Science, what science ?
A problem or part of the solution?

When the industry doctors science for profit

Science without conscience…

In his book Pantagruel (1532), François Rabelais wrote: "Science without conscience is the soul's perdition". This statement is true more than ever nowadays, and one may add to it without any hesitation, "and that of the world".

Indeed, now more than ever, probably, and much more than during the scientist[1] period of the 19th century, science and its application, technology, are presented today by our leaders as the best - if not the only - way to solve the multiple problems faced by the world[2].

Yet, many of these problems - in fact systemic crises - are the results of technologies developed by humankind since the middle of the 19th century. The most emblematic - often mentioned on hungerexplained.org - include climate change (because of the use of technologies relying on the consumption of fossil fuels) and the degradation of natural resources (water, land, biodiversity) required for the production of our food (due to the use of toxic chemicals and powerful thermal and electrical energy-driven machines such as tractors, boats and others [read pp. 161-165]), not forgetting the nuclear danger that is back on the news headlines following the invasion of Ukraine by Russia and the energy crisis linked to climate change.

Science and its technological applications made possible two major shifts:

- One consisted in de-multiplying the capacity of action and the physical impact of humankind resulting from a spectacular increase of labour productivity. By means of science, humans, who weigh only 0.01% in total biomass on Earth [read], deeply modified the environment of the planet, to the extent that some say that we entered a new geological era, the Anthropocene[3] a few decades ago. Thus humans have become a planetary force disproportionate with its physical importance.

[1] For scientism, 'scientific knowledge should help to be free from ignorance in all fields and to organize humanity in a scientific way. Politics gives way to a purely rational management of social problems and this leads to a type of government where the role of specialized technicians in a particular field is central to decision-making' [read in French].

[2] This is also the belief of the World Economic Forum of Davos that groups large transnational companies and political leaders [read].

[3] This word was used for the first time by Pavlov in 1922 [read] and became popular in the 1980s.

- The other was the extraordinary increase of labour productivity itself and of the resulting standard of living. This second consequence was without any doubt a reason why science and technology remained at the centre of “modern” mainstream ideology.

What is science?

The actual definition of what science is precisely is, however, not straightforward, as illustrated by the events and controversies that occurred during the COVID-19 crisis. The idea that science was a solid, rather monolithic block of knowledge, widespread in the public, was undermined by hesitations, debates and changes of opinions - that have nevertheless been characteristic of the realm of science over the centuries - shown by the media to an often dumbfounded population.

The Cambridge Dictionary defines science as “the careful study of the structure and behaviour of the physical world, especially by watching, measuring, and doing experiments, and the development of theories to describe the results of these activities”. In other words, examining and assessing facts, before interpreting them. Other definitions emphasize that these results make up a consistent body of explanatory knowledge [read in French] that includes testable predictions [read] and statements independent of who formulates them [read in French]. The history of methods used by science and their evolution are the objects of a specific philosophical discipline, epistemology or theory of knowledge.

What has just been stated on what science is, stresses its evolving nature, including both changing methods and results over time, that led to a succession of scientific revolutions that have deeply affected our understanding of the universe. Thus, history of science is marked by a series of names of great scientists that have revolutionized knowledge (Copernicus, Newton, Darwin, Planck, Einstein, Watson and Crick, etc.).

The ways in which science is produced, and their implications

The central role of science in the recent evolution of the world and its growing impact on the environment in which humans live, through the technological development it makes possible, calls for a brief reflection on the organization of the knowledge production process, on the method of translating it into technological applications, and the context in which these are used.

Public - private

One of the major aspects to be considered here is the respective roles of the public and private sector in scientific research and technological development.

In general, public funding is associated to large long-term projects of a rather basic nature, while private funding is expected to concentrate mostly on short-term commercial objectives aiming at producing knowledge that can rapidly be used by economic agents to develop applications that are likely to generate profits. These applications usually lead to machinery, equipment or inputs. In the case of food and agriculture, for example, private research is essentially seeking to create new agricultural or food processing machines and inputs such as seeds, fertilizer, pesticides, animal feed and veterinary medicines.

