Scientists and the Establishment of a Mass Environmental Awareness

(1950-1990)

edited by JINGYUAN WU

ZENIT

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Federico Paolini

1. Some Remarks on the Italian Case

This chapter presents the results obtained by a Research Unit within the project Prin 2017 *Science, Technology and International Relations. Case Studies in Italian Foreign Policy*: the goal was to try to analyze the role played by experts – especially by some scientists who occupied leading positions within the scientific research institutions – in the affirmation of a growing environmental awareness in the institutions and in public space.

A purpose at the limit of imprudence, considering the state of literature on the Italian case. The reckless nature of the historical study of science and of Italian scientists had already been mentioned by Francesco Cassata and Claudio Pogliano in their introduction to Annal n. 26 of the *Storia d'Italia* (*History of Italy*) where the two scholars highlighted three contraindications: a historiography with large gaps and very unbalanced in relation to chronological scans and disciplinary areas; the marginal role of Italian historians in the international redefinition of the epistemology of the history of science; the «neglected» reserved for the contemporary age compared to the seventeenth and eighteenth centuries (Cassata, Pogliano 2011).

A neglect that becomes a real black hole if you want to study, in a historical perspective, the relationships between scientists and the environment in Italy: in the same Annal edited by Cassata and Pogliano there are no essays dedicated to environmental is-

sues, relegated to sporadic quotations. Some quick passages can be found in a previous essay by Pogliano (1995, pp. 555-634) and in the seminal book by Cassata *L'Italia intelligente* (2013, pp. 394-407), while environmental historians reserve isolated paragraphs for those scientists who can be considered the main inspirers (and/or protagonists) of the environmental movement (Armiero, Barca 2004, Neri Serneri 2005, pp. 278-308; Bevilacqua 2006).

Our research has not even been facilitated by the state of the art of international historiography, because the relationships between environmental history and the sciences continue to be complex and troubled.

Although some have identified in the environmentaal history a discipline capable of building solid bridges between the *two cultures* (Radkau 2008, p. 274), its trajectory has produced outcomes different from those hoped. Moreover, the premises for this operation were anything but obvious: Snow considered the intellectuals, and in particular the men of letters, Luddists «by nature» and, among them, explicitly quoted Ralph Waldo Emerson and David Henry Thoreau (two of the initiators of ecological thought) who, according to him, had devised fantasies of various kinds that in reality masked only «screams of horror» against industrial society (Snow 2005, pp. 34-39; McMurry 2003; Case, Johnson, Otterberg 2021). Since its origins, environmental history has been characterized by its closeness to the environmental movement and by the radical and anti-system approach (Armiero, Barca 2004, p. 26; Bevilacqua 2006, pp. 9-14; Radkau 2008, p. 3): this militant character has ended up with a strong ecocentric paradigm prevailing that on the one hand, it has weakened connections with anthropocentric stories (political history, social history, cultural history) and, on the other, it has failed to produce a real hybridization of knowledge (Paolini 2013, pp. 13-25; Bonan 2020, pp. 7-16).

Forty years later, Donald Worster acknowledged that the desired «vigorous hybridization between environmental history and the natural sciences» had not yet been achieved and that, until

that moment, environmental history had not helped overcome the division between «the two cultures» (Worster 2002, p. 142). In more recent years, Giacomo Bonan, inspired by an article by J.A. Thomas, wondered if, rather than «a hybridization between fields of knowledge so different», it was no longer desirable to opt for «a critical friendship» (Bonan 2020, p. 16).

In the international context, Daniel Lord Smail proposed a neuro-historical approach that involves the integration of history and biology in order to identify a new paradigm that can analyze, under a completely different light, the history of the genus Homo since the appearance of the species Homo ergaster 1.7 million years ago (Smail 2008). Dipesh Chakrabarty argued that intersecting «the history of the species with the history of capital is a process that tests the limits of historical understanding» and stressed «the growing gap in our consciousness between the global – an exclusively human history – and the planetarium, a perspective in which humans are incidental». Chakrabarty emphasizes the «shocking discovery of the otherness of the planet» and the «observation that humans – all humans, rich or poor – are the latest arrivals in the life of the planet and are in a condition more similar to that of temporary guests than exclusive masters» (Chakrabarty 2021, pp. 91-95, 136-137; Bonan 2018, pp. 129-143).

Within environmental history, those not many scholars who have dealt with science have ended up focusing their interest on functional scientific approaches to environmental thinking, in particular on those ecological theories believed to provide the scientific basis for the affirmation of a global environmental ethics (Fischer 2000; Lewis 2014, pp. 207-226; Bocking 2006, pp. 55-74).

This attitude – marked by a dichotomous vision that separates the friendly science (of the environment and environmentalism) from the harmful, anthropocentric and subordinate to the interests of economic growth – leads us to two issues of fundamental importance: the role of science in the affirmation of the western political-economic model and its relations with the multiple actors that control the public space.

Literature agrees in assigning to science (and its technological applications) a cardinal role in the affirmation of the West and its political, economic and social systems (Toynbee 2009; Hobsbawm 1995, pp. 605-644; Ponting 1999; Bayly 2007, pp. 378-392; Headrick 2011; Ferguson 2014, pp. 74-123; Harari 2019, pp. 307-378). It follows that scientific activities are, as Harari wrote, influenced and shaped by economic, political and religious interests because it is very rare for scientists to establish research programmes because research can thrive only by alliances with a given religion or ideology that justifies its costs and affects the scientific agenda and determines what to do with new discoveries (Harari 2019, pp. 337-341; Hobsbawm 1995, pp. 642-644).

This does not mean that scientific knowledge does not follow dialectic and autonomous dynamics – as, according to Kuhn's analysis, the succession of periods of normal science and extraordinary science determined by the crisis and then by overcoming the accepted paradigm (Kuhn 1978) – but that political, ideological and economic forces determine the relevance of a discipline (think of the predominant role assigned to physics, the consequence of the race to the possession of the atomic bomb and the conquest of space) or to push the complex of knowledge in one direction rather than another: from the seventeenth Century – when, in 1627, Francis Bacon wrote *The New Atlantis*, imagining a utopian society directed by scientists, committed to ensuring humanity an ever-increasing power over nature (Bierman 1963; Studer 1998; Kendrick 2003) – the direction taken was that of the idea of progress, understood as a constant advancement of knowledge aimed at improving the human condition in objectively measurable ways.

In England at the end of the 18th Century and then, gradually, in all the countries that today recognize themselves as economically developed, the idea of progress thus took the form of modern economic development, a sustained growth of population and wealth per capita that was triggered by science-based technological innovation and was accompanied by profound social and cultural transformations. Confidence in progress and development

has been at the heart of all the great ideological narratives and this, in the twentieth Century, has led to a growing politicization of scientists that the different regimes have tried to make organic to their policies. The politicization was maximum between the two world wars, but it continued also in the second twentieth Century (Hobsbawm 1995, pp. 625-633; Harari 2019, pp. 343-392): in the United States the link between political power and science was fueled by substantial public funding for research activities concentrated in a small number of prestigious universities that drained scholars from around the world, taking them away from the institutions of the countries of origin; in the Soviet Union, the Communist Party tried to use scientists to build an alternative science of which the most obvious example remains Lysenkoism which rejected the basic concepts of genetics proposed by Mendel, Weissmann and Morgan (Roll-Hansen 2005; de Jong-Lambert, Krementsov 2017).

