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GHTM | ACTIVITY PLAN 2022 MONITORING



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1 Introduction – The year 2022 @ GHTM IHMT NOVA

In 2022, GHTM IHMT NOVA (GHTM) recovered the normality of its production of knowledge on global health and tropical medicine, strengthening the health systems of Portugal and Portuguese-speaking countries. GHTM researchers maintained their usual resilience in view of a year of return to post-covid social and organizational routine, knowing how to reconcile excellent scientific research with increasing teaching commitments and advanced training that reinforced our international cooperation.

An important task was the finalization of several Fundação para a Ciência e Tecnologia Projects, initiated in 2017 and 2018, whose normal development was hampered by the COVID-19 pandemic, where GHTM researchers managed to achieve high levels of financial and scientific execution, despite of the delays and difficulties encountered in 2020 and 2021. Important new projects with funding from the European Union were also approved and started, which reinforced and diversified the sources of funding for research at GHTM, consolidating its structural funding. Noteworthy is project “CLIMOS: Climate Monitoring and Decision Support Framework for Sand Fly-borne Diseases Detection and Mitigation with COST-benefit and Climate-policy Measures”, the first Horizon Europe project led by GHTM and one of the first coordinated by Portugal in this new EU program, with 29 partners from 16 countries. Also, participation at the EUCARE project: “European cohorts of patients and schools to advance the response to epidemics”, which will study the dissemination and impact on public health of SARS-CoV-2 variants in the transition of COVID-19 to endemicity, involving 28 partners from 13 countries.

Highlighted in 2022 is the 1st survey of data regarding the study of a cohort of immigrant and native children and their families, residing in the Municipalities of Barreiro, Moita, Alcochete and Montijo, consolidating one of the basic infrastructures of the GHTM – the Epidemiological Cohort – expanding it in addition to the Municipality of Amadora; the start of the Master's course in Field Epidemiology, a partnership with Mozambique, Cape Verde, Angola, Guinea-Bissau and Denmark, funded by EDCTP-UE; the conclusion of the multicenter randomized controlled trial on the effect of the BCG vaccine on the non-specific protection of health professionals during the COVID-19 pandemic and the start of the study on the non-specific effects of BCG in children under five years of age, also funded by European Union. In all of them, research was reinforced in the GHTM's transversal lines of Equitable Partnerships and Public Health Information, with a strong impact on GHTM's contribution to the Sustainable Development Goals (SDGs).



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The GHTM also carried out several studies on the molecular biology of mechanisms and patterns of resistance to antibacterial and antiretroviral drugs, as well as carried out the molecular epidemiological characterization of the main lineages of various opportunistic, emerging, and reemerging pathogenic organisms. Investment was also made in the study of the repositioning of drugs for multidrug-resistant infections (eg. *Neisseria gonorrhoea*, SARS-CoV, *Staphylococcus aureus*, tuberculosis, and malaria) and in the analysis of metaviromes in wastewater and in the study of SARS-CoV-2 variants, alongside with new potential anti-*Leishmania* and anti-malaria agents characterized in 2022, reinforcing the GHTM transversal lines Dispersion of Microorganisms and Populations and Drug Discovery & Resistance. Also noteworthy is the identification and characterization of the molecular profile of *Mycoplasma genitalium* resistance to antibiotics, repositioning of drugs for the treatment of *Neisseria gonorrhoeae*, as well as the determination of several epidemiological cut-offs and new mutations for resistance for old and new drugs used in the treatment of multi-drug resistant *Mycobacterium tuberculosis* and *Staphylococcus* spp. that cause infection in humans and animals.

Leveraging on a new dynamic, GHTM invested in clinical and epidemiological research in the tropics with several field missions carried out in 2022, namely with missions to remote populations in the Brazilian Amazon, São Tomé, Mozambique, Guinea-Bissau, Cape Verde, and Angola. Of note are population-based studies on childhood infection by SARS-CoV-2 in the Amazon; a population-based cohort study of urban malaria in the Amazon, funded by the US National Institutes of Health; and the enrollment of patients for the clinical trial of fexinidazole used against human African trypanosomiasis. The GHTM also collaborated in the clinical trial for the development of acoziborole in the treatment of all age groups. A cross-sectional study was also carried out on the prevalence of anti-*Leishmania* antibodies in blood donors in mainland Portugal and the causes and risk factors that contribute to perinatal and neonatal morbidity and mortality in São Tomé and Príncipe, as well as in syphilis, HIV and HBV infections in Benguela, Angola. The molecular epidemiology data of malaria in Guinea-Bissau were also updated, confirming the frequent presence of low-density asymptomatic infection by *Plasmodium falciparum* and an investment was made in the development of new molecular diagnostic tests for the early detection of resistant malaria by isothermal amplification and nanotechnology, within the scope of the transversal line Diagnostics, associated with studies on the demography of *Plasmodium falciparum* in southwest Africa with particular incidence in Angola. Research highlights within the One Health perspective include the study of infections by Bartonella spp circulating in stray cats in Lisbon, determination of the general seroprevalence for *Leishmania infantum* in dogs in Portugal and its zoonotic potential and the molecular characterization of the main genetic lineages of multidrug resistant *S. aureus* causing infection in humans and companion animals.



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A new infrastructure was implemented - BIOMOL MINION of the GHTM - a platform for common use of sequencing using Oxford Nanopore technology, in addition to the reinforcement of human resources and the start of the operation of VIASEF, the Level 3 Security Insectary of GHTM, with several projects approved for 2023. Likewise, the BIOTROPICAL Biobank reinforced its position, positioning itself in 2022 in the national and international network of biological collections, integrating and streamlining the Microbial Resource Research Infrastructure (MIRRI) network, the pan-wide research infrastructure for the management, preservation and enhancement of microbial resources and biodiversity, financed by the European Union and installed in Portugal in 2022. The “First Summer School on Antimicrobial Resistance” was carried out, contributing to the training of 36 participants from 8 countries on resistance to antimicrobial in an One Health perspective. The international symposium “New antimalarials: from drug discovery to clinical trials” was also organized, co-organized by GHTM, Institute of Biomedical Sciences of the University of São Paulo, Brazil, and Karolinska Institute, Sweden.

Once again, it was the commitment, dedication, and resilience of everyone in 2022, from students to professors and researchers, as well as technical and administrative support teams, that allowed us to maintain our GHTM as a center of scientific research in global health and tropical medicine of excellence – a recognized effort by @Il.



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General strategic objectives for 2022/2023 –

● - Not done/ Canceled/ No Outcome ; ● - Done/ Concluded/ Outcome ; ● - Delayed/ Postponed/ Delayed Outcome]

- **Promote and develop RESEARCH** in the areas of excellence at the center, in the context of the objectives of the research groups (Research Groups -RG) and the priority research lines (Cross-cutting Issues - CCI) of the GHTM / IHMT / NOVA, in line with NOVA's global scientific strategy (emphasizing NOVA Health platform) and IHMT/NOVA;
- **Implement 2022/23 strategy** defined and approved for the GHTM / IHMT / NOVA for 2019-2023 incorporating the improvement proposals of the FCT Evaluation Panel (2019) and the GHTM Scientific Advisory Board (see Annex I), ensuring success of the execution and financing plan approved by FCT for 2019-2023;
 - Promote the **Open Science policy** [<https://novaresearch.unl.pt/en/organisations/global-health-and-tropical-medicine-ghtm>], ●
 - **Integrated management GHTM / IHMT / NOVA** with the new strategic infrastructures - **security insectary ACL-3 VIASEF** - and the **Biological Resources Center / biobank - Biotropical Resources (BIOTROP)** [<https://www.ihmt.unl.pt/investigacao/biobanco/>]; ●
 - Framing the research actions of the GHTM / IHMT / NOVA in the **Sustainable Development Goals (SDGs)**; ●
 - **Focus on the European Union and National Horizon Europe Strategies and Portugal 2030 Strategy**; ●
 - **Align the objectives for Research at the GHTM / IHMT / NOVA with the objectives for the teaching and training at IHMT / NOVA.** ●
- Promote the implementation of a **new Associated Laboratory of the Science and Technology Foundation** [[Associated Laboratory in Translation and Innovation Towards Global Health](#)], in consortium with NOVA Medical School's [Comprehensive Health Research Center \(CHRC\)](#), the National School of Public Health [<https://www.ensp.unl.pt/>], FCT / NOVA's LIBPhys [<https://www.libphys.fct.unl.pt/>] and the University of Évora [<https://www.uevora.pt/>];
● / ●



3 – 2022 Executive Summary and Outputs

As in previous years and maintaining the growing trend, 2022 was an excellent year in terms of scientific production and approved projects, with **59** ongoing projects and **12** new projects approved. Our **62** researchers (**57.70** FTEs) published **202** internationally referenced articles, with a field weighted citation impact for the scientific area (FWCI) of **1.72%** **above the world average**, reinforcing the significant increase in the worldwide impact of GHTM's scientific publications, as well as our contribution for all SDGs, with special emphasis on SDG3 - Good Health and Wellbeing. Part of this research was based on strengthening postgraduate training with **11 new doctors in 2022**, contributing to strengthening our global network of teaching and research in global health and tropical medicine. For 2023 on, the GHTM will have its activity integrated in the dynamics of collaborative actions within the scope of the new Associated Laboratory of Translation and Innovation for Global Health (REAL), one of the fundamental pillars of the National System of Science and Technology.

Global output	2019	2020	2021	2022	Variation (2019 – 2022)
Total of publications	Nº	Nº	Nº	Nº	
GHTM IHMT NOVA	175	179	192	202	↗

	2019	2020	2021	2022	Variation (2019 – 2022)
Field Weighted Citation Impact	FWCI	FWCI	FWCI	FWCI	
GHTM IHMT NOVA	1,11	1.31	1.22	1.72¹	↗

¹ data collection for 2022 not consolidated.



Figure 1: Publications by journal quartile (2018-2022) - Q1 Top 25% (↗).

Percentage of publications with international collaboration (2022) - 80% (↗)

GHTM 2022 publications in SCOPUS TOP 10% - 14% (↓)

Part of this research was based on the reinforcement of postgraduate training with **11 new doctors in 2022 (11 in 2021 =)**, contributing to the strengthening of our global network of teaching and research in global health and tropical medicine.

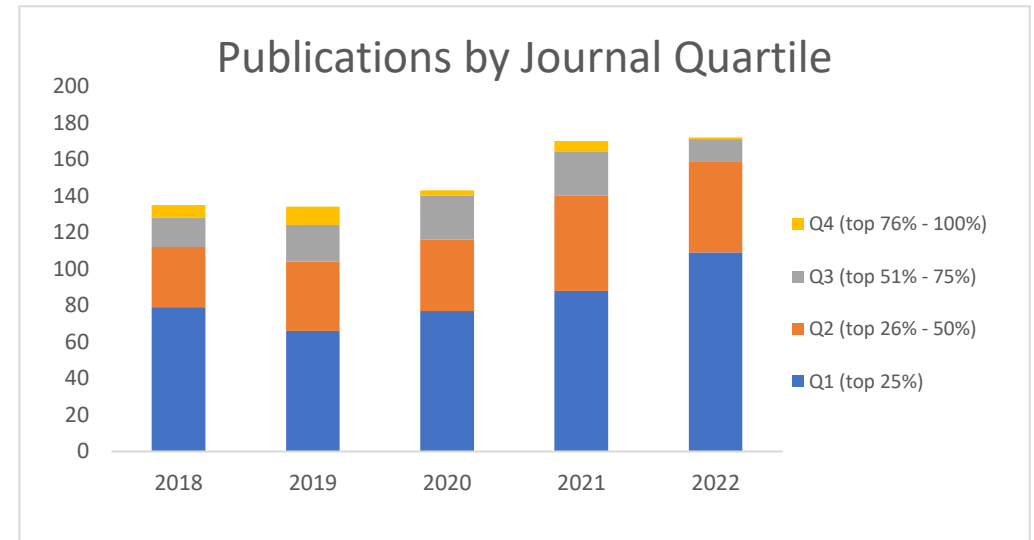


Figure 2: Publications distribution by GHTM Research Group in 2022

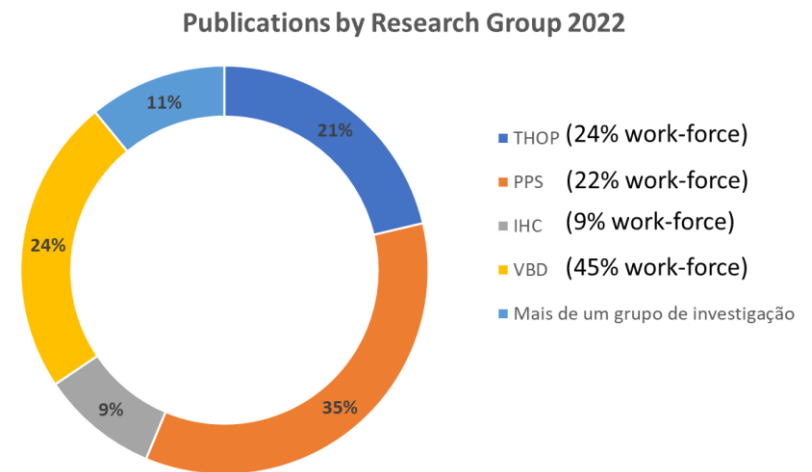


Figure 3: Publications distribution by Sustainable Development Goals in 2022 (n=202) and EU projects granted in 2022





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MONITORING OF RESEARCH GROUPS ACTIVITIES IN 2022

FRAMEWORK AND MISSION: Promote and develop RESEARCH in GLOBAL HEALTH AND TROPICAL MEDICINE, fostering research themes (RT) through the four Research Groups (RG) with the driving-force of the priority research topics of the five Cross-Cutting Issues – CCIs - Diagnostics (DG); Drug Discovery & Resistance (DDR); Public Health Information (PHI); Global Pathogen dispersion and Population Mobility (GPPM).CCI - Fair Research Partnerships (FRP):

- - Not done/ Canceled/ No Outcome
- - Done/ Concluded/ Outcome
- - Delayed/ Postponed/ Delayed Outcome



RESEARCH GROUP – INDIVIDUAL HEALTH CARE (RG – IHC)

The main lines of action of the IHC group are related to the transversal areas of the GHTM, Global Dispersion of Pathogenic Organisms and Population Mobility, Discovery and resistance to drugs and Diagnosis and Clinical Trials. The main research themes are: (a) Traveler's Health, (b) Neglected Tropical Infections, and (c) Sexual and Reproductive Health. The activities planned for 2022/23 fall within the transversal themes described above:

IHC activities were aligned with Sustainable Development Goals (SDGs) especially #3- Good Health and Well-being; and #10 - Reduce inequality within and among countries.