Of last, methods, data and other forms of knowledge (farming practices and decision-making, in particular) have now also become commercial goods, with the development of digital applications. This evolution has considerably contributed to the broadening of private research [read].

Over the past decades, private research, often funded by large and fast-growing multinational companies, has expanded very fast and more rapidly than public research. In agriculture, private funding of research and development has been multiplied by 3 between 1990 and 2014, reaching double-digit growth rates (e.g. 15.5% in 2020), and the R&D budget of 5 transnational companies has been more than $1 billion annually! [read, p. 167]

This remarkable development raises three major issues:

- The first is that rapid growth of private research funding may reverse its relationship with public research. While in the past, public funding served to develop a basic knowledge for private research and development, and to orient its direction, nowadays, through public-private partnership and research contracts, it is the private sector that increasingly influences a relatively underfunded public research, inducing it to concentrate in areas where applications are most promising and profitable and where it can then attract private co-funding.
- The second, a direct consequence, is related to the risk that research and technological development may give excessive priority to the pursuit of quick profits to the benefit of vested interests, to the detriment of more long-term considerations (in particular sustainability) and the general interest. This could further amplify the negative environmental impact of technological development observed over the last 150 years.
- The third has to do with the danger that the more disadvantaged groups who are unable to have access to new technologies because of limited financial means, will be increasingly marginalized and excluded from economic development, thus aggravating further inequality and social tension.

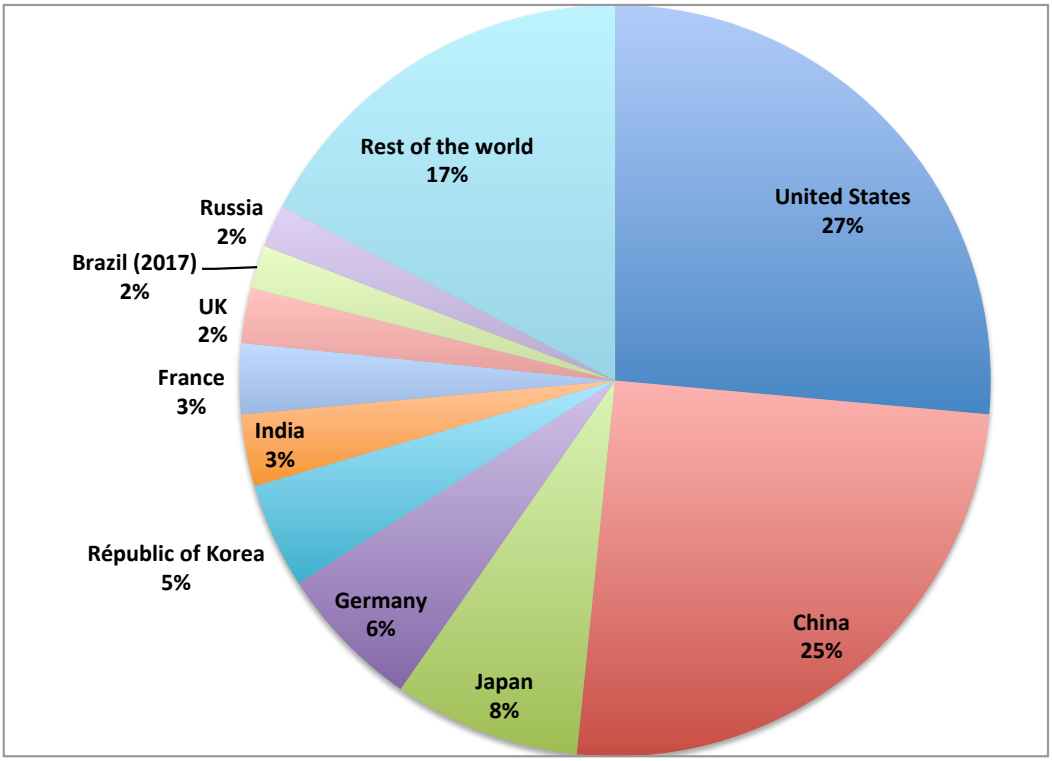
In other words, this development could weaken crucially important scientific domains for humanity as a whole, by handing over more power to those who might direct scientific progress to areas that mostly benefit a minority that is already privileged.

