

Introduction to Georgescu-Roegen and Degrowth

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While my contribution to the historical panel chaired by Spanish economist Joan Martinez-Alier (an old Catalan friend of mine and ex-president of the International Society for Ecological Economics) at the Paris De-Growth Conference, on 18 April 2008, was an oral presentation in French, my only mother language (a king polyglot acting as interpreter for the English-speaking participants), I will try for these conference proceedings (published essentially in English) to retrace in a few words the main arguments of my informal talk. (Poor and defectuous English is mine, sorry!)

My speech was illustrated by several slides (not reproduced here), most notably to present my two favourite graphs associated with the double threat of climate and oil in the new Anthropocene epoch of the Earth's Biosphere (Grinevald, 2007) :

- *the Keeling curve* : continuous record since 1958 of the variations of atmospheric CO₂ concentrations from the Mauna Loa Observatory in Hawaii – a sort of Rosetta stone for the scientific discovery of global warming...
- *the Hubbert curve* : the bell-shaped curve of crude oil extraction – or a mineral resource production cycle – emphasizing the first growth phase and the second depletion phase ; the historical turning-point between the extraction growth rate and the decline or depletion rate being named Hubbert's peak, after the works of U.S. geologist Marion King Hubbert (1903-1989).

First applied to the United States domestic production, the Hubbert model was extended to the peak of world crude oil production, now simply named Hubbert's peak or the Peak Oil.

The coming global oil crisis is now probably the best argument developed by de-growth movement, notably after the warning of British petroleum geologist Colin Campbell (author of *The Coming Oil Crisis* in 1997), the principal founder of ASPO (Association for the Study of Peak Oil and Gas) in 2001 (see Campbell, 2005, in which Georgescu-Roegen's *La Décroissance* is cited).

A picture of my three paradigmatic heroes was also presented with slides. The iconic heroes of my story (not a chronological history but a socio-epistemological reconstruction with a heuristic and pedagogical meaning) are the visionary funding fathers of some very important but not yet fully recognized « scientific revolutions ». These three heroes and related scientific revolutions are :

Sadi Carnot (1796-1832) - thermodynamics

Vladimir Vernadsky (1863-1945) - biogeochemistry

Nicholas Georgescu-Roegen (1906-1994) - Bioeconomics

(a main source for ecological economics and industrial ecology)

These long neglected historical figures and scientific paradigms are all in disagreement with the Newtonian science of modern Nations-States of the West, but now amalgamated, at least, in my academic teaching and transdisciplinary framework. It is a proposal for a new global ecological worldview, a new Biosphere cosmology, a new *Weltanschauung* for the decline of the world-wide militaro-industrial Western civilization.

Of course, the choice of Carnot (not to be confused with his father Lazare, a military engineer too), Vernadsky and Georgescu-Roegen is mine. They are symbolic heroes for a series of unwelcome or invisible scientific revolutions (ignored by standard economics and experts in international politics and world affairs), a series reconstructed (tinkered if you prefer) after my passionately reading in 1972-74 of Thomas S. Kuhn's *The Structure of Scientific Revolutions* and my personal study of the life and work of Sadi Carnot, my first hero. Like his eminent colleagues, T. S. Kuhn, a physicist turned historian and philosopher of science, was totally ignorant of biogeochemistry and bioeconomics (me too at that moment), but he was a remarkable specialist in history of thermodynamics, from the seminal work of Sadi Carnot (and his engineering precedent) to Max Planck, who was instrumental in the transition between thermodynamics, heat radiation theory and the revolutionary discovery of quanta. Philosophy and history of modern science, notably physics, were a prerequisite to understanding Georgescu-Roegen, and also Vernadsky, both using thermodynamics as paradigm.

My transdisciplinary trilogy forms a sort of conceptual « novelty by combination », to use Georgescu-Roegen's terminology.

This combined epistemological framework, with a historical slant (from the development of thermodynamics to the thermodynamics of development) is, of course, not yet commonly shared and explicitly adopted by our compartmentalized academic establishment, except perhaps for some forerunners of the Earth system perspective within the new research fields of ecological economics and industrial ecology.

The methodological proposal of the Carnot-Vernadsky-Georgescu paradigm is in line with the new concept of the Anthropocene, adopted within the holistic and interdisciplinary Global Change international scientific community. My Biosphere ecological quest (Polunin and Grinevald, 1988) was converging with the first fundamental steps of the International Geosphere-Biosphere Programme (IGBP), Earth System Science and Gaia theory (with the result I became a member of the Geological Society of London Gaia : Earth Systems Science Group).