ACTIVITIES [● - Not done/ Canceled/ No Outcome; ● - Done/ Concluded/ Outcome ; ● - Delayed/ Postponed/ Delayed Outcome]	OUTCOMES	EVIDENCES
<p>Research activities ongoing in 2022/2023 with CCIs:</p> <p>CCI - Diagnostics (DG)</p> <p>CCI - Drug Discovery & Resistance (DDR):</p> <ul style="list-style-type: none"> ● Research Project: Towards an arsenic-free oral treatment for human African trypanosomiasis due to <i>Tb rhodesiense</i> as a tool for disease elimination. UE/ EDCTP GA n° RIA2017NCT-1846 (2018-2021). IHC researcher: Jorge Seixas. ● Research Project: Towards a pediatric indication for children between 1 and 14 years of age for a safe, effective, all-oral single-dose treatment formulation of acoziborole for first and second stage gambiense human African trypanosomiasis (g-HAT). UE/EDCTP RIA2019PD-2890 (2020-2024). IHC researcher: Jorge Seixas. ● Research Project: Monitoring antimalarial drug response in imported malaria cases in Portugal. PI: Fátima Nogueira (VBD). IHC collaborator: Cláudia Conceição. Partially funded by GHTM. ● Research project: Morbidity associated with infection with <i>Schistosoma</i> and intestinal parasites in adults from Mozambique. PhD Thesis, João Tiago Serra. Supervisor: Cláudia Conceição. Co-supervisors: Silvana Belo e Mohsin Sidat. ● Research project: Prevalence of asymptomatic leishmaniasis in Portugal. PhD thesis, Rafael Amorim Rocha. Supervisor: Carla Maia (VBD). Co-supervisors: Cláudia Conceição (IHC) and Luzia Gonçalves (PPS). 	<p>Last follow-up visit completed in October 2022.</p> <p>Trial started in the Democratic Republic of Congo (DRC) in June 2022. Ongoing</p> <p>Concluded</p> <p>Field work and data analysis completed. Thesis to be defended with delay.</p> <p>This study provides the first estimate of the country-wide prevalence of past or current exposure to <i>Leishmania</i> parasites in human populations of Continental Portugal. PhD thesis to be defended.</p>	<p>Final Study Report planned for April-May 2023.</p> <p>Nine patients aged from 11 to 14 years were recruited and treated (Phase 1 of the trial). Phase 2 to be implemented in the DRC and Guinea in 2023.</p> <p>Two papers published in 2021</p> <p>Abstract presented in the “XIII Jornadas Científicas do IHMT” in December 2022.</p>



<p>● <u>Research project</u>: Studying the activity of repurposed drugs against <i>Neisseria gonorrhoeae</i>: targeting membrane transport and energy metabolism – MSc MCB - Inês Lima Vitor – 02/2023 - In collaboration with THOP</p> <p>CCI - Public Health Information (PHI):</p> <p>● <u>Research project</u> COVID-19 vaccination in migrants from Lisbon area. IHC researcher: Philip J. Havik. Funding: Centro Padre Álvares Correia, Lisboa. MSc Thesis of Licinia Marla Aragão, co-supervised by Rosa Teodósio and Philip J. Havik.</p> <p>● <u>Research project</u>: “Estudo de conhecimentos, atitudes e literacia em vacinação contra a febre amarela e contra a hepatite A de viajantes e migrantes portugueses” Team: Ilda Cesa (MSc student), Maria Raquel Pacheco, Ricardo Pereira Igreja (UFRJ), Rosa Teodósio (IHC) -- In collaboration with THOP</p> <p>● <u>Research project</u>: Vertical transmission of Hepatitis B in Angola: Evidence for political decision making - - In collaboration with THOP</p> <p>CCI - Global Pathogen dispersion and Population Mobility (GPPM):</p> <p>● <u>Research Project</u>: Malaria control and elimination: addressing the occult parasite reservoir. PI: Marcelo U. Ferreira (IHC). Funding: FCT (UID/04413/2020).</p> <p>● <u>Research project</u>: "Imigrantes Guineenses em Portugal: noção de riscos e de cuidados necessários em viagens ao país de origem". Team: Jaime Tchuda (PhD student), Rosa Teodósio (IHC).</p> <p>● <u>Research project</u>: "Parasitas intestinais em comunidades migrantes do município do Seixal". Team: Tanya Jasse (MSc student), Rosa Teodósio (IHC), Manuela Calado (VBD).</p> <p>● <u>Research project</u>: "<i>Strongyloides stercoralis</i>: prevalência e transmissão em comunidades vulneráveis" Team: Damarize Carinton (MSc student), Rosa Teodósio (IHC), Isabel Maurício (VBD).</p>	<p>Ongoing as planned. Acetazolamide, atovaquone, dequalinium, doxorubicin, amlodipine and clomipramine presented promising results against <i>N. gonorrhoeae</i>.</p> <p>Concluded</p> <p>Concluded</p> <p>Started in March 2022. Ongoing as planned.</p> <p>Started in January 2022. Ongoing as planned.</p> <p>Field work concluded.</p> <p>Field work concluded.</p> <p>Field work concluded.</p>	<p>MSc thesis defended in February 2023</p> <p>MSc thesis defended in July 2022</p> <p>MSc thesis defended in July 2022</p> <p>Two articles published in 2022.</p>
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<ul style="list-style-type: none"> ● <u>Research project</u>: Analysis of causes and risk factors contributing to Perinatal and Neonatal Morbidity and Mortality in S. Tomé e Príncipe – a case-control study. Filomena Pereira (IHC); ● <u>Research project</u>: Syphilis, infection by HIV and by HBV in Benguela, Angola: characterization and infection. Filomena Pereira (IHC); Lesya Yefimenko (IHC) -- In collaboration with THOP 	<p>Ongoing. Several papers published. Two papers in preparation.</p> <p>Filed work concluded. Results under analysis.</p>	<p>Abstract presented in the “XIII Jornadas Científicas do IHMT” in December 2022. Two papers published in 2022.</p> <p>Abstract presented in the “XIII Jornadas Científicas do IHMT” in December 2022.</p>
<p>New Research Projects planned for 2022/2023 with CCIs:</p> <p>CCI: Diagnostics (DG):</p> <ul style="list-style-type: none"> ● <u>Research Project</u>: Electrochemical biosensor for the rapid detection of SNPs associated with drug-resistant malaria. PI: Ana Tavares (VBD). IHC collaborator: Marcelo U. Ferreira. ● <u>Research Project</u>: Differential diagnosis of acute febrile illnesses in the Tropics: a multicenter study. co-PIs: Jorge Seixas and Marcelo U. Ferreira (IHC). ● <u>Research Project</u>: Pyruvate kinase deficiency and protection against malaria: exploring the underlying mechanisms and the impact on populations. PI: Ana Paula Arez (VBD). IHC collaborator: Marcelo U. Ferreira. ● <u>Research Project</u>: Group B streptococci in pregnant women and their neonates in Maputo: is it a problem and at what extent? ● <u>Research Project</u>: Detection of azithromycin resistance in <i>Mycoplasma genitalium</i> (with THOP). <p>CCI: Drug Discovery & Resistance (DDR):</p> <ul style="list-style-type: none"> ● <u>Research Project</u>: Identification and prioritisation of <i>Plasmodium vivax</i> vaccine antigens. PI: Julian Rayner (University of Cambridge, UK). IHC collaborator: Marcelo U. Ferreira. 	<p>Partially funded by GHTM. Started in October 2022 as planned.</p> <p>Starting date in Lubango, Angola, 06/2023. PhD thesis project of Helga Vicente. Currently funded by GHTM and Ciência LP.</p> <p>Fieldwork started in October 2022 as planned. Laboratory component delayed, due to lack of funding.</p> <p>Ongoing with delay.</p> <p>Ongoing as planned.</p> <p>Ongoing as planned.</p>	<p>Abstract submitted to the 6th Congress of Tropical Medicine, April 2023.</p> <p>Manuscript submitted for publication (currently under analysis).</p>



<p>CCI: Global Pathogen dispersion and Population Mobility (GPPM).</p> <ul style="list-style-type: none"> ● Research Project: Population genomics of malaria introduction in the Americas. PI: Marcelo U. Ferreira. ● <u>Research Project:</u> Mapping <i>Plasmodium falciparum</i> transmission networks in Guinea-Bissau: a molecular epidemiology approach. PI: Márcia M. Medeiros (VBD). Collaborators: Marcelo U. Ferreira (IHC), Ana Paula Arez (VBD). <p>CCI - Fair Research Partnerships (FRP):</p> <ul style="list-style-type: none"> ● Iniciativa para o reforço dos serviços sanitários de primeiro e segundo nível em Angola. Promoter: Centro per le Malattie Tropicali Ospedale Sacro-Cuore Don Calabria, Verona, Italy, IHMT partner. 	<p>Started in January 2023. Ongoing.</p> <p>Not implemented. Specific funding not available.</p> <p>Ongoing.</p>	
<p>Congresses//Events:</p> <ul style="list-style-type: none"> ● India EMBO Lecture Course: Malaria molecular epidemiology, population genetics, and evolution: Principles to practices. New Delhi, India, November 2022. IHC member involved: Marcelo U. Ferreira (invited speaker). ● Workshop-Webinar addressing 'the sociocultural dimensions and community perspectives on HAT Elimination' ● A meeting on Health communication will take place by the end of 2022 ● International symposium "New antimalarials: from drug discovery to clinical trials", co-organized by IHMT, the Institute of Biomedical Sciences of University of São Paulo, Brazil, and the Karolinska Institute, Sweden (19 and 20 December, 2022). Funded by the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) and the Swedish Research Council and supported by GHTM. IHC members: Marcelo Ferreira and José Pedro Gil. 	<p>Held in November 2022.</p> <p>Not accomplished</p> <p>Not accomplished</p> <p>Held in December 2022. A total of 30 participants attended in-person and 35 remotely.</p>	
<p>Publications/Training:</p> <ul style="list-style-type: none"> ● At least 8 papers in international journals related with the results and outcomes of the ongoing clinical trials and projects indexed in Scopus. ● At least six MSc theses and three PhD dissertations to be concluded in 2022. 	<p>Accomplished.</p> <p>Partially accomplished</p>	<p>15 papers published by IHC investigators in 2022.</p> <p>9 MSc theses concluded in 2022 No PhD dissertation defended that had been supervised by IHC members.</p>



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<p>Capacity building: ● Criação de uma Rede de Medicina Tropical e Medicina do Viajante em Português. Promoter IHMT.</p>	<p>Partially accomplished.</p>	
<p>Other activities: Editorial Boards</p> <p>Field Missions <u>Field mission to Acre State, Brazilian Amazon</u> to strengthen collaborative research between IHMT and the Federal University of Acre, in Cruzeiro do Sul. IHC researchers: Jorge Seixas and Marcelo Ferreira</p> <p><u>Field mission to the Yanomami Amerindian Reservation, Brazilian Amazon</u> to assess the health status of Yanomami Amerindians exposed to environmental mercury. PI, Paulo César Basta (Fiocruz, Brazil). IHC researcher: Marcelo Ferreira</p>	<p>Editorial board membership: <i>Pathogens and Global Health</i>, <i>Memórias do Instituto Oswaldo Cruz</i>, and <i>Parasite Epidemiology and Control</i>. Reviewing Editor (BRE) of <i>eLife</i></p> <p>A cross-sectional evaluation of approximately 300 malaria-exposed residents was carried out in seven remote riverine villages along the Azul River (1-12 July, 2022).</p> <p>Clinical and laboratory evaluation of 273 people living in the upper Mucajaí river (3-19 October, 2022).</p>	



RESEARCH GROUP – POPULATION HEALTH, POLICIES AND SERVICES (RG – PPS)

The main research topics of the PPS group are: Health Policy and Planning; Human Resources for Health; Health determinants of vulnerable populations. The activities planned for 2022/23 fall into the various cross-cutting areas described above:

PPS activities were aligned with Sustainable Development Goals (SDGs) especially #1 – No poverty; #3- Good Health and Well-being; #4-Quality Education and #10 - Reduce inequality within and among countries.

ACTIVITIES [● - Not done/ Canceled/ No Outcome; ● - Done/ Concluded/ Outcome ; ● - Delayed/ Postponed/ Delayed Outcome]	OUTCOMES	EVIDENCES
<p>Research activities ongoing in 2022/2023 with CCIs:</p> <p>CCI - Diagnostics (DG) CCI - Drug Discovery & Resistance (DDR)</p> <p>CCI – Public Health Information (PHI):</p> <p>● - 2 ongoing projects funded by Bloomberg Philanthropies Data for Health Initiative: Putting into practice activities related to a Population based Cancer Register for Cape-Verde; and a Population-based Cancer Register for Lubango, Angola</p> <p>● - 2 ongoing projects funded by European Funds: VAX-TRUST - Addressing vaccine hesitancy in Europe and BCG vaccine to reduce unplanned absenteeism due to illness of health care workers during the COVID-19 pandemic. A multi-center randomized controlled trial.</p> <p>● - EuCARE - European Cohorts of Patients and Schools to Advance Response to Epidemics - In collaboration with THOP</p> <p>CCI - Global Pathogen dispersion and Population Mobility (GPPM) :</p> <p>● - Implementation of 2 cohort studies for native and migrant children in 5 Municipalities of Lisbon Region: 2nd wave of data for Amadora Municipality 1st wave of data for Barreiro, Moita, Montijo and Alcochete Municipalities</p>	<p>Implementation of the 1st Population based Cancer Register for Cape-Verde and for Lubango, Angola.</p> <p>Databases on children’s health profile; databases on health care access by natives and migrant children;</p> <p>evidence on refugee’s access to healthcare during covid-19 in Lisbon region;</p>	<p>Mission in February 2023 with data analysis of the first database</p> <p>Several data bases on migrants children health and elaboration of a book on Migrants Children’s health in Lisbon Region (to be published by Portuguese Observatory on Migration)</p> <p>Master Dissertation on refugee’s access to healthcare during covid-19 in Lisbon region-waiting to be defended.</p>



<p>Implementing a study on the impact of covid19 on migrant's health in Amadora Municipality, funded by FAMI</p> <p>CCI - Fair Research Partnerships (FRP):</p>	<p>Databases on covid19 mortality and mobility by immigrants status; database on covid19 incidence by immigrant status;</p>	<p>Oral presentation of a poster at the 17th World Congress in Public Health (May 2023, Rome)</p>
<p>New Research Projects planned for 2022/2023 with CCIs:</p> <p>CCI - Public Health Information (PHI):</p> <ul style="list-style-type: none"> ● Risk of mortality and morbidity after vaccination against SARS-CoV-2 in Continental Portugal: total population, special exposure retrospective cohort study ● Collaboration in the conception of a Health Research Centre in Maputo, Mozambique (ISCTEM University, Matola Regional Hospital and Matola health units) <p>CCI - Global Pathogen dispersion and Population Mobility (GPPM):</p> <ul style="list-style-type: none"> ● Implementation of a children cohort study in Santiago Island, Cape Verde <p>CCI - Fair Research Partnerships (FRP):</p> <ul style="list-style-type: none"> ● Gender equality in immigration integration policies: pathways for immigrant women empowerment (planned to be submitted Horizon) ● HEROES - HEalth woRkfOrce to meet healt challEngeS (submitted Call: EU4H-2021-JA2-IBA - Joint actions wave 2) 		
<p>Congresses//Events:</p> <ul style="list-style-type: none"> ● Scientific Writing Workshop 	<p>Hybrid Scientific Writing Workshop by Joana Pais Zózimo, PhD Lancaster University, 21 march 2022.</p>	<p>20 participants</p>



<ul style="list-style-type: none"> ● Luso-Brazilian Meeting in Health Assessment and Knowledge Management ● European Congress in Public Health 2022 ● Other seminars 	<p>Talk show: Mesa redonda virtual em química medicinal: Farmanguinhos, IHMT e UA. Online: Dia/Hora: 11 de março de 2022, às 11 horas Brasil e 14 horas Portugal.</p>	
<p>Publications/Training:</p> <ul style="list-style-type: none"> ● Publication of 40 Scientific Papers <p>Publication of 2 books</p> <p>Training:</p> <ul style="list-style-type: none"> ● Master in Field Epidemiology Training for Portuguese-speaking West African Countries EDCTP, CSA Capacity development for disease outbreak and epidemic response in sub-Saharan Africa, in collaboration with Africa CDC (CSA 2020 E 3113) 	<p>Minimum of 40 Papers published in scopus; increasing the number of Q1 publications</p> <p>2 books published</p> <p>More than 20 MSc Students completing the master degree at different MSc courses where PPS is involved.</p> <p>At least 3 PhD degrees completed.</p>	<p>More than 40 papers published</p>
<p>Capacity building:</p> <ul style="list-style-type: none"> ● eLearning Course on Ethics for Health research for Lusophone African scientists ● Advanced Course on Health Statistics for Mozambican National Institute of Health Researchers ● Short training sessions on Fair Research Partnership 	<p>Seminars given in the e-learning Course on Ethics for Health Research (14-18 march 2022) Number of National Ethics Presidents as speakers: all from the 5 Portuguese African Speaking Countries N° of students attending all the course (51/56)</p> <p>Advanced Course on Health Statistics (8-14 May 2022), INS-MISAU Maputo, Mozambique</p>	<p>420 candidates 56 selected participants from Angola, Cape-Verde, Guine-Bissau, Mozambique and S. Tomé e Príncipe</p> <p>51 Certificates</p> <p>12 invited speakers</p>



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<p>● Master in Field Epidemiology Training for Portuguese-speaking West African Countries EDCTP, CSA Capacity development for disease outbreak and epidemic response in sub-Saharan Africa, in collaboration with Africa CDC (CSA 2020 E 3113) Others:</p>	<p>Curso: Novas Abordagens para Gestão de Projetos e Propriedade Industrial em Saúde. Local: IHMT presencial e on-line. Dias 17 e 18 de maio de 2022</p>	
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RESEARCH GROUP – TUBERCULOSIS, HIV AND OPORTUNISTIC DISEASES (THOP)

The overarching aim of the THOP group is the molecular epidemiology, diagnosis, study of drug-resistance mechanisms, drug discovery and control of tuberculosis (TB), HIV and opportunistic diseases on a Global Health perspective in an era of antimicrobial resistance, chronic immunosuppressive diseases and now the COVID pandemic. Still recovering from the many challenges brought by the pandemic, the following aims were envisaged for the THOP Group for 2022-2023, within the various cross-cutting areas.

THOP activities were aligned with Sustainable Development Goals (SDGs) especially #1 – No poverty, #3- Good Health and Well-being, #4-Quality Education, #6-Clean Water and Sanitation, #10 - Reduce inequality within and among countries and #15 - Life on Land.