It is, however, crucial to be aware that the bias towards economic considerations that affects science is not limited to the production and use of scientific knowledge by the private sector. It is also quite present in public authorities that do not fail to "omit" to take into account some scientific results when they contradict their own immediate economic interests or those of influential private agents, happily sacrificing the health of their population or the quality of natural resources (see below).

Rich countries - poor countries

As a whole, research and development activities have historically been dominated by rich countries. In 2018, they were 80% concentrated in ten countries, among which a few large emerging countries appeared recently. As seen in **Fig.1**, the US and China, alone, represented more than half of the research and development spendings [read].

Fig. 1: Country-level expenditure in Research and Development (2018) in US dollars PPA



Source: UNESCO

Spendings reached a total of $2,200 billion PPP[4], equivalent to around 1.7% of world GDP. The regions where they were the lowest were Sub-Saharan Africa and Central Asia with less than 0.5% of GDP.

[4] Purchasing Power Parity (PPP) is a rate of currency conversion that equalizes the purchasing power of different currencies by eliminating the differences in price levels between countries. In their simplest form, PPPs are simply price relatives that show the ratio of the prices in national currencies of the same good or service in different countries. PPPs are also calculated for product groups and for each of the various levels of aggregation up to and including GDP (OECD).

The differences in expenses lead to striking inequalities in the production of scientific articles. In the 1980s, they were concentrated by more than 90% in rich countries. In the 2010s, this share had fallen to approximately 70%, while it had grown from 3 to 25% for emerging countries.

Domination of research by rich countries can also be measured by the frequency of citations of scientific articles for which they represented more than 97% during the 1980s, and still more than 80% in the 2010s [read]. In certain disciplines, the concentration can even be higher. For example, in research on climate change, energy, transport and industrial decarbonization, the 5 main countries or regional actors (UK, EU, US, Switzerland and Norway, by order of importance) that have seen the larger public funding this area between 1990 and 2020, represented 90% of the world total of citations [read].

This quick assessment gives an idea of the concentration of research and technological development activities in a small number of rich and emerging countries, and of the scientific and technological dependency this creates for the rest of the world. This dependency generally leads to gaps in technology (and labour productivity, as well as income), as countries have a tendency to protect technological innovations source of commercial advantage, by exporting only obsolete technology (with direct foreign investments possibly excluded), thus perpetuating and even reinforcing global technological, economic and social inequalities [read], that constitute potential sources of tension.

Without conscience … science, a matter of power

Beyond its production and application, science has become a matter of power[5]. That is the origin of this absence of conscience, this lack of respect of deontological rules, this cynicism that brings about harmful practices of control, doctoring, deception and sometimes even of challenging science and creating doubt, that may have dramatic consequences for the well-being and health of humankind and the environment in which it lives.

Science has become a critical matter in the pursuit of profit. This can lead to selecting scientific results that are useful for this purpose, hiding others that are disturbing, or putting them in doubt even when they are proven and irrefutable. As mentioned earlier, this behaviour is not specific to the private sector, as it can also be adopted by political and administrative authorities to reinforce their power, occasionally in collusion with the private interests funding them.

The following examples illustrate some proven and documented cases.

Funding scientist to sing the praises of **sugar**

On several occasions, producers of sugar and sweetened drinks have funded scientists to use their authority in order to make sugar popular among consumers and to put in doubt the negative effects of these products on health as they had been proven by scientific research.

[5] Science has been used as a source of power and prestige for long, as illustrated by the importance given to science by the Ptolemaic successors of Alexander the Great as early as in the 4th century BC.

Examples of interference by the sugar industry presented in **Box 1** show the selection of favourable research findings made by some operators, whether private or public. Using corrupt scientists and making of science - “a principle that should guide humanity” - a proof of their seriousness, they carefully avoid to state their real objectives that guide their communication, whether commercial or political, depending on cases.