The Italian case – in a context characterized by a marked antagonism between scientists and humanities scholars and by an enfeebled and self-referential university system, harshly and continuously criticized (for example, «Sapere» years are full of articles of this kind)[1] – does not undermine the interweaving of science, ideology, political interests and industrial issues. The 1950s saw

1. «The disconnect between the world of the sciences called "hard" and the rest of Italian culture is particularly serious [...]. In the second half of the century [...] mutual misunderstanding was clarifying, also because scientists, from absolute minority as they were before the war, begin to grow in number and to organize themselves in universities; in which, however, it is proposed (ideally and despite a seemingly quiet coexistence) a schematic opposition between two real factions: on the one hand, that of the humanists, individual thinkers, writers, philosophers, historians, scholars of various kinds bustling around their books or their era, sensitive to political passions and even to the so-called "fashion" issues; on the other hand, that of scientists, which are forming ever more numerous and close-knit groups, which are coordinating to request funds to the point of appearing like a corporation, are more attentive to integration into international research than to local problems, they care little about political events and even less about the traditional metaphysical anxieties of Italian intellectuality. The lack of strong and consolidated cultural precedents in the scientific field (the Roman school, "prepared" by Blaserna decades in advance, is a lucky and significant embryo) makes the Italian university landscape very different from that of the Anglo-Saxon countries, of France or Germany» (Bernardini 1998, pp. 282-321).

scientists caught between the scarcity of available resources and the distrust of political forces[2] that did not avoid interference by the Vatican, the Christian Democrats and some members of the Communist Party who tried to impose, also in Italy, a science «of the people for the people» inspired by dialectical materialism and based on empiricism (the model was the Soviet biology of Mičurin and Lysenko)[3].

The 1960s – in the context of the competition for the allocation of resources between different disciplinary sectors, both at the scientific and industrial level – were characterized by political interference that ended up bridging some institutions that dealt with strategic issues such as the Cnen (National Nuclear Energy Committee), the Iss (Higher Institute of Health) and the Ligb (International Laboratory of Genetics and Biophysics): the first two were overwhelmed by judicial events (the «cases» Ippolito and Marotta) requested by the intervention, respectively, of some members of the Social Democratic Party and the Communist Party, while the Ligb fell apart under the weight of the protest of 1968-1969 that, as Cassata wrote, stigmatized biology as the discipline «best suited to support US imperialist domination» and denounced the exploitation of technicians and aides by researchers (Pogliano 1995, pp. 587-608; Capocci 2011, pp. 283-293; Cassata 2013; Bernardini 1998, pp. 308-312). Towards the end of the decade, scientists began to express concerns about the marginalization of their public role and an increasing distrust of

2. On the chronic scarcity of resources of Italian science see the editorials of Buzzati Traverso published on «Sapere»: *Editorial*, n. 697, 1968, pp. 7-8; *Scienza e governo*, n. 699, 1968, p. 7; *Un meschino episodio*, n. 700, 1968, p. 5; *Caos e responsabilità*, n. 714, 1969, p. 3.

3. See Pogliano 1995, pp. 555-576; Capocci 2011, pp. 267-282; Scarpelli 1998, pp. 123-136; Cassata 2008. So wrote Buzzati Traverso: «During my career as a geneticist I have witnessed from afar the tragic story of the destruction of all scientific research in my field following the absolute domination exercised by Trofim Lysenko, under the political protection of Stalin first and then Khrushchev. [...] I may be wrong, but a system of scientific organization like the one in which a phenomenon like Lysenko can occur, and last for over two decades, is certainly not the best to stimulate scientific productivity, and indirectly the technological one», *Perché?*, «Sapere», n. 716, 1969, p. 3. See also *Monod e il caso Lysenko*, «Sapere», n. 736, 1971, pp. 4-6.

scientific knowledge. In an article titled *Gli esperti rifiutati* (*The rejected experts*), geographer Giampiero Cotti-Cometti, referring to the floods of 1966, denounced the absence of a single flood, «the most necessary», that «of the serious and surrounding studies of what [was] successful, of the clear and detailed projects to serve as a stimulus and guide for action to prevent the recurrence of similar events»; he then stigmatized the fact that «the administrators of public affairs, at various levels, had avoided soliciting the intervention of scholars»[4]. The greatest concern, however, was the discredit that scientists felt around them. In August 1968, «Sapere» hosted a speech by the Nobel Prize winner for Medicine, Jacques Monod, who wondered if suspicion of science was justified, complaining about «anxiety», «deep distrust» and «a sense of alienation» inspired by scientific research not only among the «less educated», but also within some «relevant trends of literature and philosophy»[5]. In November of the same year, Luigi Silvestri emphasized the spread of Marcuse's anti-positivism among Italian students and highlighted how science was gradually losing its prestige:

> There was a happy time, not too distant, when it was enough to deal with science to feel the conscience in place, certain of being on the right side of progress and truth. And I'm not referring to that sort of lost paradise that goes by the name of the era of positivism (the age of Spencer, to be clear) that was overwhelmed under the blows of the generation of '90, that is of that generation of intellectuals who reached maturity between 1890 and the First World War [...]. I refer rather to the cultural season that goes from the end of the First World War until today or at least until the day before yesterday. In those years, although scientific culture had been dethroned by the high prestige position it had enjoyed in the second half of the nineteenth Century, although the official culture, the other culture of

4. *Gli esperti rifiutati*, «Sapere», n. 686, 1967, p. 69.
5. *Etica della conoscenza*, «Sapere», n. 702, 1968, pp. 6-14.

> Snow, snubbed science as a producer of «pseudo empirical concepts» (Croce), although the mystical-irrational wave, of which the men of the '90 generation had been the apprentis sorciers, had set up fascist regimes in almost all of continental Europe, though we scientists, albeit in a defensive position, had no doubt. [...] And within Western culture there always existed an area where the tradition of empiricism had not been submerged by the anti-illuminatist wave. [...] But in recent years something has changed. It seems that for the younger generations the link between scientific culture and progressive ideals has been broken. One gets the impression that in the younger generations a divorce is taking place between cultural attitudes that from the Enlightenment onwards we had become accustomed to consider as joint. Behind the scientific culture it seems that young people can no longer see the ghost of Galileo persecuted, but only the inhuman profile of Dr. Strangelove. And from the younger the wave of doubt goes back to the less young, to those of them at least who are more sensitive to the debate of ideas.[6]

In order to counteract the anti-scientism, Silvestri believed that scientists should begin to contrast their rationality «with the distortions of the system» and argued that «the only way to keep open a relationship of a contentious type with the establishment» was the «possibility of opposing a rational project [...] to the use and abuse» that science was made «for the purposes of domination»:

> The consequent application of current knowledge and, where it is lacking, the application of the scientific method is able today to address and solve all the major problems of humanity. If this does not

6. *Scienza e ricerca tra integrazione e contestazione*, «Sapere», n. 706, 1968, pp. 12-16. So wrote Buzzati Traverso «Science and its products are often cursed by today's man, who wrongly holds them responsible for our current problems. But the study of them according to a scientific approach is the only alternative we have, compared to chaos, anarchy, and to make humanity fall back into a new, darker and probably more lasting Middle Ages», *Strategia scientifica*, «Sapere», n. 717, 1969, p. 3. See also *Un ordine della natura?*, «Sapere», n. 708, 1969, pp. 6-11; *La fine di un mito*, «Sapere», n. 719, 1969, pp. 48-49.

> happen it is because the use of science takes place within a different design.[7]

To strengthen this position, in June 1969 «Knowledge» published an article by Emilio Q. Daddario (a representative of Connecticut to the American Congress) in which the author stated that science should «learn to deal with politicians» and warned that, although the scientists «[warned with their noses that they [must] keep a good distance from the political game», the «times had changed» and therefore it was in their interest «to maintain contact with politicians and with public opinion» to offer the «citizen, on every occasion, the evidence that science and research significantly affect his everyday life»[8].

