the University of Pavia develops and applies computational methods to decode the role of genomic variation in human disease. Combining deep learning with explainable artificial intelligence, the lab moves beyond classical approaches: not merely predicting complex phenotypes, but illuminating the molecular mechanisms that drive them. A particular focus lies in modelling inflammation as a genomic and biological predictor of health trajectories. Underpinning all research are open-science principles: reproducible, portable pipelines built with Nextflow and nf-core, and fully open-source code, ensuring that discoveries translate into genuine societal benefit.</i> | 1. Cloud Computing<br>2. Programming for Bioinformatics (Python, R)<br>3. AI Models<br>4. Bioinformatics Skills for DNA Analysis                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1. EOS - university infrastructure for parallel computing (HPC)<br>2. Helicon - small HPC cluster dedicated to training MDB students<br>3. CompgenAI - mini-workstation dedicated to artificial intelligence algorithm development                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2                    |   | 2               | Cellular and Molecular Neuropharmacology               | Marco Peviani      | <i>The laboratory investigates neuroinflammatory responses to identify and validate novel therapeutic targets and biomarkers for neurodegenerative diseases and neurodevelopmental disorders. To do this, the team leverages a wide set of platforms, ranging from small molecules to nanoparticles, engineered hematopoietic stem cells and macrophages to tackle critical pathological pathways in preclinical models. An ongoing and fruitful collaboration with clinicians from Research Hospitals in the area and abroad supports the clinical translatability of the result.</i>                                                                                                                                                    | 6. MRI-guided stereotaxic surgery<br>7. Multiparametric flow cytometry<br>8. Histology using microtome or cryostat<br>9. Image analysis pipelines for quantifying neuronal cells, microgliosis, astrogliosis, and cellular morphology<br>10. Assay of aerobic and anaerobic intermediate metabolism markers and oxidative stress markers in human plasma and cerebrospinal fluid samples<br>11. Isolation of mitochondria from skeletal muscle tissue                                                                                                                                                 | 4. BSL2 cell culture facility authorized for the manipulation of lentiviral vectors and their administration in cell cultures or in vivo, in animal models.<br>5. Interdepartmental Neural Stem Cells Facility ([https://inscf.unipv.it](https://inscf.unipv.it)) equipped with:<br>- 2 Binder CO2 incubators<br>- 1 GS Biotech CO2 incubator<br>- 1 Thermoadvantage MSC12 biological safety cabinet<br>- 1 SafeFast Classic Carlo Erba biological safety cabinet<br>- 1 HERMLE Z327K benchtop centrifuge<br>- 1 ArgoLab WB12 thermostatic water bath<br>- 1 EVOS XL Core Invitrogen brightfield microscope | 1. Spectramax iD5 multimode microplate reader.<br>2. BD Rhapsody single-cell platform.<br>3. ECIS impedance-based real-time cell analysis system.<br>4. MIVO® tool dynamic microfluidics system for cell cultures.<br>5. Naviglio Extractor® (ATLAS Filtri - 40L) technological innovation in solid-liquid extraction.<br>6. Preparative HPLC (SepaChrom) PuriFlash® XS-420+ (220V) High-performance Flash Chromatography System XS-420+.<br>7. Rotavapor System 11SR300151VS11 (Buchi Italia SRL), complete system equipped with bath for evaporating flasks up to 5L, vertical glassware PLG, vacuum pump V-300, interface I-300, 220-240 V, Chiller F-305. |
|                      |                                                                                     | 3               | Translational Neuroscience and Neuropsychopharmacology | Riccardo Brambilla | <i>The laboratory investigates the brain mechanisms underlying neuropsychiatric disorders, with a particular focus on neurodevelopmental disorders and neurodegenerative diseases such as Autism, Parkinson's disease, Alzheimer's disease, and Huntington's disease. It employs genetic animal models and experimental pharmacogenetic approaches (viral vectors and cell-penetrating peptides) to modulate molecular pathways involved in synaptic plasticity, memory, and behavior. The ultimate goal is to develop innovative therapeutic strategies translatable into clinical practice.</i>                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      |                                                                                     | 4               | Pharmacobiochemistry and Toxicology                    | Emanuela Verri     | <i>The laboratory investigates the role of energy metabolism defects in neurodegenerative diseases, with a focus on Alzheimer's disease. It analyzes muscle and brain metabolic alterations in patients with dementia through markers in blood and cerebrospinal fluid. Special attention is given to the amino acid profile and insulin resistance. The objective is to develop therapeutic or metabolic rehabilitation strategies to slow cognitive and functional decline.