

BIOGRAPHICAL SKETCH

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NAME: **Emanuele Capra**

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: **First Researcher at the National Research Council Institute of Agricultural Biology and Biotechnology IBBA-CNR**

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Università degli Studi di Milano	PhD	01/2012	Plant Biology
Università degli Studi di Milano	Bachelor Degree	11/2006	Agricultural Science and Technology
Università degli Studi di Milano	Master Degree	10/2000	Pharmaceutical Biotechnology

A. Personal Statement

Dr. Emanuele Capra (orcid.org/0000-0002-3167-3940), has a documented experience in field of epigenetics applied to livestock breeding and conservation. He studies the molecular basis regulating germinal cell maturation, the fecundation and embryo placental communication providing an overall understanding of epigenetic changes in different reproductive tissue and germinal cells affecting the successful of pregnancy. Animal epigenetic responses to environmental stresses during reproductive development in function of climate change and adaptation are also of interest. He applies innovative protocols for epigenetic and transcriptomic studies (NGS) to evaluate the small RNA content in microvesicle and its role in regulating inflammatory process, the epigenetic signature in different fetal tissue, in sperm isolated in high and low motile sperm, in in-vivo and in-vitro produced embryos and in oocytes from animals in breeding and non-breeding season.

He studies some of the key element that regulated epigenetic mechanism related to animal adaptation and reproductive success with a focus in the interplay between CpG methylation genomic signature and expression of mRNAs and other other non coding RNAs.

Ongoing and recently completed projects that I would like to highlight include:

PRIN 2022, Epigenetic basis of adaptation to climate change: a comparison of indicine and taurine. EPI-ADAPT” 2023-2025. PI for IBBA

PNRR AgriTech, Missione 4, Componente 2, Investimento 1.4 “Potenziamento strutture di ricerca e creazione di "campioni nazionali di R&S" su alcune Key Enabling Technologies”, Codice progetto MUR: CN00000022 2022-2025. PI for IBBA

PRIMA Project: SCALA-MEDI - del Improving sustainability and quality of Sheep and Chicken production by leveraging the Adaptation potential of LocAl breeds in the MEDiterranean 2021-2025. Task Leader T. 4.3 (epigenetic analyses).

Publications that highlight his experience and qualifications for this project are:

- Capra E, Lazzari B, Turri F, Cremonesi P, Portela AMR, Ajmone-Marsan P, Stella A, Pizzi F. Epigenetic analysis of high and low motile sperm populations reveals methylation variation in satellite regions within the pericentromeric position and in genes functionally related to sperm DNA organization and maintenance in *Bos taurus*. *BMC Genomics*. 2019 Dec 6;20(1):940. doi: 10.1186/s12864-019-6317-6.
- Capra E, Turri F, Lazzari B, Biffani S, Lange Consiglio A, Ajmone Marsan P, Stella A, Pizzi F. CpG DNA methylation changes during epididymal sperm maturation in bulls. *Epigenetics Chromatin*. 2023 May 30;16(1):20. doi: 10.1186/s13072-023-00495-6.
- Capra E, Turri F, Lazzari B, Cremonesi P, Gliozzi TM, Fojadelli I, Stella A, Pizzi F. Small RNA sequencing of cryopreserved semen from single bull revealed altered miRNAs and piRNAs expression between High- and Low-motile sperm populations. *BMC Genomics*. 2017 Jan 4;18(1):14. doi: 10.1186/s12864-016-3394-7.
- Turri F, Capra E, Lazzari B, Cremonesi P, Stella A, Pizzi F. A Combined Flow Cytometric Semen Analysis and miRNA Profiling as a Tool to Discriminate Between High- and Low-Fertility Bulls. *Front Vet Sci*. 2021 Jul 19;8:703101. doi: 10.3389/fvets.2021.703101.

B. Positions, Scientific Appointments, and Honors

2024-present First Researcher at the Institute of Agricultural Biology and Biotechnology (IBBA), National Research Council Italy.

2019 – 2024 Permanent Researcher at the Institute of Agricultural Biology and Biotechnology (IBBA), National Research Council Italy.