Box 1: The case of sugar

In 1967, the *Sugar Research Foundation*, currently known as the Sugar Association, that gathers large US sugar companies, paid the head of the nutrition department of the prestigious Harvard University and two of his colleagues the amount of $6,500 (equivalent to approximately $58,000 in 2023) to publish an analysis of the role of carbohydrates and dietary fats on atherosclerosis, in the *New England Journal of Medicine* (NEJM) [read]. The papers to be reviewed had been pre-selected by the Foundation and the result of the analysis was that the level of consumption of carbohydrates (sugars) had a minimal effect on the development of atherosclerosis, and that the main responsible products were dietary fats [read]. One of these three scientists was later responsible for drafting the first US dietary guidelines.

Almost 50 years later, in 2015, in order to support a “new science-based solution” against obesity relying on the control of weight, physical exercise and stop worrying about reducing caloric intake, the Coca-Cola multinational company mobilized scientists to promote this message in professional journals, conferences and social media, by funding them and paying for their logistics through the Global Energy Balance Network, a non-profit organization created in 2014 and closed late 2015.

In 2016, a publication by three researchers, funded by an association comprising candy producers and a consultancy firm providing advice to food companies, concluded that “Sugar candy consumers were 21% less likely (p=0.0015) to be overweight and 20% less likely to be obese (p=0.0150) than non-consumers” [read]. The industry conducted a very active promotion around this result, while the authors, themselves, did not value it so much [read].

Similar interferences have been revealed in other fields and for other products, as testified by the Monsanto Papers, showing the use by multinationals of paid authors who sign papers favourable to the paying firm and its products [read here and here], sometimes imposed under pressure to well recognized scientific journals. These doings create biases in conclusions of future peer-reviewed literature reviews.

Weak risk assessment procedures (**pesticides**)

In many countries, pesticides (herbicides, fungicides, insecticides, plant growth regulators and disinfectants used in storage facilities for crop products) are ruled by risk assessment procedures that have to be followed before they are allowed to be released on the market [read].

In Europe, it is the firms producing these chemicals that have to provide evidence of their safety for human health and the environment [read]. The Union-level approval is given after assessment by the European Food Safety Agency, EFSA. Once this approval is granted, the firms have to file a request with national health authorities (in France, l’Agence nationale de sécurité sanitaire - ANSES).

This process seems simple and logical, but it has been strongly criticized. Pesticide Action Network Europe (PAN Europe) blamed European authorities for having approved active substances found in pesticides while having only partial information in their hands. Indeed,

in some cases, the industry is authorized to submit some data after approval, especially when new scientific knowledge and techniques are involved. PAN Europe estimates that "around 200 active substances that pose a danger for the environment and biodiversity have been authorized by the EU Commission in an illegal manner and, in some occurrences, despite having been identified as being 'dangerous' by EFSA" [read in French].

A recent report (in French) prepared for the Parliamentarian Office of Evaluation of Scientific and Technological Choices of France (Office parlementaire d'évaluation des choix scientifiques et technologiques) analyses in detail the risk assessment process, highlighting its weaknesses and making recommendations to make it more reliable (**Box 2**).

Box 2: The report by French parliamentarians on risk assessment

This report, prepared for the Parliamentarian Office of Evaluation of Scientific and Technological Choices, deals with the availability of valid information on the risks arising from goods and techniques used by the industry, and on the quality of the methods of assessment of their effects and dangers. In addition, it also raises the issue of the available expertise, its organization and the resources mobilized for this purpose. Finally, it stresses the widely shared feeling in the public that the assessments are biased and risks underestimated, that results from doubt on the independence of the European agencies that are responsible for these tasks. This feeling rests, according to the report, on a series of scandals and polemics related to the mad cow (BSE), asbestos, chlordecone, neonicotinoid and glyphosate crises.

The competency, independence and diversity (from a disciplinary, professional and school of thought point of view) of the experts mobilized for assessments, the comprehensiveness and accuracy of data available, the reliability of the evaluation and experimental methods used and their validation by the scientific community, and the handling of uncertainty, are the challenges emphasized by the authors of the report. They also note the reuse by allegedly independent assessments of reports prepared by the industry, or the discarding of some scientific studies unfavourable to the products assessed, following the intervention of the firms manufacturing them. Finally, they lament a generalized lack of transparency.