ACTIVITIES [● - Not done/ Canceled/ No Outcome; ● - Done/ Concluded/ Outcome; ● - Delayed/ Postponed/ Delayed Outcome]	OUTCOMES	EVIDENCES
Research activities ongoing in 2022/2023 with CCIs:		
CCI - Drug Discovery & Resistance (DDR)		
<ul style="list-style-type: none"> ● Project TMC207 Calib financed by Becton&Dickinson (2021/23) ● Project Breakpoint Calibration for DLM, BDQ, LZD, MOX against <i>M. tuberculosis</i> financed by EUCAST, Becton&Dickinson and ThermoFisher (2021/23) ● Projects FCT-MTB-EPIs and FCT-TARGETUB (ongoing 2022/23) - New INH derivatives and new EPIs against <i>M. tuberculosis</i> - financed by FCT/MCTES – Projects completed October 2022. ● Aetiology and epidemiology of <i>Acinetobacter baumannii</i> through genomics to track global antimicrobial resistance – UI/BD/151063/2021 (ongoing until 2024) ● Gilead TB&HIV nanodiagnostics (ongoing 22/23) ● Inhibition of efflux in <i>M. tuberculosis</i> persister cells during dormancy – CEECIND/02562/2017 (ongoing until 2024); ● Drug repurposing for COVID-19 – Project Fundação para a Ciência e a Tecnologia (FCT) “Apoio Especial RESEARCH4COVID-19 project no 434” (Completed in 2022). 	<p>2 articles Q1 within CCI DDR – 22/23</p> <p>1 MSc Thesis completed in 2022</p> <p>1 national/international project submitted</p>	<p>5 articles Q1</p> <ol style="list-style-type: none"> 1. Annelies Van Rie, et al. 2022. Balancing access to BPaLM regimens and risk of resistance. <i>Lancet Infect. Dis.</i> 22:1411-1412. doi: 10.1016/S1473-3099(22)00543-6. 2. Antimycobacterial Susceptibility Testing Group. 2022. Updating the approaches to define susceptibility and resistance to anti-tuberculosis agents: implications for diagnosis and treatment. <i>Eur. Respir. J.</i> 59:2200166. doi: 10.1183/13993003.00166-2022. 3. Joaquim Marquês, et al. 2022. In vitro evaluation of isoniazid derivatives as potential agents against drug-resistant tuberculosis. <i>Frontiers in Pharmacol.</i> 1483. 10.3389/fphar.2022.868545. 4. Anna Bateson, et al. 2022. Ancient and recent differences in the intrinsic susceptibility of <i>Mycobacterium tuberculosis</i> complex to pretomanid. <i>J. Antimicrob. Chemother.</i> 77: 1685–1693. doi: 10.1093/jac/dkac070. 5. Rodrigues L, et al. 2022. Drug Repurposing for COVID-19: A Review and a Novel Strategy to Identify New Targets and Potential Drug Candidates. <i>Molecules.</i> Apr 23;27(9):2723. doi: 10.3390/molecules27092723. PMID: 35566073; PMCID: PMC9099573.



		<p>3 MSc Thesis completed in 2022</p> <p>2022 – Marta Lourenço – MSc Thesis in Microbiology (IHMT/UNL/UA) – “Epidemiologia molecular de isolados clínicos multirresistentes de <i>Acinetobacter baumannii</i> circulantes em Lisboa”</p> <p>2022 – Inês Maia - MSc Thesis in Biomedical Sciences (IHMT/UNL) – “Estudo de competição entre substratos de bombas de efluxo em isolados clínicos de <i>Escherichia coli</i> por fluorimetria em tempo real usando Vermelho do Nilo.”</p> <p>2022 – Jessica Soares – MSc Public Health and Development – “GeneXpert MTB/RIF no diagnóstico da tuberculose em São Tomé e Príncipe: avaliação da implementação.”</p> <p>Projects</p> <ul style="list-style-type: none"> • Project TMC207 Calib financed by Becton&Dickinson (2021/23) - ongoing. • Project Breakpoint Calibration for DLM, BDQ, LZD, MOX against <i>M. tuberculosis</i> financed by EUCAST, Becton&Dickinson and ThermoFisher (2021/23) - Ongoing • Projects FCT-MTB-EPIs – Terminated. • FCT-TARGETUB (ongoing 2022/23) – Terminated. • Aetiology and epidemiology of <i>Acinetobacter baumannii</i> through genomics to track global antimicrobial resistance – UI/BD/151063/2021 (ongoing- 21/24) • Gilead TB&HIV nanodiagnosics (ongoing 22/23) • Inhibition of efflux in <i>M. tuberculosis</i> persister cells during dormancy – CEECIND/02562/2017 (ongoing 22/24) <p>- 1 national project submitted FCT call March22 - PI: DM</p>
<ul style="list-style-type: none"> • Project BIOSAFE (The safe use of biocides) - financed by FEDER/FCT. Project concluded, several outcomes expected during 2023. 	<p>2 articles Q1 within CCI DDR – 22/23 2 MSc Thesis completed in 2022 2 MSc Thesis completed in 2023 1 national/international project submitted</p>	<p>Project completed. 1 article Q1; 2 articles Q2:</p> <ul style="list-style-type: none"> • Ferreira et al. 2022. IJMS (Q1, IF 6.208) Occurrence and variability of the efflux pump gene <i>norA</i> across the <i>Staphylococcus</i> genus. Int. J. Mol. Sci. 2022, 23(23), 15306; https://doi.org/10.3390/ijms232315306 • Costa et al. 2022. Antibiotics (Q2, IF 5.222); <i>S. aureus</i> causing skin and soft tissue infections in companion animals: antimicrobial resistance profiles and clonal lineages. Antibiotics 2022, 11, 599. doi.org/10.3390/antibiotics11050599



		<ul style="list-style-type: none"> • Andrade et al. 2022. Antibiotics (Q2, IF 5.222); Virulence potential of biofilm-producing <i>S. pseudintermedius</i>, <i>S. aureus</i> and <i>S. coagulans</i> causing skin infections in companion animals. Antibiotics. 2022; 11:1339. doi.org/10.3390/antibiotics11101339 <p>3 MSc Thesis completed in 2022:</p> <ul style="list-style-type: none"> • K Oliveira, Avaliação do potencial de virulência de Staphylococcus aureus associados a infeções de pele e tecidos moles. MSc Medical Microbiology (2022) • M Andrade, Caracterização do potencial de virulência de Staphylococcus pseudintermedius associados a infeções de pele e tecidos moles em animais de companhia, MSc Biomedical Sciences (2022) • M Leal, Caracterização de mecanismos de resistência a antimicrobianos tópicos e do potencial de virulência de estafilococos associados a infeções de pele. MSc Biomedical Sciences (2022) <p>4 MSc Thesis to be completed in 2023:</p> <ul style="list-style-type: none"> • C Antunes, MSc Biomedical Sciences (ongoing) • P Zacharias, MSc Medical Microbiology (ongoing) • J Neves, MSc Medical Microbiology (ongoing) • T Rodrigues, MSc Biomedical Sciences (ongoing) <p>Follow-up projects</p> <ul style="list-style-type: none"> • 1 national project submitted FCT call March22 (PI: SSCosta) • 1 PtGermany cooperation submitted (Sept22) (PI: ICouto)
<ul style="list-style-type: none"> • ● Drug repurposing for <i>N. gonorrhoeae</i> • ● Molecular detection of antibiotic resistance in <i>Mycoplasma genitalium</i> (w/ IHC), CCI DDR & Diagnostics 	<p>1 review; 2 original articles</p> <p>At least 2 new MSc students and 1 PhD student (to be recruited)</p>	<p>1 MSc Thesis completed in 2022:</p> <p>A. Pina. Identificação de novos fármacos para Neisseria gonorrhoeae através de uma estratégia de reposicionamento in silico. MSc Medical Microbiology (2022)</p> <p>3 MSc Thesis to be completed in 2023:</p> <p>A. Mendes, MSc Biomedical Sciences I. Vítor, MSc Biomedical Sciences A. Rusu, MSc Medical Microbiology</p> <p>Project:</p>



		Study of the activity of repurposed drugs against <i>Neisseria gonorrhoeae</i> : targeting membrane transport and energy metabolism. (PI: L.Rodrigues; on going). Exploratory project funded by GHM R&D Center
<ul style="list-style-type: none"> ● Antimicrobial resistance in <i>S. aureus</i> causing bloodstream infections in children in Mozambique 	<p>2 original articles in 2022 (delayed)</p> <p>1 PhD completed by 2023 (expected)</p>	<p>1 article submitted EJCM Oct22 (in revision); 1 article in preparation</p> <ul style="list-style-type: none"> ● Garrine et al. Epidemiology and clinical presentation of <i>Staphylococcus aureus</i> bacteraemia in children under 5 years of age admitted to the Manhiça District Hospital, Mozambique, 2001-2019. [<i>In revision in EJCM</i> (Q1, IF 5.103)] ● Garrine et al. Antimicrobial resistance and molecular typing of <i>Staphylococcus aureus</i> causing bacteraemia in children under 5 years of age admitted to the Manhiça District Hospital, Mozambique, 2001-2019. <i>To be submitted to Frontiers in Microbiology in 2023.</i> ● PhD thesis: MGarrine PhD Thesis ongoing; expected to be submitted 1st semester 2023
<ul style="list-style-type: none"> ● Characterization of resistance to antiretrovirals 	<p>1 PhD thesis completed in 2022</p> <p>4 articles (3 Q1 , 1 Q2)</p> <p>1 project submitted and won (EUTOPIA)</p> <p>2 Masters Thesis</p>	<ul style="list-style-type: none"> ● Rhee SY et al. The EuResist Network Study Group, Shafer RW. Spectrum of Atazanavir-Selected Protease Inhibitor-Resistance Mutations. <i>Pathogens</i>. 2022 May 5;11(5):546. doi: 10.3390/pathogens11050546 ● Pingarilho M et al. HIV-1-Transmitted Drug Resistance and Transmission Clusters in Newly Diagnosed Patients in Portugal Between 2014 and 2019. <i>Front Microbiol</i>. 2022 Apr 25;13:823208. doi: 10.3389/fmicb.2022.823208. ● Miranda MNS et al. Trends of Transmitted and Acquired Drug Resistance in Europe From 1981 to 2019: A Comparison Between the Populations of Late Presenters and Non-late Presenters. <i>Front Microbiol</i>. 2022 Apr 13;13:846943. doi: 10.3389/fmicb.2022.846943 ● Rossetti B et al.; EuResist Network, INTEGRATE study group. Effectiveness of integrase strand transfer inhibitors in HIV-infected treatment-experienced individuals across Europe. <i>HIV Med</i>. 2022 Aug;23(7):774-789. doi: 10.1111/hiv.13262.
<ul style="list-style-type: none"> ● Molecular epidemiology of HBV in Angola: drug resistance and immune escape mutants 	<p>1 MSc Thesis completed in 2022 (delayed)</p>	<p>1 MSc Thesis to be completed in 2023: MRMarques, MSc Tropical Health (ongoing)</p>



<ul style="list-style-type: none"> ● Endoperoxides against Leishmania parasites: in vitro activity and mode of action (with VBD – Sofia Cortes) 	<p>1 original article 2022 1 poster presentation 2022</p>	<ul style="list-style-type: none"> • Mendes, A., Armada, A., et al. (2022). 1,2,4-Trioxolane and 1,2,4,5-Tetraoxane Endoperoxides against Old-World Leishmania Parasites: In Vitro Activity and Mode of Action. <i>Pharmaceuticals</i>, 15 (4):446. [IF=5.2; 5-year IF=5.7; JCR category rank: Q1: Pharmacology & Pharmacy Q2: Chemistry, Medicinal] http://dx.doi.org/10.3390/ph15040446 • Mendes A., Armada, A., et al 2022. Activity of 1,2,4 - trioxolane and 1,2,4,5-tetraoxane endoperoxides against old-world Leishmania species. WorLeish - Cartagena, Colombia, August 2022
<ul style="list-style-type: none"> ● Survey and in vitro studies of medicinal plants with anti-parasitic activity. 	<p>3 MSc Thesis completed in 2022 (delayed) 1 new MSc student</p>	<p>1 article submitted <i>Complementary Therapies in Medicine</i> jant23</p> <p>4 MSc Thesis to be completed in 2023:</p> <ul style="list-style-type: none"> • DCosac, MSc Medical Parasitology (ongoing) • CMarques, MSc Medical Parasitology (ongoing) • NCá, MSc Medical Parasitology (ongoing) • SCunha, MSc Medical Parasitology (ongoing)
CCI - Diagnostics (DG)		
<ul style="list-style-type: none"> ● Project REDETb – Early diagnostics, phylogeography, dispersion and epidemiology of M/XDR-TB in Brasil as part of the CPLP-TB consortium and platform 	<p>1 article Q1 within CCI GPPM – 22/23 1 international project submitted</p>	<ul style="list-style-type: none"> • Kritski, A. L., Viveiros, M., & Carvalho, A. C. C. (2022). Rapid molecular diagnostics to detect resistance to second-line anti-TB drugs. <i>The international journal of tuberculosis and lung disease : the official journal of the International Union against Tuberculosis and Lung Disease</i>, 26(5), 385–387.
<ul style="list-style-type: none"> ● Development and application of electrochemical biosensors for the rapid detection of SNPs associated with drug-resistant tuberculosis and malaria (Collaboration with The Universitat Rovira i Virgili, Spain and LSHTM, UK) 	<p>1 article Q1 within CCI D – 22/23 1 Training period in Universitat Rovira i Virgili 1 international project submitted 1 exploratory project</p>	<p>Delayed, expected for 2023</p>
<ul style="list-style-type: none"> ● Diagnosis of sexually transmitted diseases (w/ IHC) 	<p>1 MSc Thesis in 2023</p>	<p>1 MSc Thesis to be completed in 2023: A. Rusu, MSc Medical Microbiology (also in CCI DDR)</p>
<ul style="list-style-type: none"> ● Optimization and application of an indirect immunofluorescence test as an alternative to the microscopic agglutination test (reference test) for the diagnosis of leptospirosis (ongoing); (with VBD) 	<p>2 MSc thesis + Oral /poster presentation Congress</p>	<ul style="list-style-type: none"> • Daniel Gomes, <i>Leptospire: Diagnóstico convencional vs novas abordagens moleculares. MSc Medical Microbiology (2022)</i> • Wilmer Fernandes <i>MMM 2023 Otimização e aplicação de um teste de imunofluorescência indireta para o diagnóstico de leptospirose em laboratórios convencionais. MSc Medical Microbiology (ongoing)</i>
<ul style="list-style-type: none"> ● Microbicidal activity of macrophages exposed to pathogenic spirochetes <i>Borrelia garinii</i> and <i>B. lusitanae</i> (ongoing). (with VBD) 	<p>2 MSc dissertations in 2023 + Oral /poster presentation Congress</p>	<p>1 MSc completed and 1 oral/poster presentation submitted to ECCMID 2023 Carolina Silva <i>MMM "Espiroquetídeos do complexo <i>Borrelia burgdorferi</i> s.l. e <i>Leptospira</i> spp: avaliação da atividade microbicida de macrófagos infetados"</i></p>



		1MSs ongoing 2023: Mónica Franco MMM 2023: Avaliação do stress oxidativo e defesas antioxidantes em macrófagos humanos expostos a diferentes espécies de espiroquetas do género <i>Borrelia</i> .
<ul style="list-style-type: none"> ● SARS Cov2 serological survey analysis 	3 Masters Thesis (delayed), 1 paper in preparation	
<ul style="list-style-type: none"> ● EUCare project (also with PHI) 	Start of the project	Noite Europeia dos Investigadores (Apresentação projeto EUCare project presentation Eucare Annual Meeting (September 2022)
<ul style="list-style-type: none"> ● Determination of the transcriptomic alterations in HDV-induced hepatocellular carcinoma (FCT) 	1 article Q1 in 2023	
<ul style="list-style-type: none"> ● Development of new tools for diagnosis and molecular characterization of opportunistic, emergent and re-emergent pathogens. ● Molecular epidemiology of infections by: <i>Pneumocystis jirovecii</i>, <i>Toxoplasma gondii</i> and intestinal parasites in humans ● <i>Cryptosporidium</i> and <i>Giardia</i> in commercial vegetables in the city of Maputo, Mozambique: is it a public health concern?" (IHMT/ Nova SBE/ Faculdade de Veterinária, Universidade Eduardo Mondlane-Moçambique) ● Caracterização genética e fatores de risco para aquisição de infeção por <i>Cryptosporidium</i> spp. e <i>Giardia duodenalis</i> em crianças até 14 anos com sintomas gastrointestinais em Moçambique" (IHMT/ Instituto Nacional de Saúde-Moçambique) ● Infeção por <i>Pneumocystis jirovecii</i> em doentes seropositivos para VIH e suspeita de tuberculose pulmonar na Guiné-Bissau 	4 articles 2 PhD Thesis completed in 2022 2 new MSc student	<ul style="list-style-type: none"> ● Nhambirre O L, et al. (2022) Intestinal Parasites in Children up to 14 Years Old Hospitalized with Diarrhea in Mozambique, 2014–2019.; 11, 353. https://doi.org/10.3390/pathogens11030353 ● Szydłowicz M, et al.. (2022). <i>Pneumocystis jirovecii</i> colonization in preterm newborns with respiratory distress syndrome. The Journal of Infectious Diseases, 225(10): 1807-1810. doi: 10.1093/infdis/jiab209. + 3 articles in preparation/submitted <p>2 PhD Thesis completed in 2022:</p> <ul style="list-style-type: none"> ● CSalamandane, Intestinal Parasites in Commercial Vegetables in the City of Maputo. Mozambique: ist it a Public Health Concern? (2022) ● ONhambirre. Deteção de enteroparasitas e caracterização genética de <i>Cryptosporidium</i> spp. e <i>Giardia duodenalis</i> em crianças até aos 14 anos, com diarreia, em Moçambique. (2022) <p>2 MSc Thesis to be completed in 2023:</p> <ul style="list-style-type: none"> ● JJúnior, MSc Medical Parasitology (ongoing) ● AGanhão, MSc Medical Parasitology (ongoing)
CCI - Public Health Information (PHI)		
<ul style="list-style-type: none"> ● BCG vaccine to reduce unplanned absenteeism due to illness of health care workers during the COVID-19 pandemic. A multi-center randomized controlled trial. 		
CCI - Global Pathogen dispersion and Population Mobility (GPPM)		