On the «Corriere della Sera» Adriano Buzzati Traverso reiterated his concern for the «irrational attitude» of «young people» and «less young people» that fed criticisms aimed at «slowing down, or even preventing, the progress of science»; for this reason he invited the members of the scientific community to «vigorously reaffirm» their confidence «in reason and science, understood as those distinctive elements of man» that were able to «allow the achievement not only of greater well-being but of a more satisfying vision of the world»[9]. He was even more explicit in an editorial published in «Sapere»:

> The 1960s opened in a climate of confidence and vigorous support for science. [...] But after 1965, roughly, and with increasing frequency as time progressed, voices arose which questioned the Enlightenment thesis that the expansion of knowledge could only be beneficial for humanity, asked whether man's happiness really depended on his material well-being, accused the consumer society, directly descended from the myth of progress, to destroy progressively and

7. *Scienza e ricerca tra integrazione e contestazione*, «Sapere», n. 706, 1968, p. 16.
8. *Punti di vista. I tre paradossi*, «Sapere», n. 713, 1969, p. 28.
9. *Ricerca e scienziati del '70*, «Corriere della Sera», 18 February 1970.

> without escape the natural environment of man [...] so we, scientists and advocates of reason, in a defensive position, almost had to justify our work. Foolish attitude this, in my opinion. What alternative? Return to superstition, magic, misery, to death at a young age? Do the protesters forget that if they are alive and active today they owe it to antibiotics, to the biological and medical research they so deprecated? [...] It is time to say no less science, but much more, and led to influence the decisions of ministerial cabinets, parliaments, parties, trade unions. It is too easy now, two hundred years after the era of the encyclopedists, to demonstrate how that attitude, if kept whole and true to itself, is the only one that has contributed to the well-being of man and to his greater freedom, to disperse us in exemplifications.[10]

Buzzati Traverso, however, remained convinced that science – possibly through a neo-Enlightenment movement and the compilation of a new Encyclopédie – would resist both the enslavement to political power (considered a «very recent phenomenon») both to the arguments of the counterculture that had not yet «brought any serious blow to the attitude of the Enlightenment».

The 1970s were marked by the progressive tightening of relations between policy makers (the direction of policies concerning scientific and technological development was assigned to Cipe, the Interministerial Committee for Economic Planning, established by Law n. 48 of 27 February 1967), academics and the two main public holding companies (Eni and Iri) who assumed the role – albeit in competition with each other – of facilitators of the meeting between academic and scientific circles, technicians and businesses. Historiography seems to agree in describing the decade as a period of crisis[11] in which the long wave originating from countercultural movements fueled an increasing anti-sci-

10. *È davvero nefasta la scienza?*, «Sapere», n. 720, 1970, p. 3.

11. On the difficulties of Italian science see: *Conferenza sulla politica della ricerca scientifica*, «Sapere», n. 741, 1971, pp. 10-15; *La ricerca scientifica. Dibattito sul progetto di legge presentato dal Pci alla Camera*, «Sapere», n. 776, 1974; *Problemi di una politica della scienza*,

entism that ended up undermining confidence in the progressive role of the sciences and crystallizing the debate on the dichotomy between scientific and irrationalist positions (Pogliano 1995, pp. 608-619; Capocci 2011, pp. 283-293).

In this scenario, scientists found themselves caught between the denunciation of capitalist appropriation of research results and the condemnation of scientific activities as such. The first position was that of those who recognized themselves in the most radical and moving left that, in 1976, found its most vibrant expression in the book *L'ape e l'architetto* (*The Bee and the Architect*) in which, to put it in the words of Carlo Bernardini, four theoretical physicists fed «the belief that science was completely conditioned by American capitalism and that everything had to be reinterpreted in the light of what Karl Marx had written about the interaction between man-nature and social relations of production» (Bernardini 1998, pp. 310-311; Cassata 2008, pp. 253-266). The authors of the book – later defined by themselves «almost illegible» as doctrinaire and «full of Marxian quotations» (Ciccotti, de Maria 2011, p. 228) – they belonged to a collective committed to building a model of proletarian science whose objective was to reveal the links between scientific research and capitalism, within which bourgeois science took the form of a mere instrument in the pay of the ruling class and imperialism[12]. This point of view could count on an important medium: the journal «Sapere», in the years in which it was led by Giulio A. Maccacaro (1974-1977) and then, after his death, by the editorial collective until the direction of the physicist Carlo

«Sapere», n. 789, 1976, pp. 14-15; *La ricerca pubblica nell'Università e nel Cnr*, «Sapere», n. 800, 1977, pp. 43-49.

12. See: *Una lezione dalla Cina: la scienza per il popolo*, «Sapere», n. 780, 1975, p. 3; *La scienza operaia*, «Sapere», n. 786, 1975, pp. 31-34; *Libertà e responsabilità della scienza*, «Sapere», n. 787, 1975, pp. 52-60; *Sul ruolo ideologico della scienza*, «Sapere», n. 790, 1976, pp. 14-18; *Libertà e responsabilità della scienza... in una dimensione sociale, sotto controllo popolare, con una cultura scientifica di massa, con una gestione collettiva della scienza*, «Sapere», n. 791, 1976, pp. 56-59; *Ambiguità nella popolarizzazione della scienza*, «Sapere», n. 795, 1976, pp. 27-32; *Scienza critica e diversamente prodotta*, «Sapere», n. 803, 1977, pp. 60-62.

Bernardini (January 1983). The program was well explained in the editorial published in the January 1974 issue:

> Our hypothesis is that science – two centuries from the Encyclopedia, from the bourgeois revolution, from the advent of the capitalist mode of production – is in the active or passive experience and in the implicit or explicit discourse of all men: because of science is now made the power and power men live and die. So that «making science» means, today and in any case, working «for» or «against» man and every man is reached by science to be made freer or more oppressed. The scientific organization of the work and the work of the scientific organization repeat and spread, from the factory and the laboratory, a single command that widens to reach every space and every time of life. [...] We will question ourselves, therefore, and we will question the sense, found or lost or found, to do science [...] but we want these pages particularly open and attentive to questions and proposals, experience and knowledge of «others»: those whom bourgeois hegemony has always excluded from the privilege of scientific knowledge. Because their political candidacy is also a scientific candidacy: as subjects of a science that is no longer the same in a different command but is different for a new liberation. Suffice it to say – from now on and clearly – that we reject together «scientism» and scientific luddism, because are equally alien to us the cult and exorcism of science.[13]

The group reiterated its perspective in the introductory pages to a monographic issue dedicated to *Ricerca e Società* (*Research and Society*), published in the year of the publication of the book *L'ape e l'architetto:*

> In summary, from the set of contributions transpires in a sufficiently documented way what many assumed at the level of intuition or working hypothesis: the political and productive subordination of

13. *Editoriale*, «Sapere», n. 768, 1974, p. 3.