</i>                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 3                    |  | 5               | Ion Channel Biophysics and Neurophysiology             | Gerardo Biella     | <i>Huntington's disease (HD) is a neurodegenerative disorder caused by a dominant mutation in the IT-15 gene (also designated HTT), which encodes the huntingtin protein. The expansion of the CAG trinucleotide repeat produces a toxic mutant form that leads to neuronal loss, predominantly in the cortex and striatum. Prior to neuronal death, progressive alterations in morphology, excitability, and synaptic function occur. Disruption of NMDA receptors and cortico-striatal connectivity plays a central role in the pathogenesis.</i>                                                                                                                                                                                       | 12. Cellular and tissue electrophysiology<br>13. Experience in applying electrophysiological techniques to primary cultures and brain slices derived from murine models<br>14. Multimodal integration, consisting of the technical ability to perform electrophysiological recordings simultaneously with:<br>* Electrical stimulation and plasticity induction protocols;<br>* Optogenetic stimulation for selective control of neuronal activity;<br>* Functional calcium imaging (Calcium Imaging) to correlate electrical activity with intracellular signals.<br>15. Specific sensory evaluation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 8. Three electrophysiology setups for brain slices and cell lines.<br>9. Advanced electrophysiology setup for slices and cell lines.<br>10. Ratiometric calcium imaging system equipped with an upright microscope with 20X optics and camera.<br>11. Automated patch-clamp system.<br>12. In vivo neurophysiology system for murine models.<br>13. Software (NOLDUS EthoVision software & PanLab SMART video tracking system) and mazes for conducting spontaneous behavioral tests on mice.<br>14. Station and equipment for the preparation of ex vivo brain slices of controlled thickness.<br>15. 2 Pullers Sutter Instrument CO. Model P-97.            |
|                      |                                                                                     | 6               | Cellular and Molecular Physiology                      | Gerardo Biella     | <i>The laboratory investigates the role Ca2+ signaling in angiogenesis, demonstrating that VEGF and SDF-1<math>\alpha</math> increase intracellular Ca2+ in endothelial cells, thereby stimulating the formation of new blood vessels. The work analyzes ion channels (TRP, SOCE) and reactive oxygen species involved in these processes and their role in cardiovascular diseases. Furthermore, it explores Ca2+-signals in cancer cells and T lymphocytes to identify new therapeutic targets against tumors and to enhance immunotherapy.</i>                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      |                                                                                     | 7               | Neurobiology and Integrated Physiology                 | Paola Rossi        | <i>The laboratory investigates the nervous system using electrophysiological techniques, behavioral testing, and immunocytochemical analyses, including on cell cultures. One line of research examines the effects of the medicinal</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

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|   |                                                                                                                     |    |                                       |                                       | mushroom <i>Hericum erinaceus</i> (Lion's mane) on wild-type mice, evaluating memory and hippocampal neurogenesis. Patch-clamp electrophysiology on hippocampal slices and behavioral studies are employed to elucidate the neuroprotective and cognitive potential of this mycotherapeutic agent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                 |                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 4 |  <p>Biologia cellulare</p>         | 8  | Comparative Anatomy and Cytology      | Vittorio Bertone                      | The research activity of the Laboratory of Comparative Anatomy and Cytology, in collaboration with the IRCCS Ospedale Policlinico San Martino - National Institute for Cancer Research, focuses on the development of local chemotherapy protocols using fibrin gel and nanoparticles for the treatment of experimental tumors such as neuroblastoma and melanoma. The goal is to enhance the targeted delivery of antitumor drugs while reducing the toxic effects of systemic therapy. Preliminary results show that cisplatin incorporated into the gels ensures antitumor efficacy comparable or superior to systemic administration, at lower doses. The project involves animal model studies to evaluate the efficacy, toxicity, and clinical feasibility of the methodology.                                         |                                                                                                 |                                                                                                    | <p>16. Manual microtomes (Leica – Microm HM 330 – Reichert Jung 2030)</p> <p>17. Semi-automatic microtome (Leica RM2155)</p> <p>18. Vibratome (Pelco 101 Series 1000)</p> <p>19. Cryostat (Leica CM 1850)</p> <p>20. Western Blot equipment (i.e. PowerPac Basic + Mini-PROTEAN Tetra System + Trans-Blot Turbo Bio-Rad + Azure Biosystems 300)</p> <p>21. Spectrophotometer (Shimadzu UV-1900i)</p> <p>22. Zeiss Axioskop 2 plus microscope (equipped with Canon EOS 1100D camera)</p> <p>23. Zeiss Axioplan microscope (equipped with Olympus Camedia camera)</p> <p>24. Olympus BX51 microscope (equipped with Olympus EP50 camera)</p> <p>25. Olympus BX50 microscope (equipped with Olympus Camedia camera)</p> <p>26. Olympus BX51 microscope (equipped with Optronics camera)</p> <p>27. Leica DM LB2 microscope (equipped with QImaging camera)</p> <p>28. Olympus CKX41 microscope (equipped with Olympus Camedia camera)</p> <p>29. Leica Zoom 2000 microscope</p> <p>30. Olympus BX40 microscope</p> <p>31. Zeiss Axioskop microscope</p> <p>32. Olympus CH20 microscope</p> |
