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Acclimatizing the World: A History of the Paradigmatic Colonial Science

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ABSTRACT

This paper examines the institutions, personages, and theories that informed acclimatization activities in nineteenth-century France, England, and the two colonies of Algeria and Australia. Treating acclimatization as a scientific concept and activity, the essay begins with the conditions of its emergence in Enlightenment France. Subsequent sections trace the growth of the acclimatization movement and its translation to the British context, and consider reasons for its decline in the last third of the nineteenth century. Efforts are made to show why many perceived acclimatization to be *the* paradigmatic colonial science with applications as diverse as agriculture, settlement schemes, field sports, and human health. Emphasis falls on the French and British cultural spheres, as these were the dual epicenters of both modern colonialism and organized acclimatization activity.

THE ZOOLOGICAL, BOTANICAL, AND MEDICAL CONCEPT OF ACCLIMATIZATION was an important issue for nineteenth-century European science, particularly in the colonies of