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Presentation Material of the Winning Projects

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Development of bio-based clay mortars for healthy and comfortable low energy buildings

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Energy use in buildings and for building construction represents more than one-third of the global primary energy consumption and contributes to nearly one-quarter of greenhouse gas emissions worldwide. The world population is estimated to grow in the next decades. Consequently, the global building floor area is expected to double by 2050. In this transition, a relevant amount of additional construction materials is expected to be added in the building stock to improve the thermal properties of the envelope and the efficiency of building systems, especially for heating and cooling.

In Latin America, 80% of the population lives in urban centers and settlements, where the building stock is largely represented by low-quality buildings with hygrothermal performance that often do not meet the minimal standard requirements, leading to an intense use of energy for heating ventilation and air conditioning systems with serious environmental consequences in terms of carbon emissions. Thus, the promotion of local construction materials, which require less energy for production and can significantly improve the hygrothermal performance of the envelope to decrease the operational energy of buildings, is a challenge that needs to be tackled fast to achieve sustainable growth.

Particularly in low insulated envelopes for humid tropical and subtropical climates, the internal and external coatings cover a fundamental role since they regulate the heat and moisture transfer through the walls, limiting the hygrothermal discomfort. Earth products, such as clay-based mortars, are alternative coating materials to cement which can lead to several benefits. Additional environmental, thermal and mechanical benefits can be achieved if bio-based fibres are added in the mixture.

This project proposes the development of bio-based coating mortars using lime, clay, pozzolan and bamboo biomass that would allow the Swiss and Brazilian teams to combine their expertise and start to work together on a concrete product. The use of biomass and clay in the mortar increases its open porosity, facilitating water vapor exchange, decreasing its thermal conductivity, helping to regulate the hygrothermal performance of the building and improving the human health quality. Besides, the bio-based clay mortars present a potential reduction of environmental impacts when compared with traditional cement based coating mortars. Life Cycle Assessment methodology will be used to benchmark the environmental performance of the BCM in relation to conventional solutions. The main expected result from this proposal is a deeper understanding of the potential benefits of this BCM on energy consumption, human health and wellbeing as well as merging the expertise of both teams. The mortars obtained are expected to be applicable not only in Brazil, but also in other Latin American countries such as Colombia and Ecuador, which are also located in tropical and subtropical regions and have great availability of local bamboo biomass. As the bio-based mortars will present a formulation quite similar to those used in antiquity in historical earthen buildings, they can also be used in restoration and retrofit of historical earthen buildings, as the formulation is quite similar to those used in vernacular buildings.

Host-dependent mechanisms of anti-leishmanial drug susceptibility

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Leishmaniases are a spectrum of neglected parasite diseases of serious public health importance with 350 million people at risk of infection worldwide. The cutaneous form of the disease (CL) is the most prevalent form with an estimate of more than 1.2 million cases each year. Colombia is second among the countries with the highest number of CL cases in the Americas. Transmission of cutaneous Leishmaniasis occurs in and is expanding beyond sylvatic habitats. Evidence of intrinsic differences in drug susceptibility among *Leishmania (L.) Vianna (V.) panamensis* strains and primary and secondary resistance of *Leishmania* of the *Viannia* subgenus isolated pre- and post-treatment with the standard of care anti-leishmanial drugs meglumine antimoniate and miltefosine has been documented in Colombia. The mechanisms involved are likely to be diverse yet remain to be determined. In this joint Research Merger proposal, we will exploit human and murine model systems to discern the role of the innate cell responses in drug susceptibility. We will analyze drug susceptibility phenotype of clinical strains of *L. (V.) panamensis* that have been characterized for their susceptibility to the anti-leishmanial drug formulated for their treatment to discover the inter-relation of human neutrophil responses (in the presence and absence of anti-leishmanial drugs) and parasite drug susceptibility phenotype. Concomitantly, we will examine this relationship and other parasite and host-dependent mechanisms involved in anti-leishmanial drug response *in vivo* using our recently developed experimental model of dermal infection with *L. (V.) panamensis*.

This project will be uniquely feasible through the joint collaboration and expertise of the Colombian and Swiss research teams and their institutional capacities and laboratory and clinical facilities. The Colombian team has over 35 years of experience in the natural history, immunobiology and therapeutics for human cutaneous leishmaniasis, a bio-bank of well-characterized and documented drug-resistant or susceptible *L. panamensis* clinical strains and access to endemic populations. The Swiss research team has long-term expertise in the immune response for experimental cutaneous leishmaniasis, access to state of the art imaging facilities allowing the analysis of adaptive and innate immune response including neutrophil biology. Data obtained in this merger project will provide the evidence and lay the groundwork for more comprehensive and longer-term collaborative investigation of the host and parasite determinants of therapeutic outcome.