|   |                                                                                                                     | 9  | Cellular Biology and Neurobiology     | Maria Grazia Bottone e Claudio Casali | The Laboratory of Cellular Biology and Neurobiology focuses on: (i) cellular and molecular processes in the nervous system and other tissues to investigate mechanisms of proliferation, differentiation, signaling, and cell death, as well as studies on aging, neurodegenerative and neuro-oncological diseases, the effects of substances of abuse, and eating disorders using in vitro and ex vivo models; (ii) analysis of the cell nucleus and transcriptional regulatory mechanisms, with an emphasis on epigenetic modifications of DNA, RNA, and histones, nuclear bodies, ribonucleoproteins, lncRNAs, and chromatin organization. Laboratory instrumentation includes biosafety cabinets and incubators, cryostat and microtomes, electrophoresis systems, thermal cyclers, and optical and electron microscopy. |                                                                                                 |                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 5 |  <p>Microbiologia Molecolare</p> | 10 | Molecular Microbiology                | Silvia Buroni                         | <p>The Laboratory of Molecular Microbiology employs diverse approaches to combat infections caused primarily by multidrug-resistant ESKAPE pathogens and those typical of cystic fibrosis:</p> <p>1. Development of innovative molecules active against Gram-positive and Gram-negative bacteria via Virtual Screening and Artificial Intelligence, targeting bacterial cell division.</p> <p>2. Development of adjuvants to enhance the activity of antibiotics currently used in therapy: investigation of the compound PDSTP to prevent bacterial adhesion to human cells.</p> <p>The Laboratory also investigates the molecular mechanisms of bacterial resistance and persistence.</p>                                                                                                                                  | <p>16. Gibson or standard cloning</p> <p>17. Cloning and production of recombinant proteins</p> | <p>6. BSL3, located at the Department of Clinical-Surgical, Diagnostic and Pediatric Sciences.</p> | <p>33. SkanIt fluorometer (Thermo Fisher)</p> <p>34. GloMax fluorometer-luminometer (Promega)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|   |                                                                                                                     | 11 | Microbial Enzymology and Drug Targets | Laurent Chiarelli                     | Research conducted at the Laboratory of Microbial Enzymology and Drug Targets focuses on two main areas: the study of enzymes from pathogenic bacteria as potential targets for novel inhibitors—representing promising antimicrobial drugs—and the study of enzymes involved in drug resistance mechanisms. The work entails the production of recombinant proteins, their functional and structural characterization, and the screening of chemical compound libraries, followed by the characterization of lead                                                                                                                                                                                                                                                                                                           |                                                                                                 |                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

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|   |                                                                                     |    |                                                    |                                                         | <p>inhibitors. To this end, core techniques in protein biochemistry and enzymology are employed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                            |              |                                                                                                                                     |
|   |                                                                                     | 12 | <a href="#">Genetica dei patogeni opportunisti</a> | <a href="#">Giulia Barbieri</a>                         | <p>The Laboratory of Genetics of Opportunistic Pathogens investigates gene expression regulatory networks governing metabolism and virulence in Gram-positive bacteria. In <i>Streptococcus agalactiae</i>, a pathogen responsible for neonatal sepsis and meningitis, research focuses on the global regulator CodY and its crosstalk with other transcriptional factors in modulating virulence. In parallel, the laboratory studies adaptive responses to nutritional stress in <i>Bacillus subtilis</i>, a model organism for Gram-positive bacteria. This knowledge is applied to the development and engineering of strains optimized for the production of commercially relevant enzymes.</p>                   |                                                            |              |                                                                                                                                     |