The report also stresses the critiques made of the assessment process, because tests made prior to approval are carried out by the manufacturers. Moreover, studies conducted are only rarely made fully available to the public, on the ground that the industry's commercial interests should be protected. The verifying agencies are suspected to do their job with insufficient depth and to trust exceedingly the reassuring statements made by the industry. Additional criticisms are made on the scope and methods of the studies: too short duration of experiments, insufficient number of species on which impacts are analysed, concentration on the main active element (and not the co-formulants and other additives), and failure to deal with the effects of a cocktail of products.

The report concludes by making 13 recommendations comprising, among others:

- The creation of a research fund for studies to be conducted by the agencies aiming at improving the knowledge of dangers.
- The development of tools for monitoring the effects of products in a real situation.
- The full availability to the public of the data included in the documentation submitted to the assessment agencies, so as to make it possible for associations to make their own independent evaluation of risks.
- The effective control of conflicts of interests declared by the staff and experts of the agencies.

One may regret that this report by parliamentarians does to propose what appears to be a desirable solution, namely to have the agencies carry out really independent assessments (either directly or through contracts with independent laboratories), funded by financial resources drawn from a fund financed by industrialists wanting to put a product on the market, instead of leaving this responsibility to the industry, with all the dangers this entails[6].

Doctoring science (**climate change**)

Nowadays, there is a growing number of more or less sophisticated publications aiming at manipulating science with a specific - but covert - objective. Beyond conspiracist pamphlets full of downright stupidities and spurious arguments, a more elaborate literature has developed that looks serious in order to influence more effectively the way in which the public perceives or questions scientific statements. The book by Danish statistician and political scientist Bjørn Lomborg[7], is one among the most accomplished examples (**Box 3**).

Box 3: The case of "The skeptical environmentalist", Bjørn Lomborg's book

In his book "The skeptical environmentalist", Lomborg refers to part of the scientific literature available on climate change and uses the appearance of a good scientific text understandable by a large public, with curves and graphs to give it more credibility. However, the book is full of misleading statements and approximations, as well as erroneous reasoning [read]. He quotes journalists or militants while attributing their remarks to the scientists they cite, accuses the IPCC of being biased, makes risky and even wrong extrapolations, selects scientific articles that support his assertions but do not represent the totality of the best knowledge available [read] and presenting them as proven facts, even when their authors acknowledge that they are partly uncertain, while omitting to mention the opposite views of other scientists. He also tends to mix up scenarios and forecasts [read in French]. Consequently, some of his critiques describe him as

> "A political scientist who wades into the vastly complex, unsettled literature of environmental science, scrutinizes a fraction of what is to be found there, and emerges confident that the simple summary he has developed is a fair and accurate representation of the science notwithstanding the warnings of experts in the disciplines he skims that he is mistaken." [read].

In fact, the main criticism of Lomborg's book is that he presents himself as a scientist when his work was neither peer-reviewed nor commented before being published. In response to those who criticized him, Lomborg has attacked researchers and environmental groups, accusing them of focussing on what is not working and amplifying it in order to get more finance to develop their own activities. In addition, although he introduces his book as a disinterested immersion into environmental sciences, his implicit goal seems to seek to diminish the unjustified importance, according to him, that scientists have taken in the political debate. In this sense, his work can be considered as polemical [read].

[6] See, for example, the television series « Jeux d'influence » broadcasted on ARTE and available on ARTE.tv in French and German [watch].

[7] Lomborg, B., The skeptical environmentalist, Cambridge University Press, 2001.

Box 3 (cont'd)

And it did indeed create polemics, given that his approximations and manipulations made it possible for him to put in doubt the mainstream scientific narrative and to conclude that there was no need to worry about climate change (even though, a few years later, in 2010, when publishing another book, he acknowledged that climate change needed more attention! [read]).

The doubt around Lomborg's book also pertains to the way in which it was produced. Several commentators have questioned the probability that one individual could have the expertise required to write it. Consequently, they have wondered what kind of team supported him in his work and how it had been financed [read in French].