<ul style="list-style-type: none"> ● Genome diversity of rotavirus in Mozambique 	<p>1 paper in Q1 1 poster presentation 1 PhD thesis ongoing</p>	<ul style="list-style-type: none"> ● Manjate F, et al. Molecular Epidemiology of Rotavirus Strains in Symptomatic and Asymptomatic Children in Manhica District, Southern Mozambique 2008-2019. <i>Viruses</i>. 2022 Jan 12;14(1):134. doi: 10.3390/v14010134.
<ul style="list-style-type: none"> ● Genome-wide diversity of Zika Virus 	<p>1 article</p>	<ul style="list-style-type: none"> ● Seabra SG et al 2022. Virus Evolution (Q2, IF 5.614); Genome-wide diversity of Zika Virus: Exploring spatio-temporal dynamics to guide a new nomenclature proposal. <i>Virus Evolution</i>, 8, 1–15. https://doi.org/10.1093/ve/veac029
<ul style="list-style-type: none"> ● Phylogeography, dispersion of HIV and resistance to antiretrovirals in Portugal, with a special focus on vulnerable populations (migrants and PALOPs). 	<p>2 Masters Thesis MSPD 2 articles Q1, 1 article Q2 3 manuscripts in preparation 1 project started (MARVEL) 1 invited presentation (Congresso Nacional Doenças Infecciosas e Microbiologia Clínica)</p>	<ul style="list-style-type: none"> ● Pimentel VF et al.; Portuguese HIV-1 Resistance Study Group. Differential patterns of postmigration HIV-1 infection acquisition among Portuguese immigrants of different geographical origins. <i>AIDS</i>. 2022 Jun 1;36(7):997-1005. doi: 10.1097/QAD.0000000000003203. ● Miranda MNS et al. A Tale of Three Recent Pandemics: Influenza, HIV and SARS-CoV-2. <i>Front Microbiol</i>. 2022 Jun 2;13:889643. doi: 10.3389/fmicb.2022.889643. ● Chone JS, et al. Determinants of Late HIV Presentation at Ndlavela Health Center in Mozambique. <i>Int J Environ Res Public Health</i>. 2022 Apr 11;19(8):4568. doi: 10.3390/ijerph19084568.
<ul style="list-style-type: none"> ● Phylogeography of HBV 	<p>1 article published</p>	<ul style="list-style-type: none"> ● Marcelino R et al. Phylogeography of hepatitis B virus: The role of Portugal in the early dissemination of HBV worldwide. <i>PLoS One</i>. 2022 Dec 22;17(12):e0276618. doi: 10.1371/journal.pone.0276618.
<ul style="list-style-type: none"> ● Phylodynamics of insect-specific viruses 	<p>2 articles published with VBD (Q1)</p>	<ul style="list-style-type: none"> ● Morais P, et al.. Insect-specific viruses in the Parvoviridae family: Genetic lineage characterization and spatiotemporal dynamics of the recently established Brevihamaparvovirus genus. <i>Virus Res</i>. 2022 May;313:198728. doi: 10.1016/j.virusres.2022.198728. ● Morais P, et al. Readdressing the genetic diversity and taxonomy of the Mesoniviridae family, as well as its relationships with other nidoviruses and putative mesonivirus-like viral sequences. <i>Virus Res</i>. 2022 May;313:198727. doi: 10.1016/j.virusres.2022.198727.
<ul style="list-style-type: none"> ● Migrants and COVID 	<p>2 articles published (with PPS) (2 Q1)</p>	<ul style="list-style-type: none"> ● O Martins MR et al.. (2022) Are immigrants more vulnerable to the socioeconomic impact of COVID-19? A cross-sectional study in Amadora Municipality, Lisbon metropolitan area. <i>Front Public Health</i>. Aug 1;10:920308. doi: 10.3389/fpubh.2022.920308. ● Muggli Z, Mertens T, Amado R, Teixeira AL, Vaz D, Pires M, Loureiro H, Fronteira I, Abecassis A, Silva AC, Martins MRO. Cohort profile: Health trajectories of Immigrant Children (CRIAS)-a prospective cohort study in the metropolitan area of Lisbon, Portugal. <i>BMJ Open</i>. 2022 Oct 25;12(10):e061919. doi: 10.1136/bmjopen-2022-061919.



<ul style="list-style-type: none"> ● Micro-OPV study: Effects of oral polio vaccine campaigns on infants' respiratory and gut microbiome in Guinea-Bissau (project in collab w/ Bandim Health Project (BHP) in Guinea-Bissau, SSI & University of Southern Denmark (Denmark). Project financed by GHTM/IHMT-NOVA (UID/MULTI/04413/2013, UID/04413/2020). 	<p>1 original article Q1 (collaboration w/ VBD and IHC)</p>	<ul style="list-style-type: none"> ● Medeiros MM et al. 2022. Front Microbiol. (Q1, IF 6.064) Oral polio revaccination is associated with changes in gut and upper respiratory microbiomes of infants. Front Microbiol. 2022 Oct 28;13:1016220. doi: 10.3389/fmicb.2022.1016220.
<p>New Research Projects planned for 2022/2023 with CCIs:</p> <ul style="list-style-type: none"> ● Development and application of electrochemical biosensors for the rapid detection of SNPs associated with drug-resistant tuberculosis and malaria (Collaboration with The Universitat Rovira i Virgili, Spain and LSHTM, UK) (WITH CCI DG) (Submitted - Under evaluation) ● Exploring efflux inhibition to counteract antimicrobial resistance and biofilms in staphylococci (FCT). Submitted. (CCI DDR) ● New drugs for <i>N. gonorrhoeae</i>: targeting membrane transport and energy metabolism to fight antimicrobial resistance (FCT). Submitted. (CCI DDR) ● Study of antimicrobial resistance and genotypes of <i>M. genitalium</i> (DDR) (planned to be submitted at FCT 2023) (CCI DDR) ● WasteWaterVir - Integrating metavirome analysis of wastewaters into tools for surveillance of infectious diseases (CCI Diagnostics) ● <i>G. mellonella</i> Research Hub - Pilot study on the application of a new in vivo model for pathogenicity studies and drug discovery at GHTM (WITH CCIs DDR and DG) – GHTM 2022 call (not funded, ongoing) (CCI DDR, Diagnostics) ● Splicing alterations in SARS-Cov-2 infection (DG) (planned to be submitted at FCT 2023) (WITH CCI D) ● Exploring Lyme Borreliosis miRNAs signature w/ THOP – FCT submitted (WITH CCI DG) Projected not approved ● Tiny molecules with big impacts: exploiting microRNA immune targets in dog trypanosomatid infection (w/ VBD, PI G. Santos-Gomes) – FCT (WITH CCI DG) ● Multicentric study on environmental mycobiome and antifungal resistances of critical hospital wards, submitted at FCT (Collaboration with The INSA, AIDFM/ISAMB) (WITH CCI DDR) - Projected not approved ● “Clarifying the role of efflux and mobilome on antimicrobial resistance and virulence in staphylococci” (submitted to Programme for Cooperation in Science between Portugal and Germany, 2023-24), Sept 2022 (CCI DDR) ● Influence of miRNAs on cancer drug resistance (w/ FCM) 	<p><i>At least 8 national/international projects submitted, 1 approved.</i></p>	<ul style="list-style-type: none"> ● Exploring efflux inhibition to counteract antimicrobial resistance and biofilms in staphylococci (PI: SSCosta). Funded by FCT. Begin date: 01/01/2023 ● New drugs for <i>N. gonorrhoeae</i>: targeting membrane transport and energy metabolism to fight antimicrobial resistance (PI: LRodrigues) Project not selected for funding by FCT. Approved and ongoing as one of GHTM's Exploratory projects (GHTM's 2022 internal call). ● Project WasteWaterVir - Integrating metavirome analysis of wastewaters into tools for surveillance of infectious diseases (PI: SSeabra). Approved and ongoing as one of GHTM's Exploratory projects (GHTM's 2022 internal call). ● Article to be published 2023 with NOVA Medical School



<ul style="list-style-type: none"> ● Development of a new Nab based strategy to produce a universal HIV vaccine. Collaboration with Associação para o Desenvolvimento do Ensino e Investigação da Microbiologia (ADEIM). ● Quantic dots/Citotoxicity assays. Collaboration with Departamento de Engenharia Química, Secção Química Orgânica & Inorgânica, Instituto Superior de Engenharia de Lisboa (ISEL). 		<ul style="list-style-type: none"> ● Nuno Taveira, Inês Figueiredo, Rita Calado, Francisco Martin, Inês Bárto, José Maria Marcelino, Pedro Borrego, Fernando M.H. Cardoso and Helena Barroso. A HIV-1/HIV-2 chimeric envelope glycoprotein generates neutralizing antibodies against tier 2 HIV-1 and HIV-2 isolates, Front. Immunol. - Vaccines and Molecular Therapeutics (accepted with revision).
<p>Congresses//Events:</p> <ul style="list-style-type: none"> ● European Congress of Clinical Microbiology & Infectious Diseases (2022 and 2023) ● European Society of Mycobacteriology Meeting, ESM (2022 and 2023) ● MICROBIOTEC 2023 ● ISSSI (Int. Symp Staphylococci & Staph infections), 2022 – postponed to 2024 ● 2º Simpósio Internacional de Genética Humana (Luanda, Angola, July 2022) ● Encontro Ciência 2022 (Lisboa, 16 – 18 May 2022). ● European Meeting on HIV & Hepatitis ● ILS (Intern.leptospirosis Society Meeting (Bangkok, Thailand (Nov 2022); or 16th Conf. on Lyme Borreliosis and Other Tick-borne Diseases, Sept 2022, 	<p><i>At least 15 posters and 5 oral communications</i></p>	<ul style="list-style-type: none"> ● ORAL - Diana Machado, et al.. 2022. Efflux-mediated pretomanid high-level resistance in Mycobacterium tuberculosis. 42nd Annual Congress of the European Society of Mycobacteriology. Bologna, Italy, 26-29 June 2022. ● POSTER - Diana Machado, et al.. 2021. Efflux-mediated pretomanid high-level resistance in a naive Mycobacterium tuberculosis pretomanid-resistant clinical strain. 32nd European Congress of Clinical Microbiology and Infectious Diseases (ECCMID). Lisbon, Portugal. 23-26 April 2022. ● POSTER - Rita Lopes, et al. 2022. Efflux-mediated temocillin resistance: should we ignore the colonies within the inhibition zone? 32nd European Congress of Clinical Microbiology and Infectious Diseases (ECCMID). Lisbon, Portugal. 23-26 April 2022. <p>32nd ECCMID (2022) – 1 oral communication + 3 poster presentations:</p> <ul style="list-style-type: none"> ● Costa et al. Emergence of staphylococcal non-wild-type populations to biocides in a One Health perspective: are there reasons for concern? Mini-Oral Flash presentation. ● Leal et al. Efflux and biocide reduced susceptibility in Staphylococcus pseudintermedius. (Poster) ● Andrade et al. Increased virulence potential of biofilm-producing coagulase-positive staphylococci associated with animal pyoderma. (Poster) ● Ferreira et al. Rapid screening of norA alleles among Staphylococcus aureus strains causing SSTIs in different hosts. (Poster) <p>5th Annual Texas Medical Center AMR & Stewardship Conference (USA)</p> <ul style="list-style-type: none"> ● Andrade et al. Increased virulence potential of biofilm-producing coagulase-positive staphylococci associated with animal pyoderma. (ePoster) <ul style="list-style-type: none"> ● Seabra SG et al. Encontro Ciência 2022, Centro de Congressos de Lisboa, 16 – 18 May 2022. “Viral genomic surveillance: phylodynamic analysis of Zika virus and proposal of a nomenclature system” <ul style="list-style-type: none"> ● LR et al: 1 Poster in ECCMID2022



		<ul style="list-style-type: none"> • AAb et al: 2 oral presentations (European Meeting on HIV & Hepatitis) + oral presentation -> ECCMID • JP et al: 1 oral at 2º Simpósio Internacional de Genética Humana (Angola)
Training: <ul style="list-style-type: none"> • ● Development and application of electrochemical biosensors for the rapid detection of SNPs associated with drug-resistant tuberculosis and malaria (Collaboration with The Universitat Rovira i Virgili, Spain and LSHTM, UK) • ● Cytometry course in York, UK, 2022 • ● Increase the number of doctoral students enrolled in GHTM-THOP group 	<ul style="list-style-type: none"> • <i>Initiative accomplished by the end of 2023</i> • <i>Initiative accomplished by the end of 2023</i> • <i>At least 3 new PhD students enrolled in GHTM-THOP group by the end of 2023.</i> 	<ul style="list-style-type: none"> • ERASMUS + staff University York • 1 PhD student, CFerreira, enrolled in GHTM-THOP (2022); 2 PhD students, MAndrade and MLeal, to be enrolled in 2023
Capacity building: <ul style="list-style-type: none"> • ● New GHTM BIOMOL MinION laboratory for Molecular detection and sequencing of pathogens (with CCIs D and GPPM) • ● Completion of assessment, depositing and incorporation of well characterized mycobacterial stains in GHTM BIOBANK (with CCIs DG and GPPM) • ● Pilot study on the application of a new in vivo model for pathogenicity studies and drug discovery at GHTM (<i>G. mellonella</i> Research Hub) (WITH CCIs DDR and DG) • ● Collaborative projects w/ Angola and Mozambique on STIs and pre-natal care involving PhD students (w/ IHC). • ● Capacity building in SARS-CoV2 sequencing and molecular epidemiology in Cape-Verde- Joint-venture with Instituto Nacional de Saúde Dr. Ricardo Jorge. • ● Curso Internacional de Saúde Pública (CIESP), Project IANDA Guiné Saúdi (Bissau) 	<ul style="list-style-type: none"> • <i>Completion of the refurbishing of Laboratory in 2022</i> • <i>Start and completion of strain deposition in 2022</i> • <i>1 article published using G. mellonella as an infection model</i> • <i>1 project submitted</i> 	<ul style="list-style-type: none"> • MinION equipment operational and in use by GHTM members; questions remaining on data analysis. Establishment of BIOMOL MinION laboratory delayed. • Delayed. New data: January 2023. • Andrade et al. 2022. Antibiotics (Q2, IF 5.222); Virulence potential of biofilm-producing <i>S. pseudintermedius</i>, <i>S. aureus</i> and <i>S. coagulans</i> causing skin infections in companion animals. <i>Antibiotics</i>. 2022; 11:1339. doi.org/10.3390/antibiotics11101339 • Establishment of a <i>G. mellonella</i> colony @ GHTM/IHMT-NOVA (Oct22) • Delayed for 2023 • Summer 2022 – Support GHTM and INSA (postponed September 2023) • Completed December 2022



Other activities:		
<ul style="list-style-type: none"> ● Participation at International Microorganism Day Participation at IHMT-NOVA Open Day 	<p><i>Participation of THOP members in at least 2 open science initiatives/year</i></p>	<ul style="list-style-type: none"> ● Participation of 6 THOP members at International Microorganism Day (Lisbon, 17 Sept 2022) ● Participation in ebook “Science communication in Microbiology”, edited by Sociedade Portuguesa de Microbiologia https://spmicrobiologia.files.wordpress.com/2022/09/ebook_spm.pdf (launched at International Microorganism Day) ● Costa et al. Invited Lecture at UBI (21 Sept) - IMD activity day
<ul style="list-style-type: none"> ● Summer School/Course on antibiotic and biocide resistance in bacteria and OneHealth (2022) ● Participation in GHM Session within several CCIs ● Organization and implementation of a Molecular Epidemiology Course in Angola for the CPLP countries ● 5th GHM Antimicrobial Resistance Awareness Day (Nov 2022) 	<p><i>Initiative accomplished by the end of Sept 2022</i></p> <p><i>At least 4 GHM sessions involving THOP members or collaborators</i></p> <p><i>November 2022. Endorsed by CPLP with the financial support of Fundação BAI</i></p> <p><i>Initiative accomplished by the end of Nov 2022</i></p>	<ul style="list-style-type: none"> ● Summer School on Antimicrobial Resistance, 12th–15th September 2022 (online), 36 participants, 8 countries ● 2 GHM sessions organized by OMatos, Imandomando (CISM, Mozambique) – GHM Session in Nov22 ● Postponed to 2023 ● Postponed to 2023



RESEARCH GROUP – VECTOR BORNE DISEASES (RG – VBD)

The Strategic objective of VBD is the reinforcement of local and global capacity to control vector-borne diseases. Major research competences include molecular, genetic, and eco-epidemiological studies, mechanisms of drug and insecticide resistance, transmission and vector/host-pathogen interactions, host-pathogen microbiome, vector bioecology and control, and development of diagnostic and surveillance/control innovative methods.