|   |                                                                                     | 13 | <a href="#">Mycobacteriology</a>                   | <a href="#">Maria Rosalia Pasca e Giulia De Giacomi</a> | <p>The research activity of the Mycobacteriology Laboratory focuses on the development of novel therapeutic strategies against <i>Mycobacterium tuberculosis</i> and <i>Mycobacterium abscessus</i>, with a particular emphasis on drug mechanisms of action and resistance. The group participates in international drug discovery projects and the development of new therapeutic combinations, including studies within the European ERA4TB project. Key research lines include the identification of novel cellular targets, the development of innovative antibody-drug conjugate (ADC) approaches, and the characterization of VOMG, a promising cell division inhibitor active against <i>M. abscessus</i>.</p> |                                                            |              |                                                                                                                                     |
|   |                                                                                     | 14 | <a href="#">Microorganism Genetics</a>             | <a href="#">Cinzia Calvio</a>                           | <p>The laboratory investigates microorganism genetics using the Gram-positive bacterium <i>Bacillus subtilis</i> as a model organism. This soil bacterium degrades plant biomass and contributes to nutrient cycling. It also promotes plant growth, enhancing agricultural productivity. Naturally easy to culture and engineer in the laboratory, it is widely utilized in biotechnology to produce enzymes and other high-value bioproducts.</p>                                                                                                                                                                                                                                                                    |                                                            |              |                                                                                                                                     |
| 6 |  | 15 | <a href="#">Zoology and Evolution (ZooE)</a>       | <a href="#">Lino Ometto</a>                             | <p>We study the genetic basis of biodiversity using experimental and bioinformatic approaches on model and non-model organisms. Through population genetics, we analyze how natural selection and demographic dynamics influence population evolution. Molecular evolution analyses enable the identification of genes linked to adaptation and phenotypic traits. A particular focus is placed on the evolution of invasive insects of agricultural and public health concern. Our studies integrate genomic data with ecological and biological information.</p>                                                                                                                                                     | 18. Viral infections in mosquitoes and other animal models | 7. Insectary | 35. Climate chambers<br>36. Qubit<br>37. Olympus CKX53 fluorescence microscope<br>38. ABI 310 Genetic Analyzer<br>39. NanoDrop 1000 |
|   |                                                                                     | 16 | <a href="#">Insect Evolutionary Biology</a>        | <a href="#">Ludvik Gomulski</a>                         | <p>The Asian tiger mosquito, <i>Aedes albopictus</i>, is an invasive species and a vector for viruses such as dengue, chikungunya, and Zika. Its success relies on remarkable adaptability, breeding in artificial containers, and opportunistic feeding habits. Climate change promotes its expansion and intensifies larval competition for breeding sites. The research investigates how larval density influences the metabolism, physiology, phenotype, and behavior of adults. The goal is to understand how these conditions affect life-history strategies and vector competence for disease transmission.</p>                                                                                                 |                                                            |              |                                                                                                                                     |
|   |                                                                                     | 17 | <a href="#">Insects Symbionts Laboratory</a>       | <a href="#">Maria Vittoria Mancini</a>                  | <p>Mosquito-borne diseases, such as arboviruses, cause high mortality and are difficult to control. Given the limited availability of vaccines and therapeutics, vector control targeting mosquitoes remains the primary intervention strategy. The research investigates the native microbiota of vector insects, with a specific focus on inherited symbionts and their interactions with the host. The objective is to harness these microorganisms to control mosquito populations, potentially reducing pathogen transmission and providing novel disease control strategies.</p>                                                                                                                                 |                                                            |              |                                                                                                                                     |