> our country has produced a search for mere imitation of the dominant one at the international level (especially in America), with little relationship with direct production needs, more often in function of scientific cover of less noble speculative interests or even more generally profit as ideological cover for the system. [...] The prevailing reaction has been to recover positively the evolution of things in recent years; with a movement that continues to support and stimulate new ways of doing science. [...] Thus are intertwined moments that in certain stages and by some left were considered irreconcilable: alternative use of traditional science and construction of a new science, new client for the scientific product as for the economic and social and new producer of science. And therefore basic scientific experiences, born in and managed by the movement, together with a consolidation of the balance of power and the heritage historically acquired through reforms of scientific institutions for their use more incisive and politically qualified than in the past.[14]

Despite the declared rejection of irrationalism, this vision in which scientists appeared as pawns subordinated to a generic and sprawling capitalist power contributed to the deligittimation of science and opened the way to critical attitudes increasingly full of resentful distrust. The horizon of the 80s and 90s, rather than the dawn of the new Enlightenment hoped by Buzzati Traverso, revealed the descending trajectory of scientific research, held between two powerful tongs: on the one hand the chronic lack of adequate funding and long-term management policies; on the other hand an increasingly aggressive anti-science (Pogliano 1995, pp. 619-634; Capocci 2011, pp. 293-296; Cassata 2013, pp. 385-414; Bernardini 1998, pp. 315-319). This second vice was definitely the most worrying as it was fueled by the new social context that was emerging in those decades. In an article with an unequivocal title *Basta con l'antiscientismo!* (*Cut out the anti-science!*) the physicist Giuliano Toraldo di Francia noted that the «crisis of the image

14. *Ricerca e società*, «Sapere», n. 789, 1976, pp. 2-3.

of science» was an «exclusively "advertising" fact», which he explained in these terms:

> More than journalists, the main responsibility for a certain decay of the image falls on the society of great communications, of the image-show. To say that science within its limits leads us to know the world around us is a banality that certainly does not tickle the general public as, for example, the claim that research has no method, or that science is a fairy tale invented by scientists. It is therefore understandable that the journalist privileges this second thesis, certainly more spectacular than the other. [...] Faced with the overwhelming power of advertising that accustoms since children to choose and love false, scientists have the duty to reaffirm the existence of truth; a truth that, mind you, is such only within the limits of the various theories.[15]

Even Carlo Bernardini, commenting on three news released in the summer of 1988, stigmatized the spectacularization of communication that spread pseudo-truth and ended up transporting research in a pseudoscientific dimension:

> An American physicist around Italy said that in his country, for the first time, nuclear fusion processes were carried out using an X laser triggered by an atomic bomb. Indeed, he also added that such a laser is not likely in an energy-producing plant and that replacing it with something more practical will take a long time. Is this important news? No. God knows why he had so much space. Maybe it was Andreotti's sponsorship that made a big story. Obviously, that physicist, who belongs to the apparatus of American military research, knows very well that the operation of his inertial confinement device resembles more an H bomb than a reactor, and the H bombs are now forty years old. As for Newton's law, if I had noticed making the measurements that my data deviated by 20% from his forecasts, on

15. *Basta con l'antiscientismo!*, «Sapere», n. 911, 1988, pp. 16-17.

> just a kilometer and a half of depth below the Earth's surface (as newspapers wrote without batting the edge of doubt) I would have had a stroke, and if I survived, I would have spent the rest of my life looking for where I might have been wrong, even if I thought I was right. [...] Finally, the water of good memory. A good news with, behind, the whole market of homeopathic medicine and its products (fresh water, in fact, which remains only the opportunity to «remember» the compound or the solution that was). The only thing I'd like to know is the number of people who believed in it. Just out of curiosity.[16]

Over the years, Bernardini's disappointment and pessimism did not diminish: he continued to stigmatize the distorted narrative of scientific culture, the subordination of the sciences to the literary disciplines, the pseudo-popularizing operations that «ignited» the minds talking about «parallel worlds with multiple dimensions, reversals of time, omnivorous black holes, chaos and catastrophes, relations with the divinity» thus making us believe that science was concerned «with those cosmic torments on which so many [struggled] for free» (Bernardini 1998, p. 319).

In the 2011 re-edition, some of the authors of the book *L'ape e l'architetto* complained that the «historical left» had lost «all interest» in the problems of science, while the «left born from '68» had ended up exalting the «irrational impulses» replacing the topics on the role and limits of scientific knowledge with the «rather agitated and emotional themes of ecology» (Ciccotti, de Maria 2011, p. 230).

In the framework described above, the events of those scientists who found themselves collaborating with some institutional bodies responsible for studying ecological issues should be embedded. It is a numerically small group, led by some important fig-

16. *Balle non più spaziali*, «Sapere», n. 911, 1988, p. 3. About the «memory» of water, the reference is to the theories (fraudulent proved) of the French immunologist Jacques Benveniste.

ures: Vincenzo Caglioti (chemist, President of the Cnr from 1965 to 1972), Giovanni Battista Marini Bettòlo (chemist), Giuseppe Montalenti (biologist and geneticist), Mario Pavan (entomologist). During the 1950s and 1960s, environmental issues failed to emerge from their underground dimension and remained confined to two organisms (The Commission for the Defence of Nature and Its Resources and the Commission for Nature Museums and Ecology) which had a poor visibility in public space, not to mention almost go unnoticed[17].

The work of these scientists was brought to the surface, for a short time, in the first half of the 1970s when – in the wake of initiatives for the preparation of the European Year for Nature Conservation (1970) and the United Nations Conference on the Human Environment (1972) – the center-left governments (and, above all, Amintore Fanfani, President of the Senate) favored the publication of four reports: *L'uomo e l'ambiente* (*Man and the Environment*), *Il Libro bianco sulla natura in Italia* (*The White Paper on Nature in Italy*), *Problemi dell'ecologia* (*Problems of Ecology*), il *Rapporto italiano per la Conferenza di Stoccolma* (*The Italian Report for the Stockholm Conference*), to which was added the *Prima relazione sulla situazione ambientale del paese* (*First Report on the Country's Environmental Situation*). It was, in essence, an ephemeral conjuncture fueled by synergies between the Center-left (which was to guide the participation of Italy in supranational initiatives), the activism of some state companies (Eni, in particular) and this team of scientists who were assigned the task of outlining some embryonic form of environmental policy. Since up to that time Italy – at a crucial moment for its economic and social development – had ignored environmental problems and, as usual, sailed on sight following what was happening in the United States and, to a lesser extent, in northern Europe. Once the echo of the Stockholm Con-

17. The «Corriere della Sera» dedicated a few sporadic articles to the Commission for the Defense of Nature: *Piano difensivo per l'Italia. Un «libro bianco» del Cnr sulla salvaguardia della natura*, 21 August 1969; *Difendere la natura*, 11 February 1970; *Le carenze del sistema*, 27 February 1971; *La natura che abbiamo distrutto*, 16 March 1972.

ference had faded, very little was done in practice (the finalized projects of the Cnr, the establishment of the Ministry of the Environment), and the activities of scientists returned to be shrouded in indifference of politics and public opinion, the latter fascinated by the sirens of the apocalyptic predictions and captivated by the communicative dopamine of catastrophism, but very unwilling to follow the real trajectories of different scientific fields (especially chemistry, physics and biology).

The mass media and political parties occasionally remembered scientists in the event of a disaster (Seveso, Chernobyl) or election rounds (in 1983 the Pci nominated Giorgio Nebbia to the Chamber and the geneticist Nicola Loprieno to the Senate; in 1987 the chemist Enzo Tiezzi to the Chamber and Giorgio Nebbia to the Senate). Thus, the history of this group ended sadly in the 80s[18], with a parable very similar to that of the Ligb; the causes were, again, those already highlighted by Cassata (2013, p. 413), or the crisis of the innovative and reforming charge of the center-left and the absence of a serious policy on scientific research, to which must be added the declining role of Amintore Fanfani (their main political reference, as well as the Christian Democrat exponent most attentive to those ecological sensitivities that began to manifest themselves in the first half of the 1970s) and resistance within the Cnr.