VBD activities were aligned with Sustainable Development Goals (SDGs) especially #1 – No poverty, #2 – Zero Hunger, #3- Good Health and Well-being, #4-Quality Education, #6-Clean Water and Sanitation, #10 - Reduce inequality within and among countries and #15 - Life on Land

ACTIVITIES [● - Not done/ Canceled/ No Outcome; ● - Done/ Concluded/ Outcome ; ● - Delayed/ Postponed/ Delayed Outcome]]	OUTCOMES	EVIDENCES
RESEARCH ACTIVITIES ONGOING IN 2022-WITHIN CCIs:		
CCI - Diagnostics (DG)		
● Xenodiagnosis in domestic cats (<i>Felis catus</i>) naturally infected by <i>Leishmania infantum</i> (FAPESP)	Finished in 2022	Oliveira et al 2022. Feline leishmaniasis: a xenodiagnosis study. 3rd International Caparica Conference on Leishmaniasis. 24-26 October, Costa da Caparica, Portugal. Abstract book p.122.
● SUBFAM protocol: Submicroscopic <i>Plasmodium falciparum</i> infections in Guinea-Bissau: a barrier to eliminate malaria? (with Bandim Health Project, Guinea-Bissau) – also within CCI FRP	ongoing PhD thesis of a local student 1 publication (postponed) / Oral/poster presentation	Oral presentation at India/EMBO Course
● Optimization and application of an indirect immunofluorescence test as an alternative to the microscopic agglutination test (reference test) for the diagnosis of leptospirosis (with THOP) ● Microbicidal activity of macrophages exposed to pathogenic spirochetes <i>Borrelia garinii</i> and <i>B. lusitanae</i> ; and <i>Leptospira</i> spp (with THOP)	1 MSc dissertation + oral/poster presentation Congress + ● article (in writing) 1 MSc dissertation + 1 oral/poster presentation 1 MSc 2022-23: ongoing + oral/poster presentation	1 MSc to be discussed in 2023 + poster presentation ECCMID 2023_April, Denmark 1 MSc completed + oral presentation, ECCMID 2023, April, Denmark Abstract submitted to 6° CNMT, IHMT, NOVA, April'23



CCI – Drug/Insecticide discovery & resistance (DDR)		
Drug discovery & resistance		
● Vaccination trials in rabbits (Centro de Ingeniería Genética y Biotecnología, Habana, Cuba. Study under the Cytel networking.)	Evaluation of the effect of antigens in tick feeding, mortality and fertility	Done. Paper in preparation
● Synthetic peroxides as new potential anti- <i>Leishmania</i> Chemotypes (with FCT, UAlg)	A series of synthetic compounds with moderate activity in <i>Leishmania</i>	Amado et al. 2022. doi: 10.3390/molecules27175401 Mendes et al 2022. doi: 10.3390/ph15040446
● AMAZonian snake toxins: creatING value from bioresources CIRCNA/BRB/0281/2019	International Network on the Venoms of Ecuadorian Snakes (RIEVSE Red Internacional de Estudios de Venenos de Serpientes Ecuatorianas, http://www.rievse.ikiam.edu.ec/).	1 MSc student ongoing
● MultiTarget4Malaria: a multitarget strategy to hit all stages of the <i>Plasmodium</i> life-cycle. PTDC/MEDQUI/30021/2017	Goal: to develop a preclinical candidate that fits the criteria defined by MMV (Medicines for Malaria Venture) for malaria elimination, killing parasites at different stages of the <i>Plasmodium</i> life-cycle with a novel multitarget mechanism of action.	Finished in September 2022 -Submitted paper
● Investigation of 26s, a new molecular marker for artemisinin resistance, which include studies using genomics, molecular dynamics simulations and genetic transfection.	Proposal of a new molecular marker for artemisinin resistance in malaria	Ongoing, delayed
● Development of PKG inhibitors as antimalarials	Discovery of PKG inhibitors, which target all malaria life cycle stages	Delayed due to difficulties in obtaining the compound. The problem was resolved in October 2022.
● Application a deep learning-driven protocol to identify multistage compounds with potential for malaria treatment	Discovery of potent naphthoquinones that do not inhibit mitochondrial electron transport chain	Ongoing
● Repositioning one approved antipsychotic drug (TZ) in chemosensitizing resistant parasites to chloroquine (CQ)	To demonstrate that TZ chemosensitizes parasites to CQ	Ongoing



● Investigation the antiplasmodial activity of Caboverdian endemic plants	Discovery of extracts of some plants currently used in traditional Caboverdian medicine with antiplasmodial activity	Manuscript accepted in the journal "Plants" (IF = 4.6)
● Identification of potential inhibitors of casein kinase 2 alpha of <i>Plasmodium falciparum</i> with potent in vitro activity		Manuscript submitted to Computational and Structural Biotechnology Journal" (IF = 6.1)
● When the host cell is not so cosy anymore... A drop off in energy or an increase in toxicity? FCT/MCTES, PTDC_BIA-CEL_28456_2017	concluded	Morais et al 2022. doi: 10.3389/fcimb.2022.840968 Carvalho et al 2022. doi:10.3390/ijms24021336 Webinar "Host-pathogen interactions: host-targeted therapies as a tool to overcome antimicrobial resistance" 4 MSc students (3 concluded, 1 ongoing) 1 BSc student (concluded)
● Identification of new antimalarial treatments through a target-centred "drug repositioning" approach", namely testing the effect of novel antimalarial candidates over gametocytes and the sporogonic development of malaria parasites	Discovery of new candidate antimalarials at the pre-clinical phase, which target gametocytes and the sporogonic cycle.	No info
Insecticide discovery & resistance		
● Studies on the effect of acaricides	In vitro evaluation of the effect of acaricides in tick cell lines	Done. Publication to be written
● Levels and mechanisms of insecticide resistance in the malaria vector <i>Anopheles coluzzii</i> of São Tomé and Príncipe (STP)	Insecticide susceptibility profile of <i>A. coluzzii</i> to insecticides commonly used for vector control in STP (UCMI framework activity)	A first round of field testing was completed on sep 2022. A second round will take place in Apr 2023.
● Evaluation of the effectiveness of the environmental repellent 3-(N-Acetyl-N-Butyl) Aminopropionic Acid Ethyl Ester (IR3535®), as a tool for malaria control (FBA) – WITH PPS	Participatory mapping of mosquito breeding sites (May 2022) / CAP (June 2022) / 1st year trial report (nov 2022)	



	Workshop/mentorship paper writing – outcome 3-5 papers	
● Repel+ New Mosquito Repellent Solutions for Malaria Control (Patent P2020) - New mosquito repellent delivery nanoparticles	Collaboration with industry New products for malaria control	
CCI - Fair research partnerships (FRP)		
● UMAP (University of Maryland-Angola-Portugal) Malaria working group development (Presidents' Global Impact Fund) (with INIS Angola, University of Maryland, USA) - ALSO WITHIN CCI GPPM	Ongoing PhD thesis of a local student - Study of <i>P. falciparum</i> demography in southwestern Africa, with a focus in Angola. New sample collection in several Angola provinces	Tavares et al 2022 – doi: 10.1186/s12936-022-04424-y
CCI - Global pathogen dispersion and population mobility (GPPM)		
● Leishman- European consortium European cooperation in clinical and molecular research on Leishmaniasis		Gert Van der Auwera, et al. 2022. doi: 10.2807/1560-7917.ES.2022.27.4.2002028
● Study of <i>Hyalomma</i> spp-Crimean-Congo hemorrhagic fever virus interface	Obtain tick cell lines infected with Hazara virus, the microbiome and virome of infected versus not infected tick cells.	Done. 1 MSc student concluded
● Study on the microbiome of ticks	Obtain the <i>Ixodes ricinus</i> microbiome using Minlon equipment (PhD work plan)	Done: paper in preparation.
● Tick-borne pathogens detection in <i>Ixodes ricinus</i> collected in Portugal	Prevalence of infection in <i>Ixodes ricinus</i> in Portugal (PhD work plan)	Moerbeck L et al 2022. doi: 10.3390/pathogens11111377
● Dispersal and establishment of mosquito's species into new regions	On-going PhD of Jose Mauricio Santos:1 publication	Santos et al 2022. doi: 10.1371/journal.pntd.0010715
● Anti- <i>Leishmania</i> Antibodies Survey In Dogs From Portugal (with MSD Animal Health and LETI Pharma)	Finished; Overall seroprevalence for <i>L. infantum</i> of 12.5% (95% CI 10.3–13.2%). Potential risk factors associated with <i>L. infantum</i> infection in dogs were age ≥ 2 years, residing in the interior regions of the country and non-use of repellents.	Almeida et al 2022. doi: 10.3390/microorganisms10112262



<p>● Molecular characterization of Iberian mosquitoes and viruses using multiple genetic markers and a combination of sequence analysis techniques (with Universidad - Facultad de Veterinaria de la Universidad de Extremadura and Ignacio Ruiz Arrondo: Centro de rickettsiosis y enfermedades transmitidas por artrópodos vectores/Centro de Investigación Biomédica de La Rioja (CIBIR))</p>	<p>Analysis of the genetic characterization of hematophagous vectors and the pathogens they may carry</p>	<p>1 paper in preparation Ruiz-Arrondo et al., 2022. doi: 10.1016/j.vprsr.2022.100805.</p>
<p>● Analysis of viruses associated with ticks</p>	<p>Characterization of the virome of <i>Ixodes ricinus</i></p>	<p>RNAseq data has been obtained (using the INFRAVEC sequencing facility). Data is being analysed</p>
<p>● Bloodless Diet</p>	<p>Infrastructure (insectary without blood for 1 ½ years) Implementation of a <i>A. stephensi</i> colony (blood free) 2022</p>	
<p>● DogIPM Immune precision medicine as a new opportunity to control canine trypanosomatid diseases</p>	<p>Ongoing 2 PhD students; 2 MSc student</p>	
<p>● Tackling trypanosomiasis cardiomyopathy with microRNAs and tridimensional (3D) models -miT3D (FCT – PeX)</p>	<p>inactive</p>	
<p>● Achieving new frontiers through trypanosomatid exosomes (EXOTRYPANO)</p>	<p>Webinar organization 3 MSc students</p>	<p>http://exotrypano.fmv.ulisboa.pt/ Moreno et al 2022. doi: 10.3390/ijms23158553. Rodrigues et al 2022. doi: 10.3390/biology11010100</p>
<p>● Vaccine for prevention and treatment of <i>Trypanosoma cruzi</i> infection – CRUZIVAX (grant agreement number: 815418)</p>	<p>2 MSc students</p>	
<p>● Morphological and molecular characterization of Afrotropical mosquitoes, potential vectors of arboviruses, namely through the genitalia, and the barcode marker of the mitochondrial gene <i>Cox1</i>, and a phylogenetic study using maximum likelihood and Bayesian methods.</p>	<p>800 mosquitoes were analyzed; dissection of the genitalia allowed the correct identification of 652 (98.3%) males and 11 (1.7%) females, from 55 species of 9 genera, <i>Aedeomyia</i>, <i>Aedes</i>, <i>Coquillettidia</i>, <i>Culex</i>, <i>Eretmapodites</i>, <i>Ficalbia</i>, <i>Lutzia</i>, <i>Mansonia</i>, <i>Mimomyia</i> and <i>Uranotaenia</i>. 247 sequences of the <i>Cox1</i> gene were obtained from 65 species, from which, for the first time, those of <i>Ae. capensis</i>, <i>Ae. mucidus</i>, <i>Cx. andersoni</i>, <i>Cx. telesilla</i>, <i>Cx. inconspicuus</i>, <i>Er. subsimplicipes</i>, <i>Er. quinquevittatus</i>, <i>Fi. uniformis</i>, <i>Mi. hispida</i>, <i>Ur. alboabdominalis</i> and <i>Ur. mashonaensis</i>. The joint identification of barcode</p>	<p>Montalvo-Sabino et al. 2022. doi: 0. doi: 10.3390/d14110940 1 MSc student concluded</p>



	sequences accompanied by diagnostic confirmation fills a gap in the genetic sequence databases.	
<p>External collaborations beyond vector-borne diseases</p> <ul style="list-style-type: none"> ● Detection by TouchdownPCR and genetic diversity analysis (cloning vs NGS) of mastadenovirus in waste and environmental waters the Lisbon Metropolitan area (with iBET) 	<p>Identification and genetic characterization of human mastadenoviruses in waters (environmental samples and residual water from the Lisbon Metropolitan area)</p>	<p>Cavadas, J., 2022. doi: 10.3390/microorganisms1012244</p> <p>1 MSc student</p>
<p>CCI - Public health information (PHI)</p> <ul style="list-style-type: none"> ● MosquitoWeb (NOVA Health) 	<p>Continuing collaboration with the Newsra project (newsra2020.eu)</p> <p>Social networks</p> <p>Publications- 1 publication on Wilder</p> <p>Five podcasts transmission by Rádio Belém</p> <p>Integration of existing dataset on GBIF and continuous update (gbif.org)</p>	<p>Participation on 4 training/discussion sessions with the other projects participants</p> <p>Facebook - 26 posts, Instagram - 19 posts, Twitter - 22 posts,</p> <p>https://www.wilder.pt/naturalist/as/este-pequeno-tigre-asiatico-e-um-invasor-que-ja-esta-em-portugal/</p> <p>https://radiobelem.jf-belem.pt/</p> <p>Registration of the Institution ongoing</p>
<ul style="list-style-type: none"> ● Entomoteca HR & HR – On going digitization of the collection 	<p>Publish entomological collection data in the GBIF</p> <p>Collection data digitization</p>	<p>Registration of the Institution ongoing</p> <p>Completed cataloguing and digitization of the specimens of</p>



		the suborder Brachycera (Filo Arthropoda, Class Insecta, Order Diptera)
NEW RESEARCH PROJECTS PLANNED/SUBMITTED FOR 2022/2023 WITHIN CCIs:		
CCI - Diagnostics (DG)		
<ul style="list-style-type: none"> ● Rapid detection of Single Nucleotide Polymorphisms (SNPs) associated with drug-resistant malaria using electrochemical biosensors (GHTM RESMALDETECT) – WITH THOP and IHC ● Electrochemical biosensor for the rapid detection of SNPs associated with drug-resistant malaria (PEX FCT) 	<p>Ongoing</p> <p>Not funded</p>	<p>Training period in the Lab of the external collaborators</p> <p>GHTM Project Show Case Session</p> <p>Visit of a Senior collaborator (GHTM Session + Visit to a Portuguese biotechnology company)</p>
<ul style="list-style-type: none"> ● Exploring Lyme Borreliosis miRNAs signature - with THOP (FCT) 	Not funded	
CCI – Drug/Insecticide discovery & resistance (DDR)		
Drug discovery & resistance		
<ul style="list-style-type: none"> ● Role of a new <i>Leishmania</i> DIValent cation transporter protein in macrophage infection (Submitted) 	Not funded	
<ul style="list-style-type: none"> ● LINFTAG – Adjusting CRISPR/Cas9 protein tagging in <i>Leishmania infantum</i> Portuguese strains (with WCIP, Glasgow University, UK) 	Generation of <i>L. infantum</i> and <i>L. tarentolae</i> cell lines with plasmids encoding the Cas9 endonuclease and the T7 polymerase to tag and KO proteins that can be screened for new compounds active on <i>Leishmania</i>	