|   |                                                                                     | 18 | <a href="#">Vector Biology Laboratory</a>          | <a href="#">Mariangela Bonizzoni</a>                    | <p>Mosquito-borne viral diseases, such as dengue, Zika, and chikungunya, represent a growing global threat driven by urbanization and globalization. The principal vector species are <i>Aedes aegypti</i> and <i>Aedes albopictus</i>. The research explores the biology and genome of these mosquitoes to develop innovative control strategies. It employs systems biology approaches combining molecular, cellular, and bioinformatic techniques alongside insect manipulation. The</p>                                                                                                                                                                                                                            |                                                            |              |                                                                                                                                     |

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|    |                                                                                                                  |    |                                                       |                                                       | laboratory also investigates mosquito biodiversity and the adaptation of invasive species in Italy.                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 7  |  <p>Genomica di Popolazioni</p> | 19 | Human Population Genetics                             | Ornella Semino                                        | Phylogenetic studies based on the analysis of uniparental markers and genomic studies based on whole nuclear genome sequencing allow the investigation of the history and migrations of human populations.                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                | 40. Instrumentation in the Population Genomics laboratories includes a Maxwell Promega automated DNA extractor, fluorometers, Agilent TapeStation 4150, plate centrifuge, benchtop centrifuges, PCR thermal cyclers, and electrophoresis equipment including a UV transilluminator/gel doc.                                                                                                                                                                                                     |
|    |                                                                                                                  | 20 | Human and Animal Population Genomics                  | Anna Olivieri, Antonio Torroni                        | Genomic investigations on domestic, invasive, or commensal animal species allow the reconstruction of their evolutionary history and that of the human populations that coexisted with them.                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|    |                                                                                                                  | 21 | Archeogenomics                                        | Alessandro Achilli                                    | Archeogenomics combines genomic studies on modern populations with ancient DNA analysis to reconstruct the evolutionary history of human and animal populations.                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|    |                                                                                                                  | 22 | Human Evolutionary Genomics                           | Alessandro Raveane                                    | Evolutionary genomic studies on the variability of the immune system and complex genomic regions in human populations.                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 8  |                                 | 23 | Ancient DNA Laboratory                                | Alessandro Achilli<br>Anna Olivieri<br>Ornella Semino | The analysis of ancient DNA from archaeological and/or museum specimens has transformed the study of the past. Archaeogenomics, integrating ultra-sterile laboratory procedures, next-generation genomic sequencing, and bioinformatic pipelines, allows the reconstruction of phylogenetic relationships, demographic shifts, and migratory flows of populations that lived hundreds or thousands of years ago, effectively merging basic molecular research with cultural heritage enhancement. |                                                                                                                                                                                                                                                                                                                                                                   | 8. Ancient DNA Facility: This laboratory contains two cleanrooms (rooms 4 and 5 in the attached figure) and contamination-controlled spaces maintained under positive pressure with air filters to prevent the influx of external contaminants. The purpose is to preserve low-concentration, time-degraded ancient endogenous DNA. The space also includes an anteroom/changing room with controlled pressure and air supply. