**Andrea Crisanti - Curriculum Vitae**

## Current Appointments

Professor of Molecular Parasitology at the Department of Life Science (Imperial College London)

Editor in Chief of Pathogens and Global Health (former “Annals of Tropical Medicine and Parasitology”)

Professor of Clinical Microbiology, University of Perugia (on leave)

## Higher education

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| 1973-79 | Studies in Medicine at the University of Rome "La Sapienza", School of Medicine; |
| 1979 | Degree in Medicine and Surgery 110/110 cum laude (with distinction); overall class of degrees 110/110 (best of the course); |
| 1980-81 | Hospital internship at the Catholic University of Rome; |
| 1982 | Post graduate research training in immunology and biotechnology sponsored by the Italian Research Council (CNR); |
| 1983-86 | Post graduate student at the Basel Institute for Immunology; |
| 1986 | Postgraduate degree in Immunology and Biotechnology; |

## Academic appointments

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| 1981-82 | Medical officer in the Italian army, airborne brigade Tuscania; |
| 1987-89 | Research fellow at the University of Heidelberg Zentrum Molekulare Biologie (ZMBH). EMBO fellowship award at the (ZMBH), University of Heidelberg; |
| 1990-94 | Consultant Medical Parasitology University of Rome Policlinico Umberto I |
| 1994-97 | Lecturer at Imperial College, Department of Biology; |
| 1997-99 | Reader in Molecular Parasitology at the Department of Biology from Imperial College for Science Technology and Medicine, of London; |
| 2000 to-date | Professor of Molecular Parasitology at the Department of Life Science Imperial College London; |
| 2010 to date | Editor in Chief of Pathogens and Global Health former “Annals of Tropical Medicine and Parasitology”; |
| 2011-14 | Head of the Section Infectious Disease at Department of Life-Science Imperial College London; |
| 2001-2014 | Professor of Clinical Microbiology at the University of Perugia, Faculty of Medicine, Italy |
| 2012-15 | Director of the Centre of Functional Genomics of University of Perugia; |

## Graduate and undergraduate teaching

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| 2004 to-date | Coordinator and teacher of the course "Molecular and Cellular Parasitology" at Imperial College London; Supervisor of approximately 25 doctoral theses in the field of biology and genetics of vectors of infectious diseases and in the field of host-parasite and parasite-vector interactions at the University of London. |

2004-2015 Coordinator and director of the doctoral course "Molecular Pathogenesis, immunology and control of infectious diseases" at the University of Perugia.

**Scientific Interests:** I developed an interest at translating scientific and technological knowledge in the fields of genetics, molecular biology, genomics and synthetic biology into genetic vector control measures. The work of my laboratory helped in elucidating the locomotion and invasion machinery of plasmodium parasites proposing 15 years ago a model that is still regarded as correct. The work on mosquito genetics translated in the development of a CRISPR based technology a technology known as gene drive that spreads a genetic modification from few individual mosquitoes to entire vector populations. This technology is currently regarded as a major breakthrough in the effort of developing genetic vector control measures aimed at either eliminating wild type mosquito populations or at interfering with their ability to transmit malaria.

**Scientific publications:** I have published more than 120 scientific articles on high impact peer-reviewed journals including Nature (7), Science (4), EMBO Journal (8), PNAS (4), Lancet (3) and Cell (1) totalling nearly 10000 citations with a H index of 56. I have also played a leading role in the scientific community by promoting a number of international research projects aimed at investigating novel concepts and fostering collaborative links between European and Developing Country research laboratories.

**Managerial Skills and Experience:**

**Create a Centre of Functional Genomics:** At the beginning of 2008 I obtained the support of the University of Perugia and the Regional Council of Umbria to develop a Centre of functional genomics with the objective to enhance the research capacity of the University and to expand the offer of genetic diagnostic tools to patients. As part of this operation I have also created a public private partnership (POLO GGB, see below) supported by the European structural funds to promote the transfer of genetic and genomic knowledge and technology to small medium industries operating in the field of life science, health and agriculture.

**Co-ordinate a Marie Curie international mobility program in genomics and genetics:** In response to the need of the University of Perugia to attract talented scientists for its centre of genomics as well as to offer training opportunities to its own staff I have secured up to 5.000.000 funding from the European Community and Umbria Regional Council to run a COFUND Marie Curie Initiative (I-Move) that has awarded fellowships to young and senior investigators in the field of functional genomics for a total of 250 man/month. My involvement included the ideation of the proposal as well as its implementation, chairing the executive committee, supervising the development of on informatics platform to interact with applicants and overseeing the fairness of the process.