2018 – 2019 Research fellow at the Department of Animal Science, Food and Technology – DIANA, Università Cattolica del Sacro Cuore Italy

2017 – 2018 Project Manager at BICT S.r.l, Italy

2012 – 2017 Research fellow at the Institute of Agricultural Biology and Biotechnology (IBBA), National Research Council Italy.

2008 – 2012 Scientific Coordinator at Biotrack S.r.l, Italy, spin-off of the University of Milan.

2004 – 2008 Research fellow at the Parco Tecnologico Padano. Founding:

2000 – 2004 Researcher at Keryos S.p.a

C. Contributions to Science

My publications directly addressed the epigenetic status of different tissues in livestock animals, by non-coding RNA ncRNA and CpG methylation profiling.

These publications provide important insight for the scientific community by:

- Studying the breed epigenetics diversity applied to livestock breeding and conservation. (Capra et al., Comparison between indicine and taurine cattle DNA methylation reveals epigenetic variation associated to differences in morphological adaptive traits. *Epigenetics*. 2023 Dec;18(1):2163363. doi: 10.1080/15592294.2022.2163363.)
- Deepening the molecular basis regulating germinal cell maturation, the fecundation and embryo placental communication providing an overall understanding of epigenetic changes in different reproductive tissue and germinal cells affecting the successful of pregnancy. (Capra et al. Epigenetic analysis of high and low motile sperm populations reveals methylation variation in satellite regions within the pericentromeric position and in genes functionally related to sperm DNA organization and maintenance in *Bos taurus*. *BMC Genomics*. 2019 Dec 6;20(1):940. doi: 10.1186/s12864-019-6317-6; Lange-Consiglio et al. Amniotic microvesicles impact hatching and pregnancy percentages of in vitro bovine embryos and blastocyst microRNA expression versus in vivo controls. *Sci Rep*. 2020 Jan 16;10(1):501. doi: 10.1038/s41598-019-57060-z)

- Studying the Animal epigenetic responses to environmental stresses during reproductive development in function of climate change and adaptation are also of interest. Del Corvo et al. Methylome Patterns of Cattle Adaptation to Heat Stress. *Front Genet.* 2021 May 28;12:633132. doi: 10.3389/fgene.2021.633132. eCollection 2021; Capra et al. Maternal undernutrition during periconceptional period affects whole-genome ovine muscle methylation in adult offspring. *J Anim Sci.* 2022 Aug 1;100(8):skac180. doi: 10.1093/jas/skac180. Toschi et al. Maternal peri-conceptional undernourishment perturbs offspring sperm methylome. *Reproduction.* 2020 May;159(5):513-523. doi: 10.1530/REP-19-0549.)
- Understanding some of the key element that regulated epigenetic mechanism related to male and female fertility. Capra E et al. Small RNA sequencing of cryopreserved semen from single bull revealed altered miRNAs and piRNAs expression between High- and Low-motile sperm populations. *BMC Genomics.* 2017 Jan 4;18(1):14. doi: 10.1186/s12864-016-3394-7; Capra et al. Epigenetic analysis of high and low motile sperm populations reveals methylation variation in satellite regions within the pericentromeric position and in genes functionally related to sperm DNA organization and maintenance in *Bos taurus*. *BMC Genomics.* 2019 Dec 6;20(1):940. doi: 10.1186/s12864-019-6317-6; Turri et al. A Combined Flow Cytometric Semen Analysis and miRNA Profiling as a Tool to Discriminate Between High- and Low-Fertility Bulls. *Front Vet Sci.* 2021 Jul 19;8:703101. doi: 10.3389/fvets.2021.703101; Capra et al., Seasonal effects on miRNA and transcriptomic profile of oocytes and follicular cells in buffalo (*Bubalus bubalis*). *Sci Rep.* 2020 Aug 11;10(1):13557. doi: 10.1038/s41598-020-70546-5; .Capra et al. Variations of follicular fluid extracellular vesicles miRNAs content in relation to development stage and season in buffalo. *Sci Rep.* 2022 Sep 1;12(1):14886. doi: 10.1038/s41598-022-18438-8;

Complete List of Published Work: <https://www.scopus.com/authid/detail.uri?authorId=55486634800>