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 9  |                                | 24 | Translational Cancer Genetics                         | Natalia S. Pellegata                                  | Research focuses on endocrine and gastrointestinal cancer biology and genetics to uncover genetic and epigenetic mechanisms regulating tumor development and progression. Aims to identify novel therapeutic targets and test drug combinations using in vivo and in vitro models (xenografts, 3D organoids, cell lines) paired with molecular biology and bioinformatics.                                                                                                                        | 19. 3D organotypic cell cultures                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                | 41. Tissue dissociator                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|    |                                                                                                                  | 25 | Tumor Genomics and Epigenomics                        | Rossella Tricarico                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 10 |  <p>Biologia Vegetale</p>     | 26 | Plant Biotechnology                                   | Anca Macovei                                          | Studies seed quality, developing methodologies to evaluate and enhance seed vitality and germination. Approaches include morpho-imaging, physiological germination assays, biochemical and molecular analyses, multi-omics, and machine learning for quality marker identification. Specific research explores DNA damage response (DDR) pathways via mutants and miRNA regulation.                                                                                                               | 20. DNA analysis and gene expression<br>21. Omics analysis<br>22. Comet assay (genotoxicity)<br>23. Diffusion assay (genotoxicity)<br>24. ROS detection assay (FOX, DCFH-DA, DAB, NBT)<br>25. Germination assay                                                                                                                                                   | 9. GreenTechHouse - Experimental greenhouse with growth chambers for in vitro and in vivo plant cultures, and controlled-condition seed storage room.                                                                                                                                                                                                                                                                          | 42. LEICA VISORIA-I-B fluorescence microscope<br>43. SENECA srl Climacell germinator, Memmert oven for artificial aging tests<br>44. Creality Ender-3 V3 SE 3D printer                                                                                                                                                                                                                                                                                                                          |
|    |                                                                                                                  | 27 | Molecular Seed Physiology                             | Alma Balestrazzi                                      | Investigates molecular mechanisms underlying seed quality with focus on seed priming techniques to improve germination performance and environmental stress tolerance. Uses biochemical assays (ROS and antioxidant capacity), molecular profiling (gene expression, metabolomics, ionomics), and genotoxicity tests (Comet assay).                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|    |                                                                                                                  | 28 | BioPhotoLab                                           | Alberta Pinnola                                       | Researches molecular physiology of abiotic stress responses in higher plants, mosses, and unicellular algae. Utilizes genetics (CRISPR-Cas9, transformations), biochemistry and molecular biology (protein purification, HPLC, cloning), and physiology (in vivo fluorescence and absorbance on pigment-protein complexes).                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 11 |  <p>Biologia Strutturale</p>  | 29 | Structural Biology                                    | Andrea Mattevi, Claudia Binda                         | dedicated to structural biology and enzymology. Investigates protein mechanisms at atomic resolution (metabolons, regulatory pathways, biotechnology applications). Visualizes complex enzyme catalysis and links to pathologies (cancer, neurodegeneration) to guide structure-based drug design and targeted inhibitor discovery.                                                                                                                                                               | 26. Expression of recombinant proteins (in mammalian and insect cells using baculovirus; Leishmania tarentolae; E. coli).<br>27. Purification and characterization of protein expression (for both soluble and membrane proteins).<br>28. Reconstitution of membrane proteins into nanodiscs and liposomes.