**Establish a European Research Infrastructure:** I have promoted and created with the support of the European Union a large Infrastructure facility (INFRAVEC) aimed at providing an enhanced research capacity for investigating vector biology and vector pathogen interaction as well logistic support for translating this knowledge into experimental vector control measures. A of 15 European laboratories have been integrated within a single operating infrastructure that provided resources and support to small laboratory wishing to conduct competitive research in the field of vector biology and vector-pathogen interactions. INFRAVEC has been instrumental in making these infrastructures accessible to the wider scientific community (providing support for staff exchange and experimental activities) with the objective to increase the research capacity of individual laboratories and teams beyond their current capacity. Very recently

INFRAVEC has been selected by the European Union as one of the European Infrastructure that will receive additional five years of funding because of its impact and societal relevance (INFRAVEC-2).

**Contribute to spin off companies**: 1) I was the founder and scientific director of Microtest Matrices (MtM), a spin-off of Imperial College. The company develops point-of-care microarray immunoassays and has entered the marked with an innovative micro-array based test for the in vitro diagnosis of allergy. 2) I 2010 I started with the contribution of the European Commission and the Italian Government, a public private partnership, Genomic and Genetic laboratories (Polo GGB Italian limited company) involving a group of SMEs and the Italian universities with the objective to transfer recent progress in genetic and genomic knowledge into industry.

**Promote industry academia translational activities:** I have co-ordinated coordinated the EU-FP7-industry –academy Marie Curie project FIGHTMAL. Here four research institutions and three industrial partners, have combined cutting edge expertise in protein microarrays, immunoassay development, immunology, protein expression and epidemiology with the objective of translating the genome sequence information of *P. falciparum* into a micro-array based immunoassay to unravel correlates of protection against human malaria. The implementation of the project revolved around a large staff mobility program between academic and industrial partners involving a total of 25 PhD students and post-doctoral fellow.

**Interact with policy makers and government departments:** The development and utilization of genetically manipulated insects has generated a growing scientific interest as well as the attention of policy makers, media and pressure groups as a consequence of a series of important scientific breakthroughs. New policy and safety guidelines are being drafted by international organization and individual States to regulate the use and release of genetically modified organisms. I have advised on issues concerning both application and safety of genetic modified organisms the Science and Technology Committee of House of Lord, the Consilium Pontificium of the Vatican City and the European Food Agency in their effort of developing general policy documents and guidelines.

**Contribution to career development**

*Prof. Flaminia Catteruccia.* She worked in my laboratory from 1996 to 2006. She established herself as an independent and successful scientist in the field of mosquito reproductive biology. Currently she is associated professor at the University of Harvard, School of Public Health.

*Dr. Tito Bacarese Hamilton.* He joined my laboratory as research fellow in 1998. In 2006 he was offered a position as global vice president for research and technology of LIFE SCAN a 1.5 billion company of Johnson and Johnson group. Dr. Bacarese has responsibility for the full-scale development and commercial launch of all new product platforms.

*Dr. Walter Low:* He joined my laboratory as research fellow in 2004. In 2008 he joined PX'Therapeutics, a biotech company operating in the field of protein production and purification. In 2010 Dr. Low was appointed Director of Technology Development and Antibody Engineering.

*Dr. Silvia Naitza*: She worked in my laboratory from 1994 to 1998. In 2006 she was appointed as director of the human genetics laboratory at the Italian Research Council in Cagliari.

*Dr. Nicolai* Windbichler: He worked in my laboratory as postdoctoral fellow 2005 to 2012. In 2012 he was awarded a young investigator ERC grant and 2014 Imperial College committed to employ him as lecturer at the grant.

**Competitive Funding:**

During my recent academic career I have been awarded several competitive grants from national and international research agencies including the Wellcome Trust, BBSRC, the European Commission, the American Government (DARPA), The Bill and Melinda Gates Foundation and NIH for a total of £ 8,000.000, US $ 2,600,000 and € 15,700,00 (listed below). After spending several years at Imperial College on Leave from the University of Perugia I am planning to return to Italy next year and continue my research activity there. This grant applications is a key component of this project.