Recent building typology puts Colombia at earthquake risk? From large-scale structural laboratory tests to city-scale assessment

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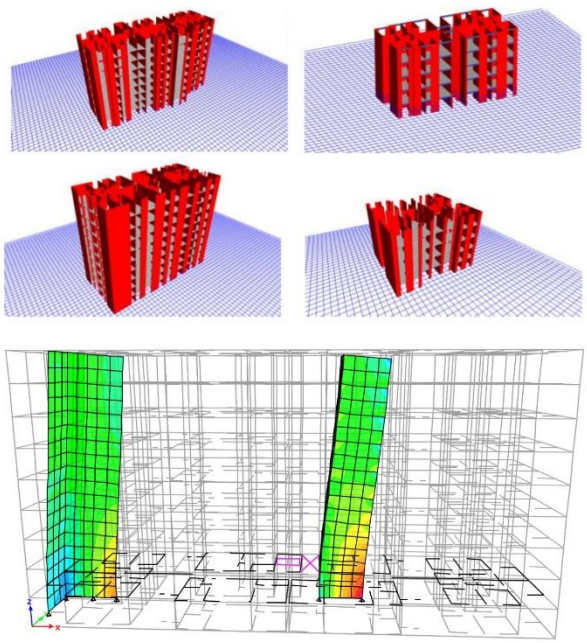

Over the past 10 years, an ever increasing and by now significant part of low-to-middle income population in some South American countries has moved to new reinforced concrete (RC) buildings whose structural skeleton is composed of walls. These vertical members not only support the weight of the building but also resist the horizontal loads imposed by earthquakes, which are a serious threat in these medium to high seismicity regions. The new building typology adopted in Colombia presents distinct and unseen features from most RC wall construction worldwide, which raises concerns within the scientific, engineering, and construction communities in Colombia, as well as in society overall, regarding the possible underperformance of this structural system under seismic loading. In order to reduce material costs, which are critical with respect to labour costs, very thin walls with only one layer of non-ductile steel reinforcement bars are being used, together with very thin slabs. Some building walls have a simple rectangular cross-section geometry, but most have very irregular non-rectangular geometric shapes, such as U-shapes, to accommodate lift shafts or staircases and to respond to architectonical configuration constraints. Their seismic behaviour is quite distinct and it can be reasoned qualitatively that U-shaped thin walls are more prone to instability and non-ductile failures than their rectangular counterparts. Unfortunately, the desirable quantification is still missing since no experimental tests on U-shaped thin walls with one rebar layer were performed to date. The present project covers this unacceptable gap by performing large-scale tests of U-shaped walls in Colombian and Swiss laboratories, which will allow to characterize the behavior of these structural members under horizontal loads along different angles. Potential structural weaknesses that should be taken into account by engineers, either in the design of new buildings or in the assessment and strengthening of existing ones, will be identified. The experimental results will also enable the development and calibration of reliable computer simulation models of entire buildings, which will be used to derive trustworthy fragility and vulnerability curves. The latter, together with extensive data collection for a state-of-the-art exposure model, will finally produce estimates of the seismic risk of this building class in the biggest Colombian cities. This project builds on the partners' expertise on experimental tests, U-shaped walls, rectangular single-layered thin walls, and seismic risk assessment. The conclusions will be made available to local and national authorities and used to update the national construction code. The dissemination of the project outcomes will be achieved with targeted seminars and journal publications.

Symbolic forms of non-judicial remedies for corporate human rights impacts.
A field exploration in Colombia's post- peace agreement context

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The United Nations Guiding Principles on Business and Human Rights (UNGPs) establish that corporations have the responsibility to respect human rights (United Nations, 2011). Respecting human rights, according to the UNGPs, implies to engage in the provision of remedies where corporations have caused or contributed to human rights wrongs (Art. 22 United Nations, 2011). Human rights violations, though, are not standard abuses. They have a profound impact on individual and collective dignity. Hence, reparations should address such moral dimensions along with the material redress required in connection to the corporate human rights wrongs.

Symbolic Reparations (SR) (*e.g.* public apologies, commemorations and tributes to victims, official declarations restoring the dignity and reputation of victims, etc. (*c.f.* United Nations, 2005)) are recognized as remedy mechanisms uniquely positioned to tackle such intangible dimensions of human rights violations and effectively contribute to the restoration of a victim's dignity (Mégret, 2009, p. 6; Minow, 1998, p. 103; United Nations, 2008). Yet, the provision of symbolic remedies by corporations remains a largely neglected topic. While the theory and practice of SR have been the object of extensive discussion when deployed by states, particularly in the transitional justice context (*e.g.* David & Choi, 2005; De Greiff, 2006; Hamber, 2006; Verdeja, 2006), the actual and potential role of private actors on such reparation schemes remains barely explored.

In 2016, after more than five decades of conflict, the Colombian government and FARC guerrilla signed a peace agreement (Government of Colombia, 2016a). During the conflict, many business corporations found themselves enmeshed in serious human rights violations (CREER, 2017d). Thus, the current Colombian transitional justice context offers an excellent field research opportunity to understand and assess different case studies of corporate SR initiatives. The aim of this research is to shed light on the triggers and constrains at play in the implementation of SR mechanisms led, or participated, by corporations. Ultimately, the goal is to identify the key elements that should be part of effective and morally relevant corporate SR initiatives. This research explores the concept of Restorative Justice (Braithwaite, 2003; Marshall, 1999) as a potential avenue for a more comprehensive reparatory approach combining material and symbolic approaches in the Colombian context.