<br>29. Production and characterization of nanobodies. | 10. Facility for recombinant protein production using human cells, equipped with everything required from recombinant plasmid preparation to the purification and characterization of protein samples.                                                                                                                                                                                                                         | 45. Labosystem chemical fume hood<br>46. HeraSafe biosafety cabinet for cell cultures<br>47. Gelaire BSB3 biosafety cabinet for cell cultures<br>48. HeraCell 240 CO2 incubator<br>49. Eppendorf 5804 R refrigerated centrifuge<br>50. Thermo Scientific Heraeus Fresco 21 centrifuge<br>51. Hermle Z300 Cytospin centrifuge<br>52. Bioer GeneExplorer PCR apparatus<br>53. M.Medical PikoReal 96 qPCR system<br>54. Life Technologies TFX-35M transilluminator<br>55. Olympus CKX41 microscope |
|    |                                                                                                                  | 30 | The Armenise-Harvard Laboratory of Structural Biology | Federico Forneris                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|    |                                                                                                                  | 31 | Membrane Proteins                                     | Francesca Magnani                                     | Focuses on membrane transporters, G-protein coupled receptors (GPCRs), and membrane protein folding using integrated protein engineering, biophysics, biochemistry, and structural biology.                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

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|    |                                                                                     |    |                                                                  |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                       | 56. Zeiss Axio Scope.A1 fluorescence microscope with acquisition system (CCD Photometrics, IPLab acquisition software)                                                                                                                                                                                                                     |
| 12 |    | 32 | Molecular Biology, Cytogenetics, Epigenomics                     | Solomon Nergadze e Elena Raimondi             | Focuses on molecular mechanisms maintaining mammalian genome integrity (centromeres and telomeres) in carcinogenesis and evolution. Expertise includes chromosome engineering and centromere biology, conducted in collaboration with Prof. Elena Giulotto and Prof. Solomon Nergadze.                                                                                                                                                                                                                        | 30. Mammalian cell cultures (primary and tumor), stabilization of primary fibroblasts with telomerase, transfection.<br>31. Cytogenetics: chromosome preparations and banding; reconstruction of human and animal karyotypes.                  |                                                                                                                                                                                                                                                       | 57. Olympus CKX41 microscope<br>58. Zeiss Axio Scope.A1 fluorescence microscope with acquisition system (CCD Photometrics, IPLab acquisition software)                                                                                                                                                                                     |
| 13 |    | 33 | Biology and Biotechnology of Reproduction                        | Maurizio Zuccotti                             | Studies ovary and testis regulation of gamete competence for embryonic development using 2D and 3D cell cultures, IVF, micromanipulation, molecular biology, 4D digital models, bioengineering, and AI to address infertility. Integrates with the Master's program in Reproductive Biology and Biotechnology.                                                                                                                                                                                                | 32. IVF pipeline: Gamete isolation and freezing, in vitro fertilization, preimplantation embryo culture.<br>33. Testicular and ovarian histology.<br>34. Tissue clearing.<br>35. Cytogenetics.<br>36. AI applied to Time-Lapse image analysis. | 11. Facility for Embryology and Reproductive Technologies<br>Equipment and expertise to perform in vitro fertilization, preimplantation embryo culture and embryo transfer, micromanipulation, and cryopreservation of mammalian oocytes and embryos. | 59. Two Olympus IX71 micromanipulators<br>60. One Nikon Eclipse micromanipulator with laser<br>61. Olympus BX60 fluorescence microscope with DP72 color camera<br>62. Nikon BioStation for time-lapse imaging<br>63. Leica RM2125 microtome                                                                                                |