**Past**

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| 2007 | BBSRC | Project co-ordinator | Sex Determination in Mosquitoes | £ 488.000 |
| 2008 | European Commission "Programme Health" | Project co-ordinator | FLUARRAY | € 2.777.900 |
| 2008 | European Commission "Programme Marie Curie" | Project co-ordinator | FIGHTMAL | € 1.870.700 |
| 2009 | European Commission "Programme Capacities" | Project co-ordinator | INFRAVEC | € 8.499.600 |
| 2010 | Foundation of NIH | Principal Investigator | Homing endonuclease vector control | £ 1.200.000 |
| 2012 | Foundation of NIH | Principal Investigator | Homing endonuclease vector control | £ 2.500.000 |

**Active**

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| 2015-18 | Foundation of NIH | Principal Investigator | Homing endonuclease vector control | £ 1.500.000 |
| 2016-20 | Bill and Melinda Gates Foundation | Principal Investigator | Target Malaria | £ 5.150.000 |
| 2016-20 | European Commission "Programme Capacities" | Principal Investigator | INFRAVEC-2 | € 570.700 |
| 2017-21 | DARPA "Safe gene" | Principal Investigator | Safe gene drive technology | $ 2,600,000 |

**Principal Scientific Publications of PI**


1. Burt A, Crisanti A. Gene Drive: Evolved and Synthetic. ACS Chem Biol. 2018 Feb 5. doi: 10.1021/acschembio.7b01031. [Epub ahead of print] PubMed PMID: 29400944.

2. Hammond AM, Kyrou K, Bruttini M, North A, Galizi R, Karlsson X, Kranjc N,Carpi FM, D'Aurizio R, Crisanti A, Nolan T. The creation and selection of mutations resistant to a gene drive over multiple generations in the malaria mosquito. PLoS Genet. 2017 Oct 4;13(10):e1007039.

3. Bernardini F, Galizi R, Wunderlich M, Taxiarchi C, Kranjc N, Kyrou K, Hammond A, Nolan T, Lawniczak MNK, Papathanos PA, Crisanti A, Windbichler N.Cross-Species Y Chromosome Function Between Malaria Vectors of the Anopheles gambiae Species Complex. Genetics. 2017 Oct;207(2):729-740. doi:10.1534/genetics.117.300221

4. Galizi R, Hammond A, Kyrou K, Taxiarchi C, Bernardini F, O'Loughlin SM, Papathanos PA, Nolan T, Windbichler N, Crisanti A. A CRISPR-Cas9 sex-ratio distortion system for genetic control. Sci Rep. 2016 Aug 3;6:31139.

5. Hammond A, Galizi R, Kyrou K, Simoni A, Siniscalchi C, Katsanos D, Gribble M, Baker D, Marois E, Russell S, Burt A, Windbichler N, Crisanti A, Nolan T. A CRISPR-Cas9 gene drive system targeting female reproduction in the malaria mosquito vector Anopheles gambiae. Nat Biotechnol. 2016 Jan;34(1):78-83.

6. Hall AB, Papathanos PA, Sharma A, Cheng C, Akbari OS, Assour L, Bergman NH, Cagnetti A, Crisanti A, Dottorini T, Fiorentini E, Galizi R, Hnath J, Jiang X, Koren S, Nolan T, Radune D, Sharakhova MV, Steele A, Timoshevskiy VA, Windbichler N, Zhang S, Hahn MW, Phillippy AM, Emrich SJ, Sharakhov IV, Tu ZJ, Besansky NJ. Radical remodeling of the Y chromosome in a recent radiation of malaria mosquitoes. Proc Natl Acad Sci U S A. 2016 Apr 12;113(15):E2114-23.

7. Simoni A, Siniscalchi C, Chan YS, Huen DS, Russell S, Windbichler N, Crisanti A. Development of synthetic selfish elements based on modular nucleases inDrosophila melanogaster. Nucleic Acids Res. 2015 Mar 11;43(5)

8. Neafsey DE, Waterhouse RM, Abai MR, Aganezov SS, Alekseyev MA, Allen JE, Amon J, Arcà B, Arensburger P, Artemov G, Assour LA, Basseri H, Berlin A, Birren BW, Blandin SA, Brockman AI, Burkot TR, Burt A, Chan CS, Chauve C, Chiu JC, (others) Crisanti A, Donnelly MJ, Emrich SJ, Fontaine MC, Gelbart W, Hahn MW, Hansen IA, Howell PI, Kafatos FC, Kellis M, Lawson D, Louis C, Luckhart S, Muskavitch MA, Ribeiro JM, Riehle MA, Sharakhov IV, Tu Z, Zwiebel LJ, Besansky NJ. Mosquito genomics. Highly evolvable malaria vectors: the genomes of 16 Anopheles mosquitoes. Science. 2015 Jan 2;347(6217):1258522. doi: 10.1126/science.1258522.