● Artificial intelligence approaches to accelerate antimalarial drug discovery for prophylaxis and transmission-blocking (FCT)	To develop new technologies artificial intelligence-driven in silico drug screening for accelerating the discovery of lead candidates to promising multi-stage antimalarials.	Not funded
● Future antimalarials: towards multi-stage compounds for treatment and transmission-blocking (GHTM)	To proceed to hit-to-lead optimization of promising compounds already discovered for us, further analyzing their activity against sexual blood stages through in vivo efficacy experiments.	Not funded
● Untangling the mechanisms of primaquine and tafenoquine resistance in malaria parasites through experimental evolution, genomics and transgenesis. (FCT, w/ Universidade do Minho)	<i>In vivo</i> selection of PQ and TFN resistance through continuous drug pressure over asexual stages of the rodent malaria parasite <i>Plasmodium berghei</i>	Not funded
● <i>Galleria mellonella</i> Research Hub: implementation of a new in vivo model for pathogenicity studies and drug discovery at GHTM - with THOP (FCT)		
● Characterization of the phenotype and molecular profile of <i>Plasmodium falciparum</i> samples from the Brazilian Amazon as to new markers of resistance to artemisinin derivatives (PAHO)	First collection and phenotyping of <i>P. falciparum</i> isolates from the Brazilian Amazon for their response to artemisinins in vitro	No info
Host/Vector – Pathogen interactions and Microbiome		
● Exploring tick microbiome: an insight into the viral and bacterial communities in <i>Ixodes ricinus</i> and <i>Rhipicephalus bursa</i> ticks (GHTM)	Assays were performed and are almost concluded.	
● Exploring the <i>Hyalomma</i> spp-Crimean-Congo hemorrhagic fever virus interface towards a preventive control of an emerging virus in Europe. (FCT)	Obtain tick cell lines infected with Hazara virus, the microbiome and virome of infected versus not infected tick cells.	discontinued due to the lack of funding
● Pyruvate kinase deficiency and protection against malaria: exploring the underlying mechanisms and the impact on populations (FCT)	Not funded	
● Mosquito microbiome and infection - 2 projects submitted to LaCaixa and FCT in collaboration with IST and Basel University	Not funded	
CCI - Fair research partnerships (FRP):		
CCI - Global pathogen dispersion and population mobility (GPPM)		



<p>● Integrating metavirome analysis of wastewaters into tools for surveillance of pathogenic diseases - with THOP (GHTM)</p>	<p>The laboratory experiments regarding this topic have been initiated during 2022, and the analysis of the results already obtained is ongoing.</p>	<p>Ongoing</p>
<p>● Analysis of zoonotic flaviviruses circulation in birds (with National Institute of Agricultural and Veterinary Research, IP - INIAV)</p>	<p>Genetic analysis of mosquito-borne flaviviruses.</p>	<p>1 MSc student Manuscript under review</p>
<p>● Implementation of a <i>Toxorhynchites</i> sp. colony. Genetic and microbiome characterization and genetic manipulation. (with Faculty of Medical Technology, Prince of Songkla University, Thailand)</p>	<p>New tools for VBD control Colony not implemented yet. Several efforts have been done: i) egg transport by Courier, ii) visit of Prof. Theerakamol Pengsakul, Head of Health and Environmental Research Center, Faculty of Environmental Management, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand</p>	
<p>● MosqDiet - Rearing <i>Anopheles</i> mosquitos without blood for malaria research and control. FCT-AGAKHAN / 541725581 / 2019 (uses VIASEF for experimental <i>P. falciparum</i> infections)</p>	<p>Ongoing project. Starting activities delayed due to bureaucratic problems associated with on the protocol signature.</p>	
<p>● Mapping <i>Plasmodium falciparum</i> transmission networks in Guinea-Bissau: a molecular epidemiology approach (GHTM)</p>	<p>An innovative molecular approach to investigate malaria transmission networks in Guinea-Bissau, with the goal of guiding malaria control and elimination strategies in this and similar endemic settings</p>	<p>Not funded</p>
<p>● CLIMOS: Climate monitoring and decision support framework for sand fly-borne diseases detection and mitigation with cost-benefit and climate-policy measures.</p>		
<p>CCI - Public health information (PHI)</p>		
<p>CONGRESSES//EVENTS</p>		
<p>● India EMBO Lecture Course: Molecular Malaria epidemiology, population genetics, and evolution: Principles to practices.</p>	<p>Oral presentation, Ronise Silva - "Low-density malaria infections: are they important to sustain malaria in Guinea-Bissau?"</p>	
<p>● ONE – Health, Environment, Society – Conference 2022". Brussels, 21-24 June 2022.</p>	<p>Poster: Viegas S, et al. One health approach to prevent new pandemics in the scope of food security and safety.</p>	



	<p>(https://www.one2022.eu/posters/gallery?field_session_category_target_id=All&field_assign_ed_session_title=All&combine=viagas)</p>	
● TTP10 - Tick and Tick-borne Pathogen Conference, August, 2022	<p>Poster: Velez R, et al., Santos-Silva M. Santos A.S. Update on the interbreeding experiments between European and north-African populations of <i>Ixodes ricinus</i> (Acari: Ixodidae)</p> <p>Poster: DEVELOPMENT AND TESTING OF MICROSATELLITE LOCI FOR POPULATION GENETICS STUDIES IN <i>IXODES RICINUS</i>. Velez R., et al.</p>	
● 15th International Symposium on Ticks and Tick-borne Diseases	<p>Participation: G. Seixas; S. Antunes; Ana Domingos</p> <p>Participation as chairman in two oral communication sessions: Ana Domingos</p>	
● 3rd International Caparica Conference on Leishmaniasis 2022	<p>Cortes et al 2022. National seroepidemiological survey of <i>Leishmania</i> infection in dogs from Portugal and associated risk factors. 3rd International Caparica Conference on Leishmaniasis. 24-26 outubro, Costa da Caparica, Portugal. p.114)</p> <p>Oliveira T, et al. 2022. Feline leishmaniasis: a xenodiagnosis study. 3rd International Caparica Conference on Leishmaniasis. 24-26 outubro, Costa da Caparica, Portugal. Livro de resumos p.122.</p> <p>Santos Gomes et al - one oral presentation</p>	
● International congresses of Parasitology – ICOPA XV	<p>Poster: Leonardo Moerbeck, et al. An insight on <i>Ixodes ricinus</i> bacteriome from Portugal mainland.</p> <p>Poster: Leonardo Moerbeck, et al. Tick-borne rickettsiae in a national park in Portugal</p> <p>Maia C, et al. 2022. Sand fly-borne pathogens in cats naturally exposed to <i>Phlebotomus perniciosus</i>. 15th International Congress of Parasitology. 21-26 agosto, Copenhaga, Dinamarca. O621 / #1353. p.622.</p> <p>Santos Gomes et al - one oral presentation</p> <p>Poster: Pinto-Almeida Aet al 2022. Comparing Praziquantel-susceptible and Praziquantel resistant <i>Schistosoma mansoni</i> using a proteomic analysis.</p>	
● 16th CVBD® world forum symposium	<p>Maia C, et al. 2022. Seroprevalence of <i>Leishmania</i> infection in dogs from two endemic countries from New and Old Worlds (Brazil and Portugal): evaluation of three diagnostic tests using Bayesian Latent Class Models. 16th Symposium of the CVBD World Forum. 9-12 maio, Amsterdão, Holanda.</p>	



	<p>Rousseau J, et al. 2022. <i>Dipylidium caninum</i> in the XXI century: epidemiological studies and reported cases in companion animals and humans. 16th Symposium of the CVBD World Forum. 9-12 maio, Amsterdão, Holanda.</p>
<p>● ALIVE- Animal Leishmaniosis Veterinary Event, Malaga, Spain. April 2022</p>	<p>Maia C, et al. 2022. National seroepidemiological survey of <i>Leishmania</i> infection in dogs from Portugal- Preliminary results. International Congress on Animal Leishmaniosis-ALIVE2022. 31 março-2 abril, Málaga, Espanha. Livro de resumos p.133-135.</p> <p>Ticha L, et al. 2022. Experimental infection of <i>Sergentomyia minuta</i> with <i>Leishmania</i> (<i>Sauroleishmania</i>) <i>tarentolae</i> using xenodiagnosis of naturally infected geckos. International Congress on Animal Leishmaniosis-ALIVE2022. 31 março-2 abril, Málaga, Espanha. Livro de resumos p.67-69.</p>
<p>● International Congress on <i>Leishmania</i> & Leishmaniasis - WorldLeish 7, Cartagena, Colombia</p>	<p>Almeida M, et al 2022. Prevalence and risk factors of <i>Leishmania</i> infection in dogs in Portugal- a cross-sectional study. Seventh World Congress on Leishmaniasis. 1-6 agosto, Cartagena de Indias, Colômbia p.752-753</p> <p>Mendes A, et al 2022. Activity of 1,2,4-trioxolane and 1,2,4,5-tetraoxane endoperoxides against Old-World <i>Leishmania</i> species. WorldLeish 7. 1-6 agosto, Cartagena, Colômbia. Abstract book p. 964</p> <p>Maia C, et al. 2022. Antibody response to <i>Leishmania</i> and to <i>Phlebotomus perniciosus</i> recombinant salivary antigens in dogs over one year in a leishmaniasis endemic focus. Seventh World Congress on Leishmaniasis. 1-6 agosto, Cartagena de Indias, Colômbia. O1-04. Livro de resumos p.343.</p> <p>Maia C. 2022. Canine and human leishmaniasis in Europe: epidemiological overview and perception of veterinary and public health authorities about their control and emergence. Round table “From prevention of canine leishmaniasis to control of human VL”. Seventh World Congress on Leishmaniasis. 1-6 agosto, Cartagena de Indias, Colômbia.</p> <p>Maia C, et al. (2022). Providing better understanding of climate and environmental drivers of sand fly borne diseases – the CLIMOS project. Seventh World Congress on Leishmaniasis. 1-6 agosto, Cartagena de Indias, Colômbia. P2-102. Livro de resumos p.1371-1372.</p> <p>Santos Gomes et al - three oral presentation; five posters presentation</p>
<p>● 25th European Health Forum Gastein. 26-29 setembro, Salzburgo, Austria.</p>	<p>Maia C. 2022. CLIMOS: Climate monitoring and decision support framework for sand fly-borne diseases detection and mitigation with cost-benefit and climate-policy measures. Session “The health impacts of the climate crisis. New tools to support European action. Evidence based support to climate change and health policy making: the EU research cluster on Climate change and Health”. 25th European Health Forum Gastein. 26-29 setembro, Salzburgo, Austria.</p>



<p>● XXXII Congresso Nazionale della Società Italiana di Parassitologia. 27-30 junho, Nápoles, Itália.</p>	<p>Maia C. 2022. Climate and environmental changes affecting the biology of sand flies and the pathogens they transmit in Europe. Simpósio “Nuove frontiere e prospettive della leishmaniosi nel bacino del Mediterraneo”. <i>XXXII Congresso Nazionale della Società Italiana di Parassitologia</i>. 27-30 junho, Nápoles, Itália.</p> <p>Foglia Manzillo V, , et al. 2022. Providing better understanding of climate and environmental drivers of sand fly borne diseases – the CLIMOS project. <i>XXXII Congresso Nazionale della Società Italiana di Parassitologia</i>. 27-30 junho, Nápoles, Itália.</p>	
<p>● 22nd European Society for Vector Ecology Conference. 11-14 outubro, Sofia, Bulgária</p>	<p>Dvorak V, et al 2022. CLIMOS - towards better understanding of climate and environmental drivers of sand fly borne diseases in Europe. <i>22nd European Society for Vector Ecology Conference</i>. 11-14 outubro, Sofia, Bulgária. Livro de resumos p.65-66.</p>	
<p>● CIISA Congress. 11-12 novembro, Lisboa, Portugal. Session 3- Animal Health</p>	<p>Pereira A, et al 2022. Molecular characterisation of <i>Leishmania</i> spp. in cats from Portugal. <i>CIISA Congress</i>. 11-12 novembro, Lisboa, Portugal. Session 3- Animal Health P068. Livro de resumos p.124.</p>	
<p>● Conference on Complex Systems CCS2022. 17-24 outubro, Palma de Mallorca, Espanha.</p>	<p>Blesic S, et al 2022. Providing better understanding of climate and environmental drivers of sand fly borne diseases – the CLIMOS project. <i>Conference on Complex Systems CCS2022</i>. 17-24 outubro, Palma de Mallorca, Espanha. P2-102. Livro de resumos p.1371-1372.</p>	
<p>● Participation in the 26th Congress of Polish Parasitology Society</p>	<p>Participation as chairman in two oral communication sessions: Ana Domingos</p> <p>Participation as chairman in a poster session: Ana Domingos</p>	<p>Oral communication: Ana Domingos - Omics approaches towards tick and parasite vaccine development</p>
<p>● Exhibit “Bioinspiration: Insect Color Driving Innovation”, at the National Museum of Natural History and Science,</p>		
<p>● XLVII Annual Meeting of the Portuguese Society for Immunology</p>	<p>Santos Gomes et al - one poster presentation</p>	
<p>● XII Congreso de la Sociedad Española de Medicina Tropical y Salud Internacional (SEMSTI), Pamplona, Spain, March 8 -10, 2022</p>	<p>Poster: Thuy-Huong Ta-Tang, et al. Aplicación de pan-filaria-qPCR para la detección de filarias zoonóticas en muestras de sangre canina.</p>	
<p>● 70th International Congress and Annual Meeting of the Society for Medicinal Plant and Natural Product Research, Thessaloniki Concert Hall, Greece, August 28-31, 2022.</p>	<p>Poster: Maria Valente, et al. Evaluation of in vitro cercariacidal activity, phytochemical profile and antioxidant activity of Vernonia britteniana.</p>	



<p>● ILS (International leptospirosis Society Meeting (Bangkok, Thailand (November 2022) (dates will be announced); or ● 16th Conference on Lyme Borreliosis and Other Tick-borne Diseases, 4 -7 September 2022, Amsterdam, Netherlands;</p>	<p>non-participation for non-imputable reasons non-participation for non-imputable reasons</p>	
<p>EXPECTED PUBLICATIONS/TRAINING:</p>		
<p>● Publications</p>	<p>At least 30 papers are expected to be published in 2022 – >37 published, 1 accepted in press</p>	
<p>● / ● Training</p>	<p>At least 3 and 6 concluded PhD and MSc thesis, respectively Enrollment of similar number of new students 1 PhD concluded, at least 5 new students 3 MSc concluded, 7 new students</p>	
<p>PhD Students</p> <p>1 Visiting PhD student, 3 months (Jan-Apr 2022), FAPESP 2018/02999-9. Resistance evaluation of tick cell lines to different acaricides. Universidade Estadual Paulista (UNESP), Campus Rio Claro/SP, Brasil</p> <p>1 Visiting PhD student 2 months. Tick antigen evaluation on vaccination trials. Centro de Ingeniería Genética y Biotecnología, Habana, Cuba. CYTED NETWORK</p> <p>1 Visiting PhD student, 1 month, Faculty of Biology and Biotechnology, University of Warmia and Mazury, Poland</p> <p>Paulo Morais. Characterization of specific insect viruses: analysis of their genetic diversity and relationship with other viruses. Biomedical Sciences. IHMT NOVA. Concluded November 2022</p> <p>Wilson Tavares. <i>Plasmodium falciparum</i> population structure in Angola, using whole genome sequence data from field isolates. Biomed Sciences. IHMT NOVA. In collaboration with Univ. of Maryland. On going</p> <p>Ronise Silva. Low-density malaria infections: are they important to sustain malaria in G.-Bissau? GHTM IHMT NOVA, in collaboration with Bandim Health Project, G.-Bissau On going</p> <p>Mariana Delgadoinho. Gut Microbiome Analysis in Patients with Sickle Cell Disease. Biomedical Sciences. IHMT NOVA. In collaboration with ESTeSL/IPL. On going</p>		



Brígida Santos. Identificação de modificadores genéticos em crianças com Anemia de Células Falciformes numa área endémica de Malária, Angola. Human Genetics and Infectious Diseases IHMT NOVA in collaboration with ESTeSL/IPL and INSA. On going

Mbueno Nzila. Clinical and parasitological response on day 7 after treatment of *Plasmodium falciparum* malaria with ACTs and their correlation with molecular markers of resistance in Banga, Angola. IHMT-NOVA in collaboration with Univ. Agostinho Neto, Luanda. On going

Denise Duarte. *Plasmodium falciparum* redox system: the role of heterocycle thiosemicarbazones derivatives as potential regulators. IHMT-NOVA in collaboration with Universidade Federal de Pernambuco (UFPE), Recife - Brasil. On going

Clemente da Silva. Resistance to antimalarials in Mozambique (?): Characterization of molecular markers and assessment of susceptibility of *Plasmodium falciparum*. IHMT-NOVA in collaboration with Instituto Nacional de Saúde, Maputo, Moçambique. On going

Valéria Chicamba. Serum leptin and malnutrition in children with severe malaria in Mozambique. IHMT-NOVA in collaboration with Faculdade de Medicina da Universidade Eduardo Mondlane, Moçambique. On going

PhD student (UAlg) developing part of their thesis in the framework of ongoing research activities

MSc Thesis

Suelma Maciel. Metabolomic profile of the host cell and parasite *Plasmodium falciparum* – glycolysis on the infected Red Blood Cell. MSc Biomedical Sciences. Concluded April 2022

Jessica Fernandes. Mestrado em Ciências Biomédicas do IHMT-NOVA. Concluded March 2022.