Embargo on scientific findings, communication and political pressure on governments (**greenhouse gas, GHG**)

The effect of CO_2 in the air on ground temperature has been known for long.

In 1827, Joseph Fourier, the French mathematician and physicist, was one of the first scientists to compare the atmosphere with a greenhouse, but it is in 1896 that Svante Arrhenius, the Swedish physicist who was among the creators of the Nobel Prize (and who obtained the Nobel Prize in chemistry for the theory that explains electrolysis), published a scientific study "On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground" [read].

Much closer to our time, a series of studies have documented how large oil multinationals (ExxonMobil et Shell) developed their own research and managed warnings and controversies on climate through schizophrenic communication and political pressure [read for example here and here]. Indeed, while their research dating back to the 1950s demonstrated the risks created by the exploitation of fossil fuels for humans and the environment, these firms organized vicious communication campaigns that negated this danger, casting doubt on the results of scientific publications and obstructing measures that should have been implemented by governments to limit them, while continuing to search for more fossil fuel fields in order to increase their activities. A 2021 study shows that the doings of Total, fourth-largest energy company in the world, were similar, "producing ignorance, spreading doubt on the legitimacy of climate science, combatting regulation" [read] (**Box 4**).

Box 4: Total's perfidy

By analysing Total's archives and interviewing former senior managers of this fossil fuel company, researchers could have a fresh look at the history of this multinational [read] and demonstrate its "wilful blindness" made of duplicity as well as its disinformation practices aiming at propagating ignorance and doubt, its denial of accountability and "responsibility-shifting, strategic philanthropy, promotion of peripheral solutions, and corporate controversy management".

It turns out that as early as 1971, the company's internal magazine (Total Information) published an article on atmospheric pollution and climate that already stated the main points on the link between climate change exploitation of fossil fuels, and made rather precise forecast of what actually happened since. This was in line with a report submitted to US President Johnson in 1965 that warned him of an almost certain change in temperature and preceded several anticipating a rise of temperature if humanity did not change behaviour.

Box 4 (cont'd)

In reply to scientific publications, Total simply claimed that ecologists were "caught in the trap of nostalgia for a past that was not as pristine as it is assumed", in other words, accusing them to be Amish some 45 years before a French president, while, at the same time, creating what was going to become its Environment Department.

In 1986, an internal report revisited the inevitable nature of global warming and stressed the need for the sector to develop a defensive strategy, anticipating an era during which oil companies' objective was to postpone control measures over the use of fossil fuels. This was also a time when the effort was on improving the efficiency of the use of fossil energy, particularly by replacing coal by gas, a solution still proposed by a number of instrumentalized economists [read pp. 7 and 9] and implemented nowadays by the company through investment projects in the development of gas fields. At the same time, the coalition of energy companies carried out research seeking to undermine the credibility of climate models so as to postpone measures that governments might want to implement (such as the eco-tax that generated a ferocious lobbying battle in Brussels), arguing, among other things, that natural emissions were more important than those originating from human activities.

It is only towards the end of the 1990s that the oil companies, seeking to avoid a situation comparable to what tobacco colleagues had experienced, started to change narrative. Yet, Total still insidiously noted in its 2002 annual report that "without the greenhouse effect there would be no life on our planet", and "water vapour is the main greenhouse gas". Giving up frontal attack, the company incited doubt by qualifying the greenhouse effect as "the hypothesis most commonly accepted" and by putting forward a rhetorical "precautionary principle" supposed to encourage "moderation", a position that reminds of that of the agrochemical industry when it began to promote precision agriculture during the 2000s.

After 2006, Total acknowledged global warming and IPCC reports, its narrative dropping the idea of this phenomenon being uncertain to shift doubt towards its magnitude. The diagnosis was "scientific", but the solution could only be found in the hands of economic operators, meaning, of course, among others, with Total. This resulted in the creation of a "Gas and Renewables" group and a chair at the College de France to be held by economist Nicholas Stern.

Conclusion

While science and innovation can be part of the solution to systemic crises faced by the world, they are also one of its causes.

