9.3.4. From mobilizing knowledge to sustained productivity growth? Agricultural prizes in Geneva during the long 19th century

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The increasing interaction between scientific and technological knowledge in Western Europe during the long nineteenth century is often seen as the most important element of change in the broader "industrial enlightenment", or "economic enlightenment", which Europe underwent and that took Europe towards sustained, innovation based economic growth.[1] A key institution in that transition was the range of scientific and industrial societies, which initiated a variety of activities aimed at promoting the diffusion of types of knowledge considered useful for increased material welfare. Among the many tools that were used by the societies to achieve their aim (for instance training, exhibitions, and publishing) one of the most common was the practice of giving prizes.

This paper investigates the growth and activities of industrial societies in Switzerland with a focus on Geneva and on one society in particular: the Society for the Encouragement of Arts and Agriculture of Geneva. Embedded within French territory and surrounded by mountains, the Republic of Geneva was characterized by its small size and limited fertile land, making agricultural productivity a source of constant concern.[2] Against this backdrop, between 1776 and 1896 the Society of Arts offered several hundred prizes, of which at least 180 were clearly oriented towards economic change. Among the latter, more than half were specifically aimed at stimulating the improvement of farming and livestock practices.[3] The following case study focuses on the prizes relating to agriculture.

The study deals with two separate but linked issues. First, the links between the giving of prizes and technological development and, ultimately, economic growth. The organizers of prizes explicitly aimed to stimulate creativity and encourage the adoption of best practices. Were these goals met? What other impact might these prizes have had? The second issue concerns the interaction between scientific knowledge and technology. Can a study of prize giving tell us something about the relations between the two fields of knowledge during that period? In what follows, I mainly focus on the first issue.

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[1] See for example Joel MOKYR, « The Intellectual Origins of Modern Economic Growth », *The Journal of Economic History*, juin 2005, vol. 65, nº 2, pp. 285-351 ; Peter M. JONES, *Industrial Enlightenment. Science, Technology and Culture in Birmingham and the West Midlands 1760-1820*, Manchester University Press, 2008, 272 p.

[2] This concern appears clearly in one of the Society of Arts' founding documents: « Trouverait-on que l'Agriculture ne saurait former chez nous un des objets qu'il est important d'encourager ? Mais la petitesse de notre territoire est une raison de plus pour y seconder la nature par toutes les ressources de l'art, et le grand nombre de particuliers pour qui l'Agriculture est un délassement, ne peuvent que s'intéresser à tout ce qui pourra varier ou multiplier les productions de leurs campagnes. » SOCIÉTÉ DES ARTS, « Prospectus de l'établissement de la Société pour l'encouragement des Arts dans la ville et le territoire de la République de Genève », 1776, p. 4–5.

[3] This tally does not include the fine-arts contests or awards given to students at the various schools set up by the Society of Arts.

In examining these issues, it may be possible to gain a better understanding of the concerns and preoccupation with agriculture in the Geneva region. It is also a way to place the activities of the Society of Arts in the broader context of diffusion and organization of knowledge in Switzerland and Europe.

As mentioned above, a main question is if prizes did in fact act as incentives to innovate. The question relates to a broader debate over what were the sources of innovation, and how innovation has been promoted, encouraged and fostered. When examining the literature which discusses prizes, we find that scholars generally consider that they functioned according to the intentions of the organizers, who aimed to establish instruments likely to generate emulation and provide incentives to innovate.[4] Nevertheless, there is little discussion about the actual impact of prize systems on innovation, a lacuna especially manifest in the Swiss case. The aim here is to discuss various effects that prizes can have on technological change.

Another method by which scholars evaluate the role of prizes with regard to innovation is to assess their efficiency against other mechanisms that were put in place to promote innovation, notably patents. In the literature, some argue that property rights were not the only, nor perhaps the most effective, way of encouraging innovation, and that prizes were as effective or sometimes even better instruments.[5] In order to discuss these issues in more depth, we ask such questions as: did prizes concern a broad or a small range of fields? What kind of innovations did they encourage? Was there resistance to the prizes, and if yes, what kind, and how was it overcome? Who among the general population was likely to be affected by the prize-winning innovations?

The establishment of agricultural science and the prizes

In the last third of the 18th century, in Geneva, as in many other regions of Europe, agriculture became the focus of increased attention from individuals trying to improve the yield and quality of local production. A relatively small set of people –probably numbering less than a dozen– began performing countless, highly detailed experiments, discussing their research within the context of technical societies, exchanging with their European peers via letters, publishing their results and trying to establish general guidelines for certain fields of agriculture and husbandry.[6] It is hard to put a label on the