There is another factor that needs a detailed discussion, namely the progressive rooting in the public space of environmentalism that produced that dichotomous evaluation of science to which we have already briefly mentioned: on the one hand knowledge useful for the ecological destiny of the planet, on the other those functional to progress and therefore, by extension, to economic growth. In essence, the institutional paths in which these scien-

18. *Si dimette la commissione di tutela dell'ambiente perché ignorata dal Cnr. Era l'unico organismo al quale Stato, Governo, Regioni, Comuni, e associazioni potevano far capo per avere un parere su questioni ecologiche*, «Corriere della Sera», 7 November 1980. In issue 896 of April-May 1987, «Sapere» published an article (*Storia di una commissione*) that briefly summarized the events of the Commission for the Defense of Nature.

tists found themselves involved also failed because their action was not perceived as organic to the environmental movement: they certainly dealt with environmental issues, but they did it prudently following the rationality of the scientific method and not the emotionality of the acolytes. Even more explicitly: they were scientists studying the environment, but not scientists-environmentalists (with the exception of Giorgio Nebbia who had a more marginal institutional role than those of Caglioti, Marini Bettòlo, Montalenti and Pavan). This caused their isolation because they found themselves in a middle position between those who opposed the affirmation of ecological awareness and those who, instead, were building a new form of knowledge deeply ideologized what was the political ecology. It is indicative that the scientists who worked within the main institutional bodies were completely ignored by the press of the time that, on the contrary, devoted ample space to foreign experts considered the main inspirers of the new ecological thought, starting with Barry Commoner. This was because – in cooperation with both the centre-left governments and the main State companies – the group of scientists had undertaken to find a synthesis between the needs of the protection of natural resources and those of social-economic development and therefore did not adhere to the alarmist tones of political ecology that much more titilated the sensationalist vein of the media. This also explains why, for example, the *Dizionario del pensiero ecologico* (*Dictionary of Ecological Thought*) by Della Seta and Guastini (2007, pp. 101-103, 240-241, 273-274) dedicates entries only to Marcello Cini (the most well-known of the authors of the book *L'ape e l'architetto*), Giulio Maccacaro (one of the inspirers and protagonists of bottom-up science) and Giorgio Nebbia (today considered one of the main inspirers of Italian environmentalism: Piccioni 2014; Ruzzenenti 2023): their adherence to the ecological point of view was ideological even before scientific. All the others (Caglioti, Marini Bettòlo, Montalenti, Pavan... but also Buzzati Traverso who had collaborated with Unep, the environmental agency of the United Nations) are ignored because, not being perceived as activ-

ists within the environmental galaxy are reduced to mere technical experts and, for this reason, remain outside the perimeter of «ecological thinking».

2. A Dichotomy That Cannot Be Overcome?

At this point it is necessary to return to the main turning point of history that we face in this chapter: the five-year period 1968-1972, the five years in which the positive perception of science and progress – until then decidedly dominant – was cracked by the rise of ecological ideas. The events that accompanied this change were the publication of some neomaltusian essays (Ehrlich 1968; Hardin 1968; Committee on Resources and Man 1969), the establishment of the US Environmental Protection Agency (1970)[19], the broad mobilization for the first Earth Day (22 April 1970)[20] the celebration of the European Year of Nature Conservation (1970)[21], the publication of the Limits to Growth report (March 1972)[22] and the United Nations Conference on the Human Environment (June 1972)[23]. The long wave generated by these events created an epoch-

19. *Nixon to Propose Pollution Agency*, «The New York Times», 6 June 1970; *Senate Confirms Ruckelshaus To Head Environment Agency*, «The New York Times», 3 December 1970; Barnes, Graham, Konisky 2021.

20. *Pollution Protests in April to Be Varied in Militance*, «The New York Times», 8 March 1979; *All Out for Ecology*, «The New York Times», 19 April 1970; *Nation Set to Observe Earth Day*, «The New York Times», 21 April 1970; *La "Giornata della Terra" negli Stati Uniti. Ecologia come partito*, «La Stampa», 28 April 1970; Rome 2013.

21. See Spring 1968 and Summer 1970 issues of «Nature in Focus. Bulletin of the European Information Centre for Nature Conservation»; *Difendere la natura*, «Corriere della Sera», 11 February 1970; *È l'«anno della natura», impariamo a rispettarla*, «La Stampa», 25 April 1970.

22. *L'utopia del progresso illimitato*, «Corriere della Sera», 20 February 1972; *The Limits to Growth*, «The New York Times», 2 April 1972; *Ci sarà un'apocalisse ecologica? Consensi e critiche alle teorie di Dennis Meadows sul «progresso» controllato*, «La Stampa», 7 April 1972; *Il mondo avviato al suicidio*, «Corriere della Sera», 18 July 1972; Neurath 1994.

23. *U.N. Group Offers Environment Plan, Asking Reorientation of Man's Values*, «The New York Times», 17 March 1972; *Il Convegno mondiale di ecologia a Stoccolma. Questo sporco sporco mondo*, «La Stampa», 4 June 1972; *Il mondo deve evitare il «disastro ecologico»*, 5 June 1972; *Environment Conference Will Offer Some Sideshows*, «The New York Times», 5 June

al rift: what had enabled human beings to advantageously walk the paths of progress and development – scientific research and its technological implications, up to that moment accepted with ossequiosa confidence – now it was accused of having produced immense damages to the Earth. As John mcneill noted, progress and economic growth had generated their antithesis (McNeill 2022, p. 430): to political-economic bipolarism was added a second that would have opposed the proponents of development to the defenders of the ecological balances of the planet.

The relevance of this shift was highlighted by Arnold Toynbee who in his *Racconto dell'uomo* (*Mankind and Mother Earth*) historicized the concept of the biosphere arguing that humans had become the first species to have acquired the ability to destroy the seat of life also producing the conditions for their extinction. This had become evident in the early 70's when it was understood that the biosphere was in danger of being «overwhelmed, polluted and finally made uninhabitable for all life by one of its creatures and inhabitants, Man». Toynbee identified the combination of scientific research/technological applications and the increasing use of energy sources as the two tools by which humans had mastered the biosphere. Furthermore, saw the most devastating symptom of the human impact in the process of urbanization that had taken the forms of «parasitic slums», of mechanical tentacles that enveloped the entire globe (railways, roads, air routes) and industrial effluents that polluted water and air. Humanity thus had two possibilities: to kill the «Mother Earth» with a wicked use of the «growing technological power», or to redeem it by defeating the «suicidal and aggressive greed» (Toynbee 2009, pp. 15-30, 582-583, 602).

Even Hobsbawm – much more lukewarm than Toynbee towards ecologist arguments – pointed out that, at the beginning of the 70's, the discovery that science-based technology could produce irreversible changes to the Earth began to affect scientific

1972; *Si vota una «carta delle Nazioni Unite» per creare un ambiente più pulito e sano*, «La Stampa», 16 June 1972.

environments by raising the demand for new limitations to scientific research, particularly genetics and biology. In his opinion, a very tense atmosphere was created because scientists who worked in the fields more akin to social disciplines (in particular ecology and ethology) transferred too superficially their knowledge to human beings and this fed tensions and conflicts. The result was the polarization of the debate between optimists and pessimists, the latter engaged in demanding the imposition of a hold on scientific research, judged no longer able to «control the powers in his possession», nor to «recognize the risks» that humanity was running (Hobsbawm 1995, pp. 637-641).

For Tony Judt (2017, pp. 601-605, 608-613), the emergence of environmentalism in the early 1970s had occurred in the context of the disintegration of the great ideological narratives and had to be considered as an aspect of the more general affirmation of a series of «monothematic» movements which had their roots in protest and counterculture, which had contributed to a growing unease with the epiphenomena of modernity; as far as the ecologist movement was concerned, However, he identified the seeds both in the new fears of the middle classes (nuclear accidents, the alienation of urban life, pollution...) and in a reactionary return to the nationalist and regionalist nature (the German *heimat*, the *France profonde*, the *feet in ancient times* of William Blake).

Armitage and Guldi remarked that the genesis of environmentalism has taken on a catastrophic dimension whose influence has transcended the boundaries of ecological debate to inspire, in the case of the United States, a new form of apocalyptic thought within popular religiosity. The two scholars noted that, despite the evolution of knowledge, the apocalyptic perspective has ended up colonizing scientific reflection, historical analysis and the collective imagination, the latter dominated by dystopias that tell the 21st Century as the «last Century» or «the last hour» of humanity. In their view, «the increase in available data» should instead «allow the elaboration of broader and more refined metanarratives» (Armitage, Guldi 2016, pp. 119-123).