Scientific research and its applications are far from keeping with the ideal image depicted by some: rational, neutral, consistent, fully dedicated to the development of knowledge in all fields.

In reality, science reflects the society in which it is produced.

It is, nowadays, unequal, as it is produced for their benefit in the richest and most powerful countries, and thus reinforces dependency of poor countries on technologies others are willing to transfer to them. It is also unequal because access to knowledge and technologies is difficult for the less favoured population groups who are constrained by limited financial means. Finally, it is increasingly in the hands of large firms who orient it towards fields and applications that are most likely to lead to goods and services that can be sold and be sources of profit. Private interests are of growing importance in it, to the detriment of general interest, which explains precisely why technologies have become one of the causes of the major crises humankind is facing.

This makes public research essential to ensure a balanced research addressing all issues, not only for basic research, but also for applied research, particularly in areas where private companies do not venture and gaps need to be filled.

Nowadays, science has become a matter of power as much as a solution of problems. Corruption, manipulation and doctoring, deliberate lies that seek to challenge its results, inappropriate procedures, cynicism are some of the ways in which some actors, whether private or public, try to establish and reinforce their political and economic power.

These doings make of science a historical and social product that is affected by the balance of power and the counterproductive ethical choices this may bring about. (Is it more useful to replace biodiversity by machines, to protect it or to recreate extinct species? Should rare resources be spent to colonize Mars and make suitable for humanity, or use them to preserve Earth?)

The question, today, is not to be for or against science, as some claim in order to disparage those who criticize a biased science that serves a minority, and treat them arrogantly and with contempt as being backward, calling them Amish[8]. Rather, it requires to make science move forward so as to effectively contribute to the resolution of systemic crises, on the basis of clear objectives that make it serve and be available to all. It will then become a real part of the solution, and stop being an element of the problem.

For this, science should be assessed not just from the economic point of view, but also from the other dimensions of sustainability, namely, social and environmental. To achieve this, science will have to be governed in a way that gives priority to the general interest of humanity rather than to vested interests, as is the case today.

Then science will be 'with conscience', and Rabelais will be satisfied. At last.

Materne Maetz
(February 2023)

To know more:

- FAO, Innovation and science, p160 et suivantes dans The future of food and agriculture – Drivers and triggers for transformation, The Future of Food and Agriculture, no. 3, FAO Rome, 2022.
- Bonneuil C, et al., Early warnings and emerging accountability: Total's responses to global warming, 1971–2021, Global Environmental Change, Volume 71, 2021.
- Mishra S., Convergence and Inequality in Research Globalization, Cornell University, 2021.
- UNESCO, Global Investments in R&D, 2020.

[8] An intolerable insult that castigates a religious group living mostly in the US and originating from Switzerland and the French province of Alsace, who deserves to be respected as everyone else.

- Office parlementaire d'évaluation des choix scientifiques et technologiques, Évaluation des risques sanitaires et environnementaux par les agences : trouver le chemin de la confiance, 2019 (in French).
- Lomborg, B., The skeptical environmentalist, Cambridge University Press, 2001.
- Arrhenius, S., On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground, Philosophical Magazine and Journal of Science, 1896.

Selection of past articles on hungerexplained.org related to the topic:

- Everybody is worried about increasing inequalities … except the super-rich and our leaders, of course! 2023.
- Plants and bacteria largely dominate world biomass, 2022.
- Even what you don't know can hurt you: the case of glyphosate, 2022
- Governance: united to decide or divided to be ruled? 2022.
- Being a lobbyist : accept to accuse sustainable agriculture in order to help develop profits of firms that fund you, 2019.
- The wheelings and dealings of the sugar industry revealed by three Californian researchers, 2017.
- Opinions: Sweetened Research, Sugared Recommendations by Jomo Kwame Sundaram and Tan Zhai Gen, 2017.
- Scientific research under the influence of private interests, 2016.
- How the large multinational corporations in charge of our agri-food system try to earn themselves an ethical, pro-development image, 2015.
- Seven principles for ending hunger - Fourth principle: Development of research, 2013.