# Basic science for human development, peace, and planetary health

## Concept Note

The Pontifical Academy of Sciences has held conferences and issued science-based statements urging to address, among others, the massive health problems caused by the pandemic and by inadequate health systems, the large-scale destruction of nature and the climate crises, artificial intelligence, rising inequalities, hunger and poverty, and increasing local and global conflicts. We identified specific science opportunities to address each of these problems.

The Academy has a strong track record of seeking scientific solutions and engaging with political and societal actors to implement innovative actions to overcome the most serious problems facing humanity.[1] The 2022 Plenary does not abandon this perspective. Actually, the emphasis on basic science in this conference with a thought-perspective "*from basic science to problem solving",* is in the long run not in contradiction to the perspective *"from noting problem to search for science"*. Both perspectives serve human advancement and our planet, yet the former is at risk of being somewhat marginalized. This is especially true when crises, wars, and growing risks trouble people and planet, as is currently the case.

There are, for instance, key areas where basic science is going to improve human welfare, such as medicine, food systems, and energy and more. Many of the main disciplines of science are involved in those areas. The progress and prospects of basic science relating to those areas are hugely important and clearly timely. Moreover, basic science is of intrinsic value. Obtained insights

lead to deeper understanding, knowledge and possibly wisdom.

While keeping human development, peace and planetary health problems in perspective, the 2022 Biannual Plenary of the Pontifical Academy of Sciences aims to explore and highlight the driving forces and opportunities relating to *basic science for human development, peace and planetary health.* We will be addressing the following questions:

1. What are new and emerging breakthroughs in sciences?
2. How did science breakthroughs come about? And then ask
3. How can they influence new, better and more effective ways to reduce the threats and problems for people, peace, and planet?

The first two questions are fundamental to science processes. The third one is a challenge which we must engage in, too.

It is ever more important for **science to have peace as a goal**. The Pontifical Academy of Sciences did actively engage in support of this goal at critical junctures before, such as addressing threats of nuclear war, and more recently, risks of Artificial Intelligence and robotics in warfare. The many ongoing armed conflicts are of grave concern to us. The accelerated and even global risks that emerge from threatened or actual attacks by powerful countries on neighbors are putting political order and human civilization at risk. At a time, when science is so dominant in culture, all science disciplines should consider their potential contributions to peace. Peace is a precondition for sustainable development. Divisiveness, for instance related to race - not just absence of war- undermines both, peace and planetary health. This is the rationale of our theme **“Basic science for human development, peace, and planetary health”**.

The time horizon of science for certain issues such as climate, biodiversity, genetics, robotics must be very long term, even decades or centuries. Emphasis on basic sciences with a humanity and planetary health perspective is very much in line with the Academy’s Statute, “The aim of the Pontifical Academy of Sciences is to promote the progress of the mathematical, physical and natural sciences and the study of epistemological problems related thereto” and PAS “…promote(s) the progress of sciences and the solution of important scientific-technical problems, which are fundamental for the development of mankind”. When taking long-term views philosophical questions and epistemological problems must also be considered. An obvious one may be the ambit of science, what can be known, and how many problems there are beyond its consideration. This PAS Plenary Session features **a session in honor of H.E. Msgr. Marcelo Sánchez Sorondo**, our admired and esteemed former Chancellor, on the occasion of his 80th birthday. We can relate to Aristotle, who at the beginning of his Metaphysics, said “It is through wonder (τὸ θαυμάζειν) that men now begin and originally began to philosophize; wondering in the first place at obvious perplexities, and then by gradual progression raising questions about the greater matters too, e.g. about the changes of the moon and of the sun, about the stars and about the origin of the universe”. Admiration even leads one to wonder about the very origin of the whole

universe, which some said was produced by chance, others by an intelligence, and others by love. “Now he who wonders – continues Aristotle – and is perplexed feels that he is ignorant (thus the myth-lover (ὁ φιλόμυθος) is in a sense a philosopher, since myths are composed of wonders); therefore, if it was to escape ignorance that men studied philosophy, it is obvious that they pursued science for the sake of knowledge, and not for any practical utility” (Aristot. Met. 1.982 b 11-20). The fact that important discoveries didn’t come about because of a goal, but because of **curiosity** as a result of wonder and admiration, raises philosophical, ethical, religious, as well as science policy questions. All knowledge, whether scientific, philosophical, or theological, is concerned with discovering the origin and cause of wonder and goes from wonder to wonder. Thus, Aristotle can show another essential attribute of disinterested knowledge which is that of being liberal or free: “Clearly then it is for no extrinsic advantage that we seek this knowledge; for just as we call a man free (ἐλεύθερος) who exists for himself and not for another, so we call this the only free science, since it alone exists for itself” (Aristot. Met. 1.982b 28-30).

This Plenary is driven by the expectation that strong support for curiosity-driven science has huge payoffs that often come about in unpredictable ways, mostly in the long-term, but increasingly even in the short term. A fine example of what basic science can achieve, as it happened, is the rapid development of the COVID vaccine thanks to developments in the decade-long studies of messenger RNA, which were planned for completely different purposes. Moving beyond anecdotes we want to explore systematic patterns in the progress of basic science insights in different disciplines and their interdisciplinary linkages. The conference discourse shall include voices of scientists about the challenges they faced, in order to understand the very basic aspects of the problem regarding, for instance, cutting-edge science like CRISPR-cas, Quantum Physics, Laser innovations, atmospheric science, mathematical algorithm innovations or Astrophysics.

The theme of the 2022 PAS Plenary is timely also in view of the **United Nations’ “International Year of Basic Sciences for Sustainable Development”** that will be developed on the basis of themes identified as priorities by UNESCO and the United Nations. https://www.iybssd2022.org/en/home/.

The Pontifical Academy of Sciences had already addressed issues of **beliefs and science skepticism** in the public at large, and the ability to adhere to false beliefs instead of rational arguments. These issues have further emerged in recent years. It is thus necessary to further consider at the Plenary 2022 the determinants of these tendencies, the role that religion may play in both adherence to science skepticism and openness to science, and the opportunities of science education to make a difference. Science discourse at PAS is transparent to the global public.

The **narratives on basic sciences** among PAS Academicians might be of interest to a broad community to see how science is done, and what can come out of it, not neglecting risks of misuse of science. We encourage scientists at the conference to speak from the bottom of their hearts

about all aspect of curiosity-driven science, which has at times ended up unintentionally changing the world. Academicians may share their diverse narrative on what brought them to the invention and how curiosity and great efforts drove their work, but also how they connect to the big issues mentioned above, i.e. human development, peace, and planetary health.

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[1] See events and conferences at https://www.pas.va/en/events/plenary-session.html and https://www.pas.va/en/events/workshop.html