I cite these historiographical interpretations – some of which are very far from the moment I write – because they have all grasped the two key issues that have also emerged from the consultation of the materials identified during the research. In other words, that the progressive affirmation of ecological ideas and environmentalism began to fuel a dichotomy between the advocates of economic growth and science to be able to support it and how many, Instead, they demanded a deep rethink of the relationships between humans and the biosphere starting to support anti-positivist and anti-scientist positions. The latter introduced into the debate a vehement criticism against the anti-ecological character of development, the commodification of science, the subordination of scientific research to technological innovation: this led them to believe that only science close to the principles of environmental ethics was the bearer of truth, but also to legitimize subcultures (animalism, vegetarianism, naturism...) and distinctly ideological and often Manichean attitudes that presented as truthful para-scientific knowledge (homeopathy, biodynamic agriculture, unconventional medicine...). While it is true that this dichotomy had already emerged since the last decades of the nineteenth Century, since the early seventies it has fuelled a mass of reductionist elaborations asserted both by supporters of development and by its detractors: the former have always ignored (or minimized) the impact of development on the biosphere, while the latter have robbed humanity of an unwelcome disturbing presence of the natural order of the Earth.

The supporters of the first position have continuously entrenched themselves behind the results, irrefutable, produced by development: that humanity that, at the beginning of the industrial era, was composed of an indistinct mass of individuals afflicted by extreme material and cultural poverty, in the second half of the twentieth Century it had transformed into a composite and stratified global community whose well-being had extraordinarily increased. Of course, there remained a clear imbalance between the industrialized countries and those emerging

from the colonial yoke, but the improvement brought about by the socio-economic dynamics of the golden age was evident, especially as regards socio-cultural aspects. Between 1820 and 1970 the global average life expectancy had increased from 29 to 56.1 years, infant mortality by the first five years of life had fallen from 42% to 14% and illiteracy had fallen from 87.95% to 44.38%; moreover, the share of the population living in conditions of extreme poverty had declined from 89.34% to 47.97%, while the gross domestic product of the world had grown from 1.18 to 21.94 trillion international dollars and that per capita had increased by 5.29 times (9.23 times in the western reaches; 7.97 times in Eastern Europe; 7.41 times in Western Europe; 6.47 times in Central and South America; 5.41 times in North Africa and the Middle East; 3.32 times in East Asia; 1.68 times in South and Southeast Asia, 1.66 times in Sub-saharan Africa)[24]. In the literature, the optimists of economic growth have been quite numerous, often authors of important volumes that for decades have been used as reference books in scientific debate and university courses. Some scholars have totally removed the ecological dimension from their analysis (Pollard 1981; Thomas 1994; Foreman-Peck 1995; Arrighi 1996), others have hastily dismissed critical positions (Roll 1973; Birdzell 1986; Cameron 1997), others – as far as they are aware of «collateral damages» – have continued to point to economic expansion as the main engine of civil progress (Friedman 2005).

Over the decades, critics' analyses of anthropocentric progress have ranged from neo-Malthusian (Paul Ehrlich, Garrett Hardin,

24. The data was processed using *Our World in Data* interactive tables (*GDP per capita, 1820 to 2022*; *World population living in extreme poverty, World, 1820 to 2015*; *Life expectancy*; *Global child mortality*; *Literate and illiterate world population*), https://ourworldindata.org/, last viewed on 17 May 2024. Since the 1980s, the globalization process has produced a further improvement in indicators: world GDP has reached 130.11 trillion international dollars (2022), GDP per capita 16,091 international dollars, life expectancy 71 years (2021; before the pandemic had reached 72.8 years in 2019); extreme poverty, infant mortality and illiteracy decreased to 9.98% (2015), 4% (2021) and 12.99% (2022) respectively. See Maddison 2008; Allen 2011; Ravallion 2016.

System Dynamics Group, Edward Goldsmith and Robert Allen), to radical political ecology (Serge Moscovici, Ivan Illich, André Gorz) passing through the ecological economy (Kenneth Boulding, Herman Daly, Nicholae George-scu-Roegen) to arrive at the most intransigent radicalism (primitivism, organicism, deep ecology, bioregionalism, anti-utilitarianism, rewilding, basic movements Lulu and Nimby, animalism, antispecialism, veganism, up to eco-terrorism and the Vhemt movement whose objective is to make the human species disappear).

It is worth dwelling on the most famous neo-Malthusian analysis, that of the report *The Limits to Growth*, given the impact it had in public space. In the book there are some passages that, in the opinion of the writer, show how the ideological dimension has deeply oriented the construction of mathematical models used by the writers: the catastrophic vision does not seem to be the logical consequence of the results produced by the mathematical simulations, but, on the contrary, the premise on which they were built; the plant of the work seems very similar to that of an empirical verification of some hypotheses of which the authors were initially convinced. The aim of the book appears to be much more political than scientific: in other words, it raises an alarm with the intention of bringing public attention to the ecological question. In this regard, it was noted that the engagement of scientists in favour of environmental arguments was encouraged by pressure from non-governmental organisations, of the citizens and also of the governments that saw in the scientific forecasts a solid support in order to facilitate the approval of the environmental policies, since the support of the scientists guaranteed the suffrage of the scientific truth. This attitude represented a significant novelty, as even the most likely scholars to intervene in support of political debate were (and are) aware that truth is a commodity that can belong to religious or politicians, but it is always denied to scientists (Funtowicz, Ravetz 1999; Allen, Tainter, Pires 2001; Steel, List, Lach, Shindler 2004).

In *The Limits to Growth*, the preponderance of ideology on scientific rigour is evident in the parts dedicated to the economy: the

report states repeatedly that the «state of global equilibrium» could only have become a reality when the developing countries had progressed both in the absolute sense and in relation to the already developed countries. The impracticability of this assertion was already revealed by the authors themselves, who pointed out that analysis did not depend on «political feasibility» because their «programme» was «as thorny on the social plane» as «simple in mathematical terms» (Meadows, Meadows, Randers, Behrens III 1972, pp. 128, 130-132). And mathematics confirms how the proposal to block the development of industrial capital at the values of 1985, imagining to reach a «condition of equality between the rate of investment and depreciation» in 1990, it would create a state of equilibrium characterized by the crystallization of global inequalities to the benefit of the West. Still in 1990 the Western countries (offshoots and Western Europe) held 46.99% of the world's wealth (56.59% including Eastern Europe), while Asia 28.41% (22.94% in 1980, before the take-off of the so-called Asian tigers); as for the other areas (Central-South America, Middle East/North Africa, Sub-saharan Africa) between 1980 and 1990 their economies had seen their percentage weight decrease (respectively -1.43%; -0.21%; -0.29%). The redistribution of world wealth began only in the 1990s, when globalization (understood as progressive liberalization and financialization of the economy) supported the growth of Asia, but also (more modestly) of Africa; in 2022, 43.72% of world GDP was concentrated in Asia, against 37.63% of Western countries, while the Middle East/North Africa (8.56%) exceeded Central and South America (6.98%) and even Sub-saharan Africa had quadrupled the value of its economy (from 905.42 billion to 4.04 trillion international dollars) reaching 3.11% of global GDP (it was 2.10% in 1990)[25].