| 14 |   | 34 | Red Blood Cell                                                   | Giampaolo Minetti                             | Studies erythrocyte membrane biology in pathophysiological and transfusion contexts. Current focus: terminal erythropoiesis, analyzing remodeling processes (lipidomics and proteomics) during reticulocyte maturation and RBC aging. Skills range from cell isolation to advanced biochemical and biophysical analyses (fluorescence microscopy, membrane domains, vesiculation).                                                                                                                            |                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                       | 64. Optima MAX preparative ultracentrifuge, Beckman Coulter, with MLA-80 and MLS-50 rotors<br>65. Tri-Carb 2800TR liquid scintillation analyzer, PerkinElmer<br>66. COBRA II gamma counter, Packard<br>67. LS-3 fluorescence spectrometer, PerkinElmer<br>68. GENios Plus microplate reader, Absorbance, Fluorescence, Luminescence, Tecan |
|    |                                                                                     | 35 | Platelet Biochemistry                                            | Mauro Torti, Ilaria Canobbio, Gianni Guidetti | Studies vascular pathophysiology and biochemical mechanisms of platelet activation in thrombosis, inflammation, Alzheimer's, and cancer. Areas: 1) signal transduction in thrombosis/thromboinflammation; 2) platelet amyloid peptides in neurodegeneration and antimicrobial defense; 3) extracellular vesicles in metastasis; 4) endothelial pathophysiology at the blood-brain barrier. Uses cell culture, primary cells, transcriptomics, extracellular vesicle purification, and modified animal models. |                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                            |
| 15 |  | 36 | Functional Oncogenomics                                          | Sergio Comincini e Federico Manai             | Focuses on pre-clinical strategies for high-malignancy CNS tumors (primarily glioblastoma multiforme). Develops and characterizes novel molecules targeting mitochondrial function in tumor-derived cells using molecular genetics, functional assays, light/fluorescence/electron microscopy, and flow cytometry.                                                                                                                                                                                            | 37. Extracellular vesicle analysis.<br>38. Cellular functional assays.                                                                                                                                                                         |                                                                                                                                                                                                                                                       | 69. Muse Cytofluorimeter Cytec<br>70. Real Time Pcr Applied Biosystems<br>71. Q-nano Gold Izon<br>72. Inverted Fluorescent Microscope Nikon Ts100<br>73. Cells Culture Cabinets<br>74. Cell Culture Incubater<br>75. Luna Cell Ai Counter Logos Biosystems<br>76. 2d Protein Electrophoresis Biorad                                        |
| 16 |  | 37 | Molecular Mechanisms of Innate Immunity and Nucleic Acid Sensing | Anna Kajaste-Rudnitski                        | Investigates vector-host interactions and innate immunity in gene therapy, CNS diseases, and autoimmune disorders. Long-term goal: understand how anti-pathogen defense mechanisms impact gene therapy safety and efficacy and contribute to autoimmune and inflammatory diseases.                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                | 12. Facility for the production of retroviral and lentiviral vectors and genetic manipulation of mammalian cells (KO/KI with CRISPR).                                                                                                                 | 77. Instrumentation for retroviral and lentiviral vector production and genetic manipulation of mammalian cells (KO/KI with CRISPR, etc.)                                                                                                                                                                                                  |
| 17 |  | 38 | Molecular Parasitology                                           | Davide Sassera                                | Studies interspecies interactions (mutualism, commensalism, parasitism) from functional and evolutionary perspectives to improve medical and veterinary prevention and treatment. Uses integrated genomics, transcriptomics, bioinformatics (machine learning, protein structure prediction), molecular biology, and microscopy.                                                                                                                                                                              | 39. Culture of pathogens of the genus Borrelia.<br>40. Omics data analysis.                                                                                                                                                                    |                                                                                                                                                                                                                                                       | 78. High-performance computing cluster<br>79. Real-time PCR<br>80. Darkfield stereomicroscope                                                                                                                                                                                                                                              |