9. Galizi R, Doyle LA, Menichelli M, Bernardini F, Deredec A, Burt A, StoddardvBL, Windbichler N, Crisanti A. A synthetic sex ratio distortion system for the control of the human malaria mosquito. Nat Commun. 2014 Jun 10;5:3977.

10. Bernardini F, Galizi R, Menichelli M, Papathanos PA, Dritsou V, Marois E, Crisanti A, Windbichler N. Site-specific genetic engineering of the Anophelesgambiae Y chromosome. Proc Natl Acad Sci U S A. 2014 May 27;111(21):7600-5

11. Dottorini T, Persampieri T, Palladino P, Baker DA, Spaccapelo R, Senin N,Crisanti A. Regulation of Anopheles gambiae male accessory gland genes influences postmating response in female. FASEB J. 2013 Jan;27(1):86-97.

12. Spaccapelo R, Aime E, Caterbi S, Arcidiacono P, Capuccini B, Di Cristina M,Dottorini T, Rende M, Bistoni F, Crisanti A. Disruption of plasmepsin-4 and merozoites surface protein-7 genes in Plasmodium berghei induces combined virulence-attenuated phenotype. Sci Rep. 2011;1:39

13. Thailayil J, Magnusson K, Godfray HC, Crisanti A, Catteruccia F. Spermless males elicit large-scale female responses to mating in the malaria mosquito Anopheles gambiae. Proc Natl Acad Sci U S A. 2011 Aug 16;108(33):13677-81

14. Nolan T, Petris E, Müller HM, Cronin A, Catteruccia F, Crisanti A. Analysis of two novel midgut-specific promoters driving transgene expression in Anopheles stephensi mosquitoes. PLoS One. 2011 Feb 4;6(2):e16471. doi: 10.1371/journal.pone.0016471

15. Windbichler N, Menichelli M, Papathanos PA, Thyme SB, Li H, Ulge UY, Hovde BT, Baker D, Monnat RJ Jr, Burt A, Crisanti A. A synthetic homing endonuclease-based gene drive system in the human malaria mosquito. Nature. 2011 May 12;473(7346):212-5. doi: 10.1038/nature09937

16. Spaccapelo R, Janse CJ, Caterbi S, Franke-Fayard B, Bonilla JA, Syphard LM, DiCristina M, Dottorini T, Savarino A, Cassone A, Bistoni F, Waters AP, Dame JB,Crisanti A. Plasmepsin 4-deficient Plasmodium berghei are virulence attenuated and induce protective immunity against experimental malaria. Am J Pathol. 2010 Jan;176(1):205-17. doi: 10.2353/ajpath.2010.090504

17. Di Cristina M, Nunziangeli L, Giubilei MA, Capuccini B, d'Episcopo L, Mazzoleni G, Baldracchini F, Spaccapelo R, Crisanti A. An antigen microarray immunoassay for multiplex screening of mouse monoclonal antibodies. Nat Protoc. 2010 Dec;5(12):1932-44. doi: 10.1038/nprot.2010.161.

18. Papathanos PA, Windbichler N, Menichelli M, Burt A, Crisanti A. The vasa regulatory region mediates germline expression and maternal transmission of proteins in the malaria mosquito Anopheles gambiae: a versatile tool for genetic control strategies. BMC Mol Biol. 2009 Jul 2;10:65. doi: 10.1186/1471-2199-10-65.

19. Papathanos PA, Bossin HC, Benedict MQ, Catteruccia F, Malcolm CA, Alphey L, Crisanti A. Sex separation strategies: past experience and new approaches. Malar J. 2009 Nov 16;8 Suppl 2:S5. doi: 10.1186/1475-2875-8-S2-S5.

20. Windbichler N, Papathanos PA, Crisanti A. Targeting the X chromosome during spermatogenesis induces Y chromosome transmission ratio distortion and early dominant embryo lethality in Anopheles gambiae. PLoS Genet. 2008 Dec;4(12):e1000291. doi: 10.1371/journal.pgen.1000291