In an attempt to find a compromise between the need not to halt economic growth and the need to protect natural resources,

25. The data was processed using *Our World in Data* interactive table, *Gross domestic product by world region 1820-2022*, https://ourworldindata.org/economic-growth, last viewed on 23 May 2024.

the United Nations, since the second half of the 1980s, has promoted the consensus of sustainable development, understood as an economic development that meets the needs of present generations without compromising the possibilities for future generations to meet their own. This notion was first affirmed by the Brundtland Report (1987) and then clarified by the United Nations Conference on Environment and Development (1992), the World Conference on Sustainable Development (2002) and, finally, the 2030 Agenda for Sustainable Development (2015)[26].

The progressive conceptualization of environmental sustainability has been entrusted to an institutional science managed by supranational agencies (and strictly dependent on UN and state funding programs) which has been recognised and endorsed by the international community, in particular by the industrialised countries. Around the agencies and specialized programs of the United Nations (UN Environment Programme; UN Human Settlements Programme; World Meteorological Organization) has been formed an increasingly large scientific community that, over the years, has developed a significant amount of studies and reports: the most important are the Global Environment Outlook and the Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), up to now in their sixth edition[27].

However, the concept of sustainable development has not mitigated – as policymakers probably expected – the dichotomy

26. World Commission on environment and development, *Our common future*, Oxford University Press, Oxford-New York 1987; *Report of the United Nations Conference on Environment and Development. Rio de Janeiro, 3-14 June 1992*, Volume I. *Resolutions Adopted by the Conference* (A/CONF.151/26/Rev.1), United Nations, New York 1993; United Nations, General Assembly, Fifty-fifth session, 18 September 2000 (A/RES/55/2), *Resolution adopted by the General Assembly: United Nations Millennium Declaration*; *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August-4 September 2002* (A/CONF.199/20), United Nations, New York 2002; United Nations, General Assembly, Seventieth session, 21 October 2015 (A/RES/70/1), *Resolution adopted by the General Assembly on 25 September 2015. Transforming our world: the 2030 Agenda for Sustainable Development*.

27. United Nations Environment Programme, *Global Environment Outlook. Geo 6*, Cambridge University Press, Cambridge 2019; IPCC reports can be found at https://www.ipcc.ch/.

between proponents and detractors of economic growth: the debate has continued until the present time with increasingly harsh tones, They are also exacerbated by policies to promote ecological transition, which are multiplying conflicts between the centres and the peripheries, as well as between the upper and lower segments of the population. One of the reasons for the increasing polarization must be found in the fact that political decision-makers have increasingly urged science to generate indisputable truths to be used as new dogmas to support decision-making: In this way any critical observation can be depowered and silenced with the accusation of representing a mystification of the truth that, by its nature, can only be unique. Moreover, the progressive mediatization of the debate through social networks has pushed people to lock themselves in homogeneous groups that reject differences of opinion and hate everything that does not fit within their values.

This has led to a further polarisation of the debate on environmental problems. On the one hand we find the composite galaxy of ecoscepticism[28] animated by heterodox scientists, repentant environmentalists, supporters of an anthropocentric vision inspired by traditionalist Catholicism and conservative think-tanks (America Policy Center, Heartland Institute, Fraser Institute, Molinari Economic Institute...). On the other hand there are the advocates of degrowth and social models based on austerity and anti-consumerism (Latouche 2007; Pallante 2011 and 2022; Bonaiuti 2017 and 2023), as well as new manicheisms fueled by catastrophic and anxiety-inducing visions that find expression in mass media celebrities such as Greta Thunberg or in organizations such as The Last Generation or Extinction Rebellion (Spadaro 2020; Read 2020; Dave, Ndulue, Schwartz-Henderson 2020; Martone, Sciarrone 2023).

It is worth noting a fundamental contradiction inherent in these new fundamentalists: their supporters on the one hand de-

28. See Lomborg 2001; Larcher 2004; Moore 2010; Testa 2020; McCright, Dunlap 2000; Jacques, Dunlap, Freeman 2008; Paolini 2020, pp. 221-235, 269-296.

clare themselves convinced followers of science (one of the most cited sources are the IPCC reports), on the other hand, they are deeply wary of those fields of knowledge – chemistry, physics, pharmacology – which they consider irremediably colluded with the methods of production proper to financial capitalism and, therefore, incompatible with the ecological transition.

This strong polarization also persists within the literature. On one side of the fault line there are optimists, who believe that the development model can be amended thanks to the increasing attention to environmental aspects and the constant advancement of science and its technological applications. These include, for example, Giorgio Ruffolo and Fred L. Block. Ruffolo writes:

> The human hybris virus, however, does not manifest itself only «negatively», accelerating locally, in the world dominated by man, the universal tendency to the increase of disorder: entropy. Man is also the highest point of a process symmetrical to that of increasing entropy: the process of evolution. Symmetrical to the second law of thermodynamics is in fact what some scientists have defined the law of organization. If there was only the law of entropy there would be only chaos. [...] philosophies that challenge science and technology as idols of our servitude lead us on the opposite path to that marked by the law of organization that regulates the evolution of being. They lead us into the smoke of mysticism, while science and technology, at the service of knowledge, not of the market, are the paths open to our creative development. [...] Technical progress is not the cause of the disappearance of ends, but its subjugation to capitalist accumulation. That synthesis of technology and of the market, which was the secret of capitalist triumph, is today its prison. It is not true that technique prescribes to do all that is feasible. It prescribes to do all that is profitable. The problem, then, is not to escape from technology, but to remove the technique from the laws of the market, putting it at the service of knowledge. In this sense the ecological balance, the stopping of the economic growth of having, sterile and self-destructive, is the necessary premise of a transcendent hu-

> manism aimed at the existential development of the human species. (Ruffolo 2008, pp. 280-284)

For his part, Block is confident that quantitative growth can be replaced by qualitative growth:

> This book has treated the issue of growth and economic dynamism as something positive, to the extent that this implies an efficient use of natural resources to produce products that are increasingly better and on a larger scale without passing the costs of this on to workers, consumers or the environment. Today, however, there is strong support from many quarters that the historical goal of material growth is destroying the planet and that we must instead embark on a path of degrowth. Apologists for the decline are certainly right when they point out that the development model pursued over the past two centuries is unsustainable. But the theorists of degrowth do not understand that it is possible to improve people's living conditions without necessarily having to resort to that model of growth based on the destruction of natural resources that was typical of the industrial age. We can clarify the issue by distinguishing between quantitative growth and qualitative growth. [...] Qualitative growth tends to be compatible with the protection and safeguarding of natural resources and seeks to meet human needs without compromising the survival of the planet. We are faced with examples of qualitative growth whenever we make investments to clean a river from pollutants, or develop technologies that allow us to recycle materials. (Block 2021, p. 233)

On the other side of the fault line there are the proponents of a radical change, of a clear break with the past: the analyses of these authors are effective in explaining the causes (moreover, now well known to anyone who deals with environmental issues) but they are unable to propose alternative models through which they can concretely guarantee both the acquired well-being and the improvement of the quality of life of those who are in conditions of

scarcity and poverty. Two bishops of this approach are Christophe Bonneuil and Jean-Baptiste Fressoz:

> To think of the Anthropocene means to accept the data and the models of the sciences of the Earth system that envisage, in increasingly certain terms, an imbalance on the scale of the geological times such as to radically upset the conditions of human existence. It means realizing the telluric power of industrialization and the market, which has derailed the Earth from the stable parameters of the Holocene, as well as the need to give different material foundations to our freedom; It means putting in place new environmental humanities and new political radicalities (movements that promote buen vivir, the common good, transition, degrowth, ecosocialism and much more) to get out of the impasse of industrial modernity. Thinking of the Anthropocene also means distrust of the great official narrative, which tells us of a unified human species that can be saved only through science. It means bringing scientists among the people because they discuss step by step their results and their forecasts, not to fall into a geo-cracy that offers technical and commercial solutions useful to manage the whole Earth. [...] The history of the Anthropocene is a story of the disibinitions that have normalized the unsustainable: hygienism that bypasses the environmental medicine of the eighteenth Century, the technical norm that eliminates disputes and becomes the ontology of the administration of environmental harmfulness, the proliferation of objects that have shaped the liberal anthropological subject, the Gnp and the notion of economy that have imposed the idea of infinite growth, the solutions techno-scientific that in every age have claimed to improve the management of nature to bring it to the maximum sustainable yield and, today, the green capitalism, which integrates the environmental criticism in its financial utopia of the generalized compensation. (Bonneuil, Fressoz 2019, pp. 357-361)