Tiago Santos. Ionic Liquids Applications as Antimalarial Drugs. Mestrado em Parasitologia Médica IHMT-NOVA. Concluded February 2022.

Ana Balau. Effect of the compound 2,3-diphosphoglycerate (2,3-DPG) on the *Plasmodium falciparum* development – transcriptomics analysis. MSc Biomedical Sciences, IHMT (2022-2023)

Irina Matos – Influence of genetic variants of ICAM1 and CD36 on the phenotypic variation of sickle-cell disease and malaria in Angolan children. MSc Biomedical Sciences, IHMT. (2022-2023)

Molecular analysis of antimalarial resistance of *Plasmodium falciparum* in São Tomé and Príncipe (2022-2023).

Ana Cândido. Mestrado em Ciências Biomédicas do IHMT-NOVA. Estudo da atividade anti-malária de endoperóxidos. Ongoing 2022/2023.

Bernardo Aguiar. Snake venoms as antimalarials. Mestrado em Parasitologia Médica IHMT-NOVA. Ongoing 2022/2023.

Ana Dias. Marcadores moleculares de resistência a anti-maláricos em amostras de malaria importada em Portugal. Mestrado em Parasitologia Médica IHMT-NOVA. Ongoing 2022/2023.

Soraia Rodrigues. Malaria grave: causas e consequências. Mestrado em Saúde Tropical do IHMT-NOVA. Ongoing 2022/2023.

Other

1 Pos-doc, **3 months**, Faculty of Biology and Biotechnology, University of Warmia and Mazury, Poland

1 Pos-doc, **2 weeks**, Faculty of Biology and Biotechnology, University of Warmia and Mazury, Poland

BSc student - Inês Santos. Interaction between *Plasmodium falciparum* and the glycolytic chain of the host cell – activity of the bisphosphoglycerate mutase enzyme (BPGM) and 2,3 - diphosphoglycerate (2,3-DPG) effect in infection”, BSc in Cell and Molecular Biology, FCT NOVA. Concluded May 2022.



BSc student (6 months), Tick-parasite prevalence by molecular methods. Instituto de Ciências Biomédicas da Universidade de São Paulo (ICB - USP).		
CAPACITY BUILDING		
● Hands-on Workshop on “Gene editing in Trypanosomatids: Modern approaches for identification of novel drug targets”.	Workshop Gene editing & regulation in protozoan parasites & their vectors. 27th October - 2nd November 2022.	
● Participation in the training activity: Entomology Summer Course, “Hands on’ Course on Arthropods of Medical and Veterinary Significance: a global perspective, from theory to practice”	Entomology Summer Course, “Hands on’ Course on Arthropods of Medical and Veterinary Significance: a global perspective, from theory to practice”. School of Veterinary Medicine, Toulouse, France. 4 th July Lecture: “Sandflies: Ecology, Biology, Pathogenic roles, with a special focus on human and canine leishmaniasis”.	
● UCMI course on field and laboratory techniques for surveillance and control of mosquito vectors (São Tomé and Príncipe June 2022)	The UCMI course took place on the 6-21 jun 2022 and had the participation of 11 students from CNE, USTP and CIAT. Teachers involved: J Pinto, CA Sousa and JD Charlwood	
● Course “Insect collections, medical and forensic entomology”, 5-9 September, IHMT, Lisbon, Portugal	not enough student registrations	
● Course “Public Health and Vector Borne Diseases”. Between 28 June and 6 July 2022 (14 hours). Course held by videoconference for students of the “Master and Ph. D Program in Biodiversity Informatics”, at the Faculty of Agricultural Sciences, University of Abomey-Calavi (Benin),	Course took place by videoconference between 28 June to 6 of July with 8 master/PhD students attending.	
<ul style="list-style-type: none"> ● Training program for National Tuberculosis Reference Laboratory of STP technicians in medical and molecular microbiology. ● COST-sponsored training internship: mosquito identification and phylogenetic analysis of viral sequences ● Course on New approaches to project management and industrial property in health (May 2022, with Farmanguinhos, Fiocruz) ● A hands-on Workshop “Formação em técnicas in vitro e ex vivo de avaliação da suscetibilidade aos antimaláricos” organized by INS, Mozambique and IHMT-NOVA, Portugal, Maputo, May 2022 ● Hosting of Prof. Wuelton Monteiro, FMT-HVD. Erasmus + (July 2022) 		



OTHER ACTIVITIES		
<ul style="list-style-type: none"> ● Participation in “Congresso Nacional de Práticas Pedagógicas no Ensino Superior”, jul/2022 	Oral communication: Verônica Maguela, et al 2021. Digital interactive protocol as tool for pedagogic innovation on laboratorial learning. https://novaforma.h5p.com/content/1291559474582681137	
<ul style="list-style-type: none"> ● Participation / Member of the Tick Mitochondrial Genome Network 		
<ul style="list-style-type: none"> ● Encontro de ciência2022 	Oral presentation: Sandra Antunes - Estudos ómicos em <i>Rhipicephalus bursa</i> - <i>Babesia ovis</i> para o desenvolvimento de métodos alternativos de controlo de carraças e doenças associadas. Poster: Ronise Silva - Low-density malaria infections: are they important to sustain malaria in Guinea-Bissau?	
<ul style="list-style-type: none"> ● NOVA Quality Day: Protocolo experimental interativo 	Oral communication. A Domingos	
<ul style="list-style-type: none"> ● Participation in the Noite Europeia dos Investigadores 2022, at the National Museum of Natural History and Science- 30 September 2022 ● Participation in the FICA (Festival Internacional de Ciência) 2022, in Oeiras, 15 october 2022 – dissemination of the MosquitoWeb 	Activity Bioinspiration: Insect Colour Driving Innovation	
<ul style="list-style-type: none"> ● Field mission to STP in order to reinforce the ongoing collaboration with National Malaria Control Program (PNLP), evaluation of the operational procedures associated with malaria active surveillance, and blood samples collection for preliminary analyses. 		
<ul style="list-style-type: none"> ● Native Scientist-led "Training in Science Communication and Dissemination" (https://www.nativescientist.com/institutions) tailored to the institution's goals and for internal researchers interested in science outreach activities. 	Formalization of a group of researchers committed to science communication activities for the dissemination of IHMT major research fields and educational opportunities. - Ongoing	
<ul style="list-style-type: none"> ● Participation at International Microorganism Day 2022 (17 September) 	Activity: “Drug resistance: a macro challenge also with parasites!!!”	
<ul style="list-style-type: none"> ● Prémio de Investigação Enrique Coris Gruart (2022), Facultad de Veterinaria (unizar.es) na modalidade A (Medicina, Cirugía y Sanidad Animal Veterinarias) (39.ª edição) – trabalho “O trabalho Situación epidemiológica del virus del Nilo occidental y virus Usutu en Extremadura, da autoria de Daniel Bravo Barriga e coautoria Paulo Almeida 		
<ul style="list-style-type: none"> ● Lectures: Origin, characteristics and prevention of infections caused by SARS-CoV-2, the virus that causes COVID-19 (Escola Secundária de Cascais (March 2022) 		



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GHTM | ACTIVITY PLAN 2022

MONITORING REPORT OF CROSS CUTTING ISSUES ACTIVITIES IN 2022

- - Not done/ Canceled/ No Outcome
- - Done/ Concluded/ Outcome
- - Delayed/ Postponed/ Delayed Outcome



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CCI – DIAGNOSTICS (DG)

Objective: to develop novel diagnostic tools for epidemiological assessment and surveillance, to improve precision treatment and to provide affordable, rapid, and sensitive diagnosis to field settings and/or travel medicine. This is achieved by research activity on molecular diagnostics, biomarkers, point-of-care testing and devices, lab-on-a-chip technologies addressed to infectious diseases and carried out by all Research Groups.

Key subjects: Develop and implement novel tools; Molecular diagnostics; Biomarkers; Point-of-care testing and devices; Lab-on-a-chip technologies; Infectious Diseases

The promotion of interaction and transfer of knowledge on diagnostic tools and applications continued during 2022 with a new season of GHTM sessions under the thematic “Investing in Diagnostics Towards Better Health.

Sharing GHTM’s activities, knowledge and methodologies in this area” (<https://ghm.ihmt.unl.pt/events/ghm-sessions-2022ccid-diagnostics-1stsemester-calendar/>). While in 2021, lectures by IHMT researchers were privileged with the aim of increasing internal communication and awareness of on-going work, in 2022, external researchers were invited to encourage collaboration with other institutions.

As a main research activity within the DG CCI we highlight the studies on differential diagnosis of acute febrile illnesses (IHC), the development of novel tools and methods for the diagnosis of pathogens such as *Leptospira*, pathogenic spirochetes, SARS-Cov-2, or *Leishmania* infection in companion animals in a perspective of One Health (THOP, VBD). Also, the development or application of diagnostic tools for molecular characterization of infections and/or for epidemiological assessment and surveillance has been a focus of THOP and VBD groups, with examples such as studies on seroprevalence of SARS Cov2, surveillance of infectious diseases through the analysis of wastewaters and molecular characterization of opportunistic, emergent and re-emergent pathogens (*Pneumocystis jirovecii*, *Toxoplasma gondii* and intestinal parasites - *Cryptosporidium* spp. e *Giardia duodenalis*). Novel point-of-care testing and devices are also being developed for the rapid detection of drug-resistant tuberculosis, malaria, or sexually transmitted pathogens (IHC, THOP, VBD).

A considerable part of this activity has been underfunded given the low success rate of approval on the last national calls for scientific projects and weak international collaboration within this area. Even so, a total of thirteen articles were published in 2022 in peer-reviewed journals within the scope of this CCI.



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CCI - DRUG DISCOVERY & RESISTANCE (DDR)

Objective: to identify new therapeutic drugs (including single-encounter radical cure for malaria) and transmission-blocking, and timely detection and characterization of drug and insecticide resistance related to mutations, efflux or other mechanisms on key pathogens and vectors. In addition, tracking the prevalence and spread of drug resistance mutations allows national treatment policies to be adjusted.

Key subjects: Chemogenomics, Drug Repurposing; hit-to-lead discovery, Pre-clinical and clinical trials, Resistance mechanisms, Tropical Medicine

The year 2022 witnessed the return to a “new normal”, that followed the previous impact of the COVID pandemic. With regards to the Cross-cutting Issue (CCI) Drug Discovery and Resistance (DDR) this was reflected on our capacity to freely return to our wet-lab activities and consequently recover some of the time lost in previous years in terms of scientific productivity. To this purpose, only 13% of the proposed scientific activities were not done, cancelled, or resulted in no visible outcome, most of which corresponded to projects that were submitted for funding with no success (for detail, please refer to the Research Groups report). Fifty-two percent (52%) of the activities were fully fulfilled, whilst 35% are still ongoing, delayed or have been postponed. Importantly, there were a total of 33 articles published in peer-reviewed journals within the scope of this CCI, some of which in high impact journals, highlighting the relevance of DDR for the overall strategy of our Center. The dynamics of the CCI was boosted by the organization and implementation of several workshops and webinars on different and scientifically specialized aspects of DDR, as well as through disclosure of information to the general public in events such as the “Ciência Viva” (for detail, please refer to the Research Groups report). During 2022, there were several scientific highlights within the DDR CCI that were the successful end-product of several strategical objectives previously established, with the most impacting listed below:

- Monitoring antimalarial drug response in imported malaria cases in Portugal
- Development of updated approaches for anti-tuberculosis agent susceptibility evaluation
- Breakpoint calibration for 2nd line drugs against *Mycobacterium tuberculosis*
- Drug repurposing studies for *Neisseria gonorrhoeae*, COVID-19 and malaria.
- Characterization of main antibiotic resistant staphylococcal lineages causing infections in companion animals
- First description on the efflux pump NorA determinant across staphylococci
- Characterization of resistance to antiretrovirals
- Discovery of synthetic peroxides as new potential anti-Leishmania Chemotypes
- Application of deep learning-driven protocols to identify multistage compounds with potential for malaria treatment.
- Studies on the levels and mechanisms of insecticide resistance in the malaria vector *Anopheles coluzzii* of São Tomé and Príncipe (STP).



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CCI – PUBLIC HEALTH INFORMATION (PHI)

Objective: To support public health decision making through the production of information and political decision-making tools, namely in the area of epidemiological surveillance and early detection systems..

Key-subjects: epidemiologic intelligence & reasoning; knowledge translation; Knowledge translation through effective communication and promotion of health literacy - [public health intelligence center].

During 2022, the CCI Public Health Information pursued its objective to support public health decision by producing information and strengthening the evidence base for decision making. Several projects from the research groups were initiated/ continued in child and/or migrants health, with a special focus in tropical diseases but also in non-communicable diseases. The CCI was particularly active in the field of vaccination, resulting mainly from the issues raised by the pandemic and by vaccine hesitancy regarding SARS-CoV-2.

In terms of epidemiologic surveillance we can highlight two main areas: the first related to the ongoing projects MosquitoWeb and Entomoteca HR & HR that continued to develop although not at the foreseen rhythm and the uptake of data management platforms, namely REDCap with data from several research projects being managed through this platform. This was the result of several training and capacity building sessions developed by the CCI and open to the GHMT community, including students. The continued use of this platform will allow to centralize and concentrate data collected in a single place and server, thus representing the first step to create a “data and information bank” for GHMT researchers.



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CCI - GLOBAL PATHOGEN DISPERSION AND POPULATION MOBILITY (GPPM)

Objective: addresses global dispersion of infectious diseases using transdisciplinary and integrated approaches in collaboration with partners in endemic countries. Our aim is to understand the factors that underpin the spread or containment of infectious diseases globally and locally, particularly environmental changes and population mobility, in control or elimination contexts.

Key subjects: Chemogenomics; Drug Repurposing; Hit-to-lead discovery; Pre-clinical and clinical trials; Resistance mechanisms; Tropical Medicine

In 2022, the CCI Global Pathogen Dispersion and Population Mobility has developed transdisciplinary work that transverses all RGs. One important research topic that has been initiated with GPPM is metavirome studies in wastewaters, with an exploratory project that has been funded by GHTM. Another one is HIV-1 genomic surveillance in PALOPs countries, that is now fully established with the FCT funding through project MARVEL that started in 2022.

Other research topics that were continued included molecular epidemiology and genomic surveillance of human viruses (e.g. Rotaviruses, Zika, HIV, HBV) or zoonotic viruses (e.g. insect specific viruses or flaviviruses in birds), studies in migrant populations (COVID in migrants, HIV in migrants), phylogeography studies, as well as studies concerning the expansion of vectors. With IHC, GPPM developed six different projects that are ongoing and that have generated 2 published articles, while 2 manuscripts are in preparation.

With PPS, we emphasize the implementation of cohort studies comparing native and migrant children in 5 municipalities of Lisbon, resulting in 1 completed masters thesis, two published papers the establishment of migrants' health databases. Furthermore, the EUCARE project (European Cohorts of Patients and Schools to Advance Response to Epidemics) continued its activities leading to a first publication. Finally, the serological survey in Cascais has been finalized, resulting in 3 masters thesis and one manuscript being finalized for publication.

With THOP, studies developed in 2022 include studies on genome diversity of rotaviruses in Mozambique, on genome wide diversity of Zika, on phylogeography of HBV, on phylogenetics of insect specific viruses, studies on migrants and COVID and studies on microbiome changes after vaccination with oral polio vaccine. These resulted in 11 manuscripts published and 3 manuscripts in preparation.

Finally, with VBD, we emphasize the start of 'CLIMOS: Climate monitoring and decision support framework for sand fly-borne diseases detection and mitigation with cost-benefit and climate-policy measures', as well as the several studies on the dispersal of different vectors and of zoonotic viruses associated with vectors and other hosts (e.g. mosquitos, ticks, birds). These resulted in 7 manuscripts published and 2 masters' thesis, as well as 2 manuscripts in preparation.

HIGHLIGHTS:

PROJECTS - WasteWaterVir – Surveillance of Viral Genetic Diversity in urban residual water; MARVEL - Minimizing the emergence of HIV-1 drug resistance through an evidence-based portable high-throughput sequencing and computational approach; CLIMOS: Climate Monitoring and Decision Support Framework for Sand Fly-borne Diseases Detection and Mitigation with COST-benefit and Climate-policy Measures”

PAPERS:

- Seabra SG et al 2022. Genome-wide diversity of Zika Virus: Exploring spatio-temporal dynamics to guide a new nomenclature proposal. *Virus Evolution*, 8, 1–15.
- Marcelino R et al. Phylogeography of hepatitis B virus: The role of Portugal in the early dissemination of HBV worldwide. *PLoS One*. 2022 Dec 22;17(12):e0276618.
- Martins MR et al. (2022) Are immigrants more vulnerable to the socioeconomic impact of COVID-19? A cross-sectional study in Amadora Municipality, Lisbon metropolitan area. *Front Public Health*. Aug 1;10:920308.
- Montalvo-Sabino, E.; Abílio, A.P.; Guarido, M.M.; Valadas, V.; Novo, M.T.; Kampango, A.; Sousa, C.A.; Fafetine, J.; Venter, M.; Thompson, P.N.; Braack, L.; Cornel, A.J.; Parreira, R.; de Almeida, A.P.G. Morphological and Molecular Characterization Using Genitalia and COXI Barcode Sequence Analysis of Afrotropical Mosquitoes with Arbovirus Vector Potential. *Diversity* 2022, 14, 940.
- Almeida, M.; Maia, C.; Cristóvão, J.M.; Morgado, C.; Barbosa, I.; Ibars, R.F.; Campino, L.; Gonçalves, L.; Cortes, S. Seroprevalence and Risk Factors Associated with Leishmania Infection in Dogs from Portugal. *Microorganisms* 2022, 10, 2262.