[4] See for example Maxine BERG, *Luxury and pleasure in the eighteenth-century Britain*, Oxford, Oxford University Press, 2005, 373 p ; Jeremy L. CARADONNA, *The Enlightenment in Practice: academic prize contests and intellectual culture in France, 1670-1794*, Cornell University Press, 2012, 531 p ; Michel COTTE, *De l'espionnage industriel à la veille technologique*, Besançon, Presses universitaires de Franche-Comté, 2005, 294 p ; Katrin KELLER, « Die Preisfragen der Oekonomischen Gesellschaft Bern », *in Berns Goldene Zeit: das 18. Jahrhundert neu entdeckt*, 2008, p. 37 ; Daniel ROCHE, *Le siècle des Lumières en province: académies et académiciens provinciaux, 1680-1789*, Paris, Mouton, 1978.
[5] Petra MOSER, « How Do Patent Laws Influence Innovation? Evidence from Nineteenth-Century World's Fairs », *The American Economic Review*, 1 septembre 2005, vol. 95, nº 4, pp. 1214-1236 ; Petra MOSER, « Innovation without Patents: Evidence from World's Fairs », *Journal of Law and Economics*, février 2012, vol. 55, nº 1, pp. 43-74.
[6] Revealing the relatively small number of people invovled, the president of the *Société des Arts* de Candolle said that « Genève fut considérée par les agronomes comme un des points les plus avancés du continent, mais à vrai dire ce n'était que dans la sphère élevée de trois ou quatre grands propriétaires, dont M. Pictet était le plus marquant. La masse des petits propriétaires ne s'en occupait pour ainsi dire pas. » Alphonse DE CANDOLLE, *Discours de M. Alphonse de*

people involved. They were not a homogenous group either in terms of education or profession, but rather, included diplomats, politicians and clergymen. All however were intellectuals and for the most part belonged to important land-holding families.[7] Depending on the source, they are referred to as "improvers",[8] "agronomists", "farmers" or "cultivators" as opposed to small rural growers who are more often called "peasants", "grangers", "cattlemen", "sharecroppers" or "farmers".[9] Regardless, modern agricultural science was progressively becoming an independent scientific field of research. Amply documented and widely disseminated at the time, their research has reached us in various forms, such as treatises, journal articles, letters and essays. A portion of these documents are based on submissions to contests, most often organized by the societies for economic improvement.

Agricultural prizes in Geneva

All fields included, there were three main types of prizes and contests during the long 19th century. First, prizes were awarded to the best students attending the various classes established by the societies for encouragement. Second, medals were given during exhibitions; and third, contests were held in which the public at large could participate. Only this final type of contest is discussed here.

This study rests essentially on data gathered from the topics for the agricultural contests organized by the Society of Arts between 1776 and 1885 and on a number of winning essays which were then published. The corpus examined is by no means exhaustive, but it is, I believe, broad enough to provide a good overall appreciation of the topics of the contests organized by the Society. During the period included in this study, contests can be divided into two phases of unequal length: first "the beginnings", an interval of five years between 1776 and 1781 during which time the first contests were organized; second, a period of time spanning from the 1820s to the end of the 19th century which includes the vast majority of contests.

This two-part division provides a useful framework for examining the evolution of the topics and format of prizes over time. For example, it is interesting to note that each phase corresponds more or less with a particular form of contest: on the one hand *questions* aiming, in my opinion, to stimulate the search for solutions and collecting of information regarding previously identified problems with agricultural production; on the other hand, *awards*[10] aimed more at rewarding "best practices", meaning the best

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Candolle, président de la Société des arts, prononcé dans la séance générale du 5 janvier 1864 à l'occasion de l'installation de la Société dans l'Athénée, Société des Arts, 1864, p. 17.

[7] A good example in Geneva is Charles Pictet-de Rochemont (1755-1824), who put aside his military, political and diplomatic activities in order to raise merino sheep and dedicate himself to the agriculture section of the *Bibliothèque britannique*, which he cofounded (1796). *Pictet [-de Rochemont], Charles*, http://www.hls-dhs-dss.ch/textes/f/F20517.php, consulté le 4 novembre 2012.

[8] The term refers to the pioneering Society of Improvers in the Knowledge of Agriculture in Scotland (1823).

[9] "*Fermiers"* as opposed to "*agriculteurs"*

[10] Les *primes* en français dans les sources.

possible use of already available knowledge.[11] Although undoubtedly schematic, this distinction allows us to speculate on the different impacts prizes can have on innovation depending on whether they fit within the first or second form.

Conclusions

While it remains difficult to identify and assess the direct impact of the prizes on agricultural productivity, their existence shows a willingness to facilitate the creation, acquisition and diffusion of knowledge considered useful for productive purposes and makes it possible to suggest what impact they had with regard to innovation.

Prizes seem to have had an effect on the diffusion of knowledge. On the one hand, we find that the best essays were published in local journals and in widely-read reviews like the *Bibliothèque britannique*. This indicates that the knowledge resulting from the contests was disseminated within the intellectual and scientific communities in Geneva as well as beyond. This observation must be tempered, however, by the limited number of essays actually submitted and rewarded. On the other hand, the number of awards for best agricultural practices increased significantly over the period in question becoming more and more common. This seems to support that in spite of resistances to agronomy, this type of prize progressively garnered the interest of farmers, who were more and more willing to adopt new practices.

As for the second issue of the paper, it is reasonable to assume that prizes contributed to the formalization of knowledge useful to agriculture. This can be seen in the essays which give detailed procedures for experiments. They include the formulation of hypotheses, systematic methods of investigation, repetition of experiments under various conditions, and the recording of limitations and biases. These are all indications that the contests contributed to fostering and diffusing the use of methods which today we qualify as scientific.

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[11] This distinction is similar to the two aspects of learning as presented by Lundvall and Johnson : « processes which lead to new knowledge and those which spread old knowledge to new persons. » B. LUNDVALL et B. JOHNSON, « The Learning Economy », *Journal of Industry Studies*, Déc 1994, vol. 1, nº 2, p. 23.