In reality, the chronological order of the names Carnot, Vernadsky and Georgescu-Roegen was not exactly that from my intellectual biography. We must note here that my original research about Vernadsky's life and Biosphere theory, the birth of biogeochemistry (including the study of biogeochemical cycles altered by human action) and Vernadsky's hidden influence (together with Lotka) on the post-WWII systems ecology, was essentially made after my works together with Nicholas Georgescu-Roegen and the first publication of *Demain la décroissance* (Georgescu-Roegen, 1979).

My personal awareness of the overdevelopment of the West and the biosphere limits of world economic growth, which was contemporary with my growing awareness of the importance of the Vernadskian idea of The Biosphere (Grinevald, 1987, 1988 ; Polunin and Grinevald, 1988), came slowly and not without difficulties. This work was developed after my first socio-epistemological and historical studies (in touch also with Michel Serres and other historians of Western science and technology.

The concept of the Carnotian revolution (Grinevald, 1976) was coined to emphasize the break of the thermo(dynamic)-industrial revolution, a break with the long neolithic cyclic worldview of traditional agrarian societies, which was well illustrated by the forgotten Vitruvian paradigm of « hydraulic architecture » (Bélibor) of Enlightened Europe (pre-industrial and pre-thermodynamic world of James Hutton, John Smeaton, James Watt, including the classical economists like Adam Smith and Thomas Malthus). After the French Revolution and Napoleonic Wars, the silent Carnotian revolution was a real bifurcation in the historical evolution of Western civilization, not yet well recognized, before the works of Georgescu-Roegen, Michel Serres and some others. My concept of Carnotian revolution, quickly adopted by Georgescu-Roegen, since our first meetings in 1974-75. Of course, it was congruent with Georgescu-Roegen's work on entropy and economic development. It was in line with the new environmental studies emphasizing the anthropological and ecological paradigm shift of the modern fossil-fueled civilization.

Georgescu-Roegen's bio(spheric)economics became, in my mind, convergent with the thermodynamic framework of global ecology, the Vernadskian science of the Biosphere (Vernadsky, 1998) revived by the Gaia hypothesis of James Lovelock and Lynn Margulis (Grinevald, 1987 ; Schneider and Sagan, 2005).

The new perception of the limits of the Earth's Biosphere, of global human habitability of our little living planet, dangerously altered by modern economic growth since the thermo-industrial revolution) was itself in flux. Reworking some Vernadskian and Teilhardian ideas about the Noosphere (or the Anthroposphere), and some precedents in geological thinking or Natural History (Buffon, Stoppani...), the theme of the human impact on the face of the Earth became more and more central (see Naredo and Gutiérrez, eds., 2005). I have adopted immediately the new concept of the Anthropocene Grinevald in Naredo and Gutiérrez, eds., 2005, p.15-90 ; 2007), coined in 2000 by Paul Crutzen and Eugene Stroemer to distinguish the current accelerated man-made-geological epoch from the steady-state 10.000-year-old Holocene epoch (Crutzen, 2002 ; Steffen, Crutzen and McNeill, 2007 ; Zalasiewicz et al., 2008). It is a very useful evolutionary framework to think about the Peak Oil, Global Warming and the necessity of downshifting.

Those who are familiar with our current concern with economic growth criticism and the « de-growth » alternative, probably agree already with the opinion that « *la décroissance* » (as we say in French, translating Georgescu-Roegen's term decline, the English term used as different from growth and steady states in Adam Smith's

Wealth of Nations) have its main historical and epistemological seeds in Georgescu-Roegen's bioeconomic revolution (see Grinevald, 1980, 1992, 2006, and my Introduction in Georgescu-Roegen, 1995). My presentation and translation (with Ivo Rens) of Georgescu-Roegen's first bioeconomic essays, was published in Lausanne, Switzerland, in 1979, under the very title *Demain la décroissance* (Georgescu-Roegen, 1979). A second new revised and expanded edition, entitled (without *Demain*) *La Décroissance*, was published in Paris sixteen years later, just after the passing of the great Georgescu-Roegen. This 1995 second edition, which was not without effect in France (see Bernad et al., eds., 1993 ; Latouche, 2006 ; Mongeau, ed., 2007) was reissued, with an up-dated bibliography, in 2006.

Now, several decades after the seminal « limits to growth » debate and « the environmental revolution » (Max Nicholson) of the early 1970s, Georgescu-Roegen's *La Décroissance* is perhaps not a bestseller but a leading radical ecological-economics manifesto !