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CCI – FAIR RESEARCH PARTNERSHIPS (FRP)

Objective: To actively promote fair and equitable partnerships - with the assumption that we can contribute to increased productivity if: the definition of the research agenda results from joint work; clarification of responsibilities and promotion of mutual learning (“reverse innovation”); there is data sharing and research networks.

Key subjects: institutional practices to promote research integrity; knowledge co-production strategies; reverse innovation;

There are three dimensions to the Cross-cutting Issue (CCI) Fair Research Partnerships (FRP): 1) contributing to the achievement of global health equity through fair and equitable practices in research partnerships; 2) knowledge management, through training communication strategies, and standard procedures on data sharing and ownership; 3) strengthening institutional practices to achieve more equitable partnerships.

During 2022, the Cross-cutting Issue (CCI) Fair Research Partnerships (FRP) remained committed to developing work in the three dimensions, possible to verify in the research developed, having continued the research integrated into the projects developed by three research groups and directly identified with the ICC. With the IHC, the Initiative for Strengthening First and Second-Level Health Services in Angola is under development. With VBD two projects are being implemented, with PPS a project is still being implemented and a new project has begun, a Joint Action with 19 European countries HEROES - HEalth woRkfoRce to meet health challEngeS.

A course on Fair Research Partnerships was offered at the Ph.D. Tropical Diseases and Global Health, involving 20 doctoral students organized into 4 groups, developing research around the Cross-cutting Issue (CCI) Fair Research Partnerships (FRP) - two literature reviews, and two studies analyzing research partnerships in Mozambique and Angola were developed. Additionally, we organized 4 online GHTM sessions, actively spreading the theme of fair and equitable partnerships and implementation challenges. Four papers resulting from these activities are in preparation and should contribute to disseminating innovations that occur in the Global South.



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GHTM | ACTIVITY PLAN 2022

MONITORING REPORT OF STRATEGIC GHTM / IHMT / NOVA INFRASTRUCTURES ACTIVITIES IN 2022

- - Not done/ Canceled/ No Outcome
- - Done/ Concluded/ Outcome
- - Delayed/ Postponed/ Delayed Outcome



STRATEGIC GHTM / IHMT / NOVA INFRASTRUCTURES

● BIOLOGICAL RESOURCE CENTER (BRC) / BIOBANK – BIOTROPICAL RESOURCES (BIOTROP)

Coordinated by two members of the VBD group, transversal activity to all RG and CCIs, but particularly aligned within DG, DDR and GPPM.

ACTIVITIES [● - Not done/ Canceled/ No Outcome; ● - Done/ Concluded/ Outcome ; ● - Delayed/ Postponed/ Delayed Outcome]	EXPECTED OUTCOMES	EVIDENCES (to be filled in 2023)
<p>RESEARCH ACTIVITIES ONGOING IN 2022/2023</p> <p>Ongoing implementation of the <i>Strategic Plan 2021-2023</i> (http://ihmtweb.ihmt.unl.pt/Download/BIOTROP/BIOTROP_2021-2023_STRATEGIC_PLAN_vsf.pdf), namely:</p> <ul style="list-style-type: none"> - ● priority to implement approved procedures with the Traveler's Clinic and Central Laboratory of IHMT - ● interaction with National Roadmap for Research Infrastructures (RNIE) networks (Pt-mBRCN /MIRRI-PT and Biobanco.pt) - ● increase the network with national similar infrastructures (e.g. INSA biobank, Veterinary Faculty of Lisbon) - ● establish collaboration with potential stakeholders at Portuguese-speaking countries (especially PALOP and Brazil) - ● implement a sample quality plan - ● requalify retrospective/historical collections 	<p>Storage of samples positive for the presence of pathogens from a variety of endemic areas – Prospective collections</p> <p>Knowledge/technology transfer. Regrettably without funds from FCT as network member</p> <p>Biobank extended network at national and international level (CPLP)</p> <p>Increase the biological resources and samples quality control/quality assurance.</p> <p>Very heterogeneous which implies an individual evaluation and an institutional coordinated approach and compromise (eg Fiocruz collections)</p>	<p>Network meeting with MIRRI-PT/PT-mBRCN (14 December, Universidade Minho, Braga)</p> <p>Visit to INSA and meeting with Veterinary Faculty of Lisbon</p> <p>Visit to Fiocruz Biological Collections and COVID19 Biobank</p> <p>Ongoing organization of a meeting with Portuguese speaking stakeholders with the aim of developing a network of Lusophone biobanks</p> <p>Ongoing - 2 SOPs were concluded (blood); no final plan yet</p> <p>halted</p>



<ul style="list-style-type: none"> - ● promote the integration of prospective collections - ● search for collaborations within pharmaceutical and biotechnology industry 		
<ul style="list-style-type: none"> - ● create a BIOTROP bilingual website (only a section in Portuguese at the IHMT's website is available) 	<p>Create the BIOTROP (micro)site to promote resources and services within the national and international scientific community and biotech industry</p>	<p>Delayed (additional expertise needed)</p>
<p>NEW RESEARCH PROJECTS PLANNED FOR 2022/2023:</p> <p>Under evaluation</p> <ul style="list-style-type: none"> ● Submission of Expression of Interest regarding RNIE by both networks (Pt-mBRCN /MIRRI-PT and Biobanco.pt), FCT <p>To be submitted</p> <ul style="list-style-type: none"> ● Proposal to the next funding cycle for the RNIE announced by FCT through the Portugal 2030 program. ● Design and implement a Business Model (Canvas model) with implementation plan 	<p>Funds from FCT as RNIE networks member</p> <p>Update, modernization and strengthening for the period 2022-2027.</p>	<p>No news from FCT</p> <p>Call cancelled</p>
<p>CONGRESSES//EVENTS:</p> <p>International scientific conference</p> <ul style="list-style-type: none"> ● ESBB Africa Conference 2022 ● II International Symposium on Human Genetics 2022, Faculty of Medicine - Agostinho Neto University <p>Internal scientific sessions</p> <ul style="list-style-type: none"> ● GHTM CCI Diagnostics 	<p>1 Oral communication</p>	<p>2 Oral communication (presentation of the Biotropical Resources infrastructure)</p> <p>Postponed</p>



PUBLICATIONS/TRAINING: Publications on: <ul style="list-style-type: none"> ● <i>Creating value in health sciences – implementation of biobanks in infectious and chronic diseases: A Review</i> – joint article with CHRC biobank (CHAIN) ● <i>An overview of current (tropical) infectious disease biobanks, their usage, regulatory and procedure standards for the sample and data, etc.</i> - joint article with ETOP IBCSG Partners Foundation Training: <ul style="list-style-type: none"> ● Visit to Fundação Oswaldo Cruz/FIOCRUZ, Rio de Janeiro, Brazil under the ICM NOVA - International Credit Mobility project, Erasmus+ Program. 	<p>2 publications (reviews)</p> <p>Training on the best practices in the management and requalification of biological collections</p>	<p>Partners left institutions.</p> <p>July 2022</p> <p>https://ghm.ihmt.unl.pt/mission-to-fiocruz-biological-collections-allowed-networking-acquire-new-tools-and-share-good-practices-and-experiences/</p>
CAPACITY BUILDING:		
OTHER ACTIVITIES: <ul style="list-style-type: none"> ● Participation in science outreach activities (e.g. Noite Europeia dos Investigadores, Open Day IHMT, Ciência VIVA FCT, etc) 	<p>Dissemination of biobank activities to general public, especially targeting “young scientists”</p>	<p>ENCONTRO CIENCIA 2022. show case (16-18 May 2022, Lisbon/Portugal</p> <p>https://ghm.ihmt.unl.pt/encontro-ciencia22-review-on-demand/</p>



● BIOINFORMATICS HUB

The GHTM/IHMT Bioinformatics Hub supports bioinformatic research for the entire GHTM scientific community.

The high processing and data storage capacity of this infrastructure has been essential to follow the intense speed, complexity and volume of data that have been produced in the area of genome-wide sequencing. This infrastructure has been acting at four levels: sequencing, data management, support for research projects and enhancement of collaborative networks.

More specifically:

I. SEQUENCING:

● / ● Nanopore sequencing – MinION

Several GHTM researchers expressed their interest to carry out high-throughput sequencing in-house, as well as in fieldwork situations (refer to the Report on the analysis of the questionnaire for the purchase of MinION equipment and technology, from “Oxford Nanopore Technologies”). After evaluation of the available options, the portable equipment for nanopore sequencing MinION Mk1C, from “Oxford Nanopore Technologies”, was purchased in 2020. The management of MinION usage, namely concerning the schedule and storage space verification, is performed by the coordinator of the Bioinformatics Hub, with the support of the other members of the Hub.

Implementation actions performed:

- Implementation of the MinION usage regulation;
- Initial support in the use of the MinION equipment to ensure good application practices;
- Management of usage and timing;
- Reassessment of data storage needs

II. DATA MANAGEMENT:

- Research data produced at GHTM/IHMT has been managed individually by each research group, mainly resorting to ad hoc storage and sharing options.

Actions:

- To define a general standard operating procedure for data storage and management;
- To develop data management plans, as well as integration in data analysis systems, for particular GHTM/IHMT projects that require it;
- To regularly reassess the needs for computer infrastructure or access to remote platforms.

III. SUPPORTING RESEARCH PROJECTS:

- Bioinformatics support in the areas of genomics and transcriptomics was given in 2022 to several projects on HIV, HPV, Hepatitis, antibiotic resistance, Zika and other arboviruses.

Action proposals:

- To reinforce the support the development of projects and the analysis of genomics and transcriptomics data within the scope of ongoing research activities at GHTM;
- To manage all the bioinformatics equipment usage, assuring access and good practices, and proposing new acquisitions of computer material according to the research needs.



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IV. COLLABORATIVE NETWORKS:

IHMT is part of collaborative networks within the scope of bioinformatics applied to health. The reinforcement of the existing bioinformatics infrastructure will allow to expand the networks and look for new collaborations and funding.

● Action proposals (ongoing):

- To continue to boost interaction and collaboration with national and international infrastructures and networks, namely, maintaining the participation in the PT-OPENSOURCE Infrastructure, in the REDCap (Research Electronic Data Capture) consortium, in the PrimaryCare@Covid19 and Lab-BioBanco digital platforms and in networks WANETAM-3 (West African Network for TB, AIDS, Malaria) and TB WGseq & Bioinformatic network (London School of Hygiene and Tropical Medicine);
- To strengthen partnerships and collaborative networks and prepare applications for funding;
- To develop exchange programs with CPLP partners.

The BIOINFORMATICS HUB will be evaluated and restructured in 2023 and in preparation for the new FCT application.



● / ● VIASEF

The “In Vivo Arthropod Security Facility (VIASEF)” is part of the Roteiro Nacional de Infraestruturas de Investigação since 2014. This infrastructure, hosted at the Instituto de Higiene e Medicina Tropical/NOVA, is devoted to the study of arthropods and the pathogens they transmit. VIASEF is specifically adapted to rear and maintain invasive and non-invasive arthropod vector species, transgenic strains and to perform transmission studies of pathogens of human and animal diseases that need to be handled in BSL-3 laboratories.

ACTIVITIES [● - Not done/ Canceled/ No Outcome; ● - Done/ Concluded/ Outcome ; ● - Delayed/ Postponed/ Delayed Outcome]]	EXPECTED OUTCOMES	EVIDENCES
<p>RESEARCH ACTIVITIES ONGOING IN 2022/2023</p> <p>● Ongoing projects associated to VIASEF and other insectaries</p> <p>● Lifetable and vector competence studies of <i>Anopheles coluzzii</i> from São Tomé and Príncipe</p>	<p>activities on the areas of anti-vector and anti-malaria products, host parasite interactions, vector physiology and parasite biology</p> <p>further details at *</p> <p>In the framework of the UCMI, a comparison between transgenic and non-transgenic lines of <i>Anopheles coluzzii</i> from São Tomé island will be performed for <i>P. falciparum</i> infectivity and lifetable traits</p>	<p>Ongoing -Several <i>Aedes albopictus</i> colonies were established from field collected mosquitos from Spain and São Tomé and Príncipe). Reference <i>Ae. albopictus</i>, <i>Ae. aegypti</i> colonies from MR4 were established. A <i>Culex quinquefasciatus</i> from Cape Verde was also implemented.</p> <p>2 MSc thesis</p> <p>A single attempt was made to test shipment procedures. This was accomplished but the implementation of a colony was not achieved due to the reduced numbers of specimens.</p>
<p>NEW RESEARCH PROJECTS PLANNED FOR 2022/2023</p> <p>● Submission of Expression of Interest regarding RNIE to FCT - joint proposal with an existing Infrastructure, CONGENTO (https://congento.org), another infrastructure from the Portuguese Road Map.</p>		<p>Under evaluation / No news from FCT</p>



<p>Experimental <i>P. falciparum</i> infections are predicted in the following projects:</p> <ul style="list-style-type: none"> ● LaCaixa, CaixaResearch Health 2022, HR22-00633 - The impact of mosquito microbiome and biofilm producing bacteria on malaria transmission. Partner Institutions: Instituto Superior Tecnico, Portugal and Department for Biomedical Research - University of Bern, Switzerland. (submitted) ● Changes in malaria transmission associated with biofilm-producing microbiota in the midgut of the mosquito vector. Partner Institutions: Instituto Superior Tecnico, Portugal and Department for Biomedical Research - University of Bern, Switzerland. (submitted) ● Targeting <i>Plasmodium</i> glycans for multistage antimalarial vaccination (PI: Susana Ramos). Partner Institutions: IGC, Portugal and INS, Mozambique. (submitted) ● Design and implement the VIASEF Business Model as requested by the financing agency and recommended in 2022 by GHTM SAB. <p>ONGOING PROJECTS WITH VIASEF – PLEASE SEE LINK</p>		<p>Not funded</p>
<p>CONGRESSES//EVENTS</p>		
<p>PUBLICATIONS/TRAINING</p> <ul style="list-style-type: none"> ● Short training course ● MSc projects: <p>Tiago Melo - Caracterização do microbioma de populações de <i>Aedes albopictus</i> de Espanha e de São Tomé e Príncipe - Concluded</p> <p>Eficácia residual de mosquiteiros impregnados de longa duração de ação em Bissau, Guiné-Bissau – Waiting for public defense</p>	<ul style="list-style-type: none"> - Security in BCL3 and ACL3. - Using the VIASEF (obligatory to use the infrastructure) 	<ul style="list-style-type: none"> - To be implemented in the 1st semester of 2023 - Taylor-made training courses, adapted to users' needs, were carried-out



<p>● / ● CAPACITY BUILDING</p>	<ul style="list-style-type: none"> - Promote the use of the infrastructure within the institution and outside - Finalize regulation for use and management - Implement reference mosquito colonies - Expand the ongoing projects with industry 	<p>On-going Regulations were made and homologated in March 2023</p> <p>On-going: <i>Next colonies to be established</i> Anopheles gambiae and coluzzii</p> <p>On-going: New funding proposals for joint ventures are being discussed</p>
<p>OTHER ACTIVITIES</p> <p>● VIASEF, IHMT-NOVA – US Embassy Lisbon, Portugal – International Visitor Leadership Program from the US Department of State</p> <p>Road Map</p> <p>● Participation in science outreach activities (e.g. Noite Europeia dos Investigadores, Open Day IHMT, Ciência VIVA FCT, etc)</p>	<p>Activities to publicize the infrastructure.</p> <p>Dissemination of VIASEF activities to general public, especially targeting “young scientists”</p>	<p>https://www.ihmt.unl.pt/viasef-ihmt-nova-embaixada-dos-eua-lisboa-cientistas-portugueses-e-norte-americanos-partilham-experiencias/</p> <p>On-going</p> <p>“5th International Workshop on Aedes albopictus, 10-13 May 2022, Montpellier, France”.</p> <p>ENCONTRO CIENCIA 2022. Show case (16-18 May 2022, Lisbon/Portugal</p> <p>https://ghmt.ihmt.unl.pt/encontro-ciencia22-review-on-demand/</p>