The fault line also crosses contemporary Italian historiography, as demonstrated by the books *Miseria dello sviluppo* (*Misery of Develpment*) by Piero Bevilacqua and *Occidenti e modernità* (*West-*

ern Worlds and Modernity) by Andrea Graziosi[29]. Bevilacqua uses a narrative register that does not skimp on peremptory tones and flaunts a firm confidence in the truthfulness of his statements. The beginning is of those bewitching and cunning, at Moby Dick: «the development», the author sentences, «is over». The end of development would be demonstrated by the progressive gap between economic growth and well-being; by the appearance of «new forms of poverty, marginality, environmental degradation, insecurity, abysses of inequity»; from a conceptualization of economic growth that has mocked the temporal and spatial dimensions based on the dual fiction of the «pretense eternity of social phenomena» and the «supposed infinity of nature». In Bevilacqua's explanation, sustainable development becomes a further imposture that the «human mammal», after «at the top of the evolution processes» thanks to «technical development», used to take away from the Earth «its thousand-year history» that took «into its hands» believing that they «could rule it». Given the premises, the continuation of reasoning does not renounce to evoke the duplicity of science: on the one hand, in fact, there is science «above all suspicion», the one that discovered the ozone

29. Eugenio Capozzi's analysis is also interesting: this is harshly critical of the ecology that the author defines as the «utopia of environmental anti-humanism» and considers a product of the ideology of political correctness: «The environmental ideology is immediately "soluble", as a secular religion and set of rules of conduct. While dogmas that prescribe absolute equivalence between cultures or absolute coincidence between subjective desires and rights collide with events that can be interpreted in the opposite direction, and generate conflicts and tensions because of the controversial effects caused by their slavish application, the environmentalist worldview appeals to such a profound and general tendency, a psychological movement so widespread in public opinion that it is very easy to rely completely on it, accepting all its practical implications. [...] The generic ideal of a clean world against a "dirty" is too simple and attractive, the doctrinal myth of man prevaricating on nature is too strong and widespread, because so many belonging to the western educated neo-bourgeois classes, or aspiring such, do not let persuade, without standing to discuss the technical solutions and the choices of government aimed at that work of cleaning (although the critical voices on the ideological construction in this regard, especially outside Europe, have been growing). Environmentalism thus represents a precipitate, a synthesis of the diversionary program to abolish conflicts and bring humanity back to the original state of innocence» (Capozzi 2018, pp. 139-165, 164-1659).

hole and «[squaderna] scenarios of global upheavals as a result of global warming»; on the other there are the «knowledge» inept and prone to the economy that the author considers a «religious belief» and therefore a «knowledge without foundations». Bevilacqua fails to recall that that unsuspected science has established itself in parallel and consequently to the definition of the concept of sustainable development, because it constitutes the rib on which the aforementioned United Nations agencies graft their narrative. As for the proposal to escape the «poverty of development», the author resorts to the concept of degrowth, although he recognizes that some of his «most authoritative supporters» (like Serge Latouche) do not even try to translate into political practice «things theoretically easy» and that «to degrowth it would be necessary to give legs to walk» changing the name (Bevilacqua 2008, pp. 3-5, 12-14, 196-198). Moving from the perspective of degrowth, Bevilacqua comes to imagine a new messianism:

> We believe that a socialist perspective can be reopened in new forms, other than the collectivization of the means of production, but that – together with an intelligent taxation – passes through a redefinition of the links between public and private that the increasingly limited and common resources impose. Of course, an economy brought back into being through the collective common good must be based on an unprecedented wisdom of the balances and fragility of the living world. So far no science of nature has oriented the global use of resources without rules. The pure technique of plundering has triumphed. But it should be clear at this point what is perhaps the greatest achievement of this possible strategy. A new horizon, an unexpected possibility of planning the future are opening up before us, able to provide general purposes for our action. Politics, shattered and emptied by the loss of ideal prospects, is now offered a new opportunity to find meaning, universal motivations. An ethic of responsibility – the moral horizon advocated by Hans Jonas – can now find unexpected foundations in the pursuit of our own interests. In

> declining religions, ideologies and beliefs, or in their entrenchment in closed fanaticism, a new secular faith, aimed at the salvation of the common home, can refound the reasons for being together. (Bevilacqua 2008, pp. 201-202)

Diametrically opposite to Bevilacqua's is Graziosi's analysis. In his opinion, the rhetoric of Neo-Malthusian theories – which colonized public space in Italy as well – prevented us from fully understanding the important implications produced by the transition from a peasant to an urban society, beginning with the emptying of rural areas and the «self-liquidation» of the peasants who chose voluntarily and consciously not to remain such preferring the «call of comfort». The author also strongly stresses the impact of scientific progress on the lengthening of life expectancy that he attributes to its main corollaries (changing health care and systems, increasing well-being, changing lifestyles, improving individual opportunities). He considers the «green discourse» as part of the «landslide of the value system of the left that occurred between the sixties and seventies of the twentieth Century» which he explains in these terms:

> Its roots in fact lie in an apocalyptic approach linked to the fear of nuclear power or chemical poisoning (certainly worrying but denounced in a world where average life expectancy made giant leaps forward)and often based on engineering calculations – that is to say, given resources and knowledge – and not economic and even less «open to the unpredictable» on the future and the availability of resources. From this point of view, the green discourse, which also has strong antiscientist components, still has affinities with the predictions about the population explosion that accompanied his birth, as well as the predictive ambitions of economic planners or the more mundane versions of Malthusianism. For example, they are linked to the theories of the degrowth of Nicholas Georgescu-Roegen, which make up the aporia of green discourse compared to those of classical progressivism, which was ardent supporter of growth and devel-

> opment, but also to the Jewish tradition-co-Christian of «Be fruitful and multiply; fill the earth, make it subjected» which is closely linked to progressivism. (Graziosi 2023, pp. 170-171)

As for the future, Graziosi recognizes the scientific foundation of concerns about the ecological state of the planet, but is firmly convinced that the only possible path is that «indicated by rationality». In his opinion, the only applicable remedies are inspired by «technical-scientific progress» and any choice «must be pursued elastically, based on scientific knowledge and their advancement, which is by definition unpredictable». Finally, to try to see a new world concretely realized, he considers it appropriate

> abandon a moralism often counterproductive because, even when it is inspired by the best intentions, may seem elitist, paternalistic and even contemptuous especially to those who today feel hurt by the rapid changes of the modern world [...]; renounce binding plans in favor of open reasoning on the future; and finally abandon all apocalypticism and anti-scientism because only knowledge, technical progress and a wise use of prices and incentives can help us to cope with the problems created by development. (Graziosi 2023, p. 173)

In conclusion, this chapter attempts to sketch out the complex interpretative framework in which the relations between scientists and the environment must be inscribed.

The debate analysed here clearly reveals that, also with regard to environmental issues, behind the conflict between rationality (scientific knowledge) and irrationality (a span of attitudes ranging from mild scepticism to the radical rejection of science) conceals a strategic contrast between antithetical and irreconcilable socio-economic interests.

The hope is that this chapter will stimulate future research that will be able to arrange new and significant interpretative pieces in a scientific mosaic that, still today, remains fragmented, ambiguous and controversial.

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