According to me, the most prophetic part of this little book was the proposal of a « minimal bioeconomic program ». This iconoclastic anti-growthmania platform is part of the chapter entitled « Energy and economic myths », a lecture first delivered on 8 November 1972 by the author of *The Entropy Law and the Economic Process* (Georgescu-Roegen, 1971) within the series *Limits to Growth : The Equilibrium State and Human Society* at the Yale School of Forestry and Environmental Studies (Georgescu-Roegen, 1975a ; see also Wade, 1975), and on numerous other occasions elsewhere. It was part of Georgescu-Roegen's lecture given on 6 June 1974 at the University of Geneva Department of Econometrics. I was present and I remember the moment as very exciting, at least for my mind. It was the very first time I met professor Nicholas Georgescu-Roegen. I was here, with pencil and paper, because I was in charge of the University of Geneva Information and Press Office (see my press release : Grinevald, 1974), but also because a theoretical physicist of my alma mater, Josef Maria Jauch (deceased at 60 on 29 August 29 1974) has lend me (while I was completing my master in philosophy on the entropy notion a copy of Georgescu-Roegen's *The Entropy Law and the Economic Process* (a difficult encyclopaedic book which I just cited in a footnote in my 1973 memoir on *La notion d'entropie dans la pensée contemporaine*). So, when I first see and heard professor Georgescu-Roegen, I was not completely unaware of his 1971 great book on entropy and economics, contrary to the other participants of Georgescu-Roegen's lecture at the University of Geneva in June 1974.

Later, I considered Georgescu-Roegen's minimal bioeconomic programme as one of the most practical by-products of the new philosophical and scientific perspective proposed by the eminent Romanian-born mathematician and French/English-educated statistician turned development expert and mathematical economist in the United States. I learned from himself that he was the « darling » of U.S. mathematical neoclassical economists after his emigration first at Harvard in 1948, after his previous residence at Schumpeter's Harvard Department of Economics in 1934-36, then as full professor at Vanderbilt University, Nashville, Tennessee (for 27 years).

Ever since my first encounter in Geneva, Nicholas Georgescu-Roegen appeared to me as a sort of heretical Galileo of modern times. Thanks to all our meetings (including at his home, and mine, too), and the reading of all his papers, he became the most inspiring transdisciplinary epistemologist among my personal encounters with outstanding thinkers, like Jean Piaget, Michel Serres, Edgar Morin, Ilya Prigogine and many others.

Fortunately, just a week after our first meeting at the University of Geneva, I met again Georgescu-Roegen in Paris during the CNRS-Ecole Polytechnique colloquium commemorating the 150th anniversary of Sadi Carnot's *Réflexions sur la puissance motrice du feu* (see the proceedings – including papers of both Georgescu-Roegen and Grinevald – published under the title *Sadi Carnot et l'essor de la thermodynamique*, Paris, Editions du CNRS, 1976). As far as I know, it was the first international and interdisciplinary conference including a section on thermodynamics and economics. Nevertheless, the intellectual situation of a dissenter like Georgescu-Roegen was dramatic! I was realizing how the author of *The Entropy Law and the Economic Process* was one of the most heretical scholar within economics and philosophy of science, because his peculiar application of the Second law of thermodynamics to understanding of economic activity and environment-development problématique, was a very unwelcome epistemological perspective, as well as the unexpected discovery of entropy within Newtonian science of the Western thermo-industrial revolution and its imperial expansion.

Georgescu-Roegen's modest bioeconomic proposal was in line with his invisible scientific revolution of Vernadsky's biogeochemistry and Biosphere concept, ignored or rejected by the mainstream in statistical physics, earth sciences, molecular biology, economics and international politics. The fate of Georgescu-Roegen's paradigm shift, which later inspired the promoters of Ecological Economics and Industrial Ecology, seems practically similar with Vernadsky's biogeochemical perspective of the planet Earth's Biosphere during the Stalinist regime.

Thanks to my crazy entropy addiction, the year 1974 was a turning point in all my intellectual life. If I was fortunate enough to be instrumental in the seminal iconoclastic idea of « la décroissance », in the sense of Georgescu-Roegen, many years before the rise of the new countercultural movement of the same name, it was mainly thanks to my encounter and close friendship with Nicholas Georgescu-Roegen. It was my greatest privilege to be named « dearest of all dear friends of mine », as Nicholas writes me in a letter of 15 February 1981. Always I think of him with an immense gratitude and respect. Remember Nicholas Georgescu-Roegen as the father of a new ecological-economic philosophy of the enjoyment of life and way of living : « la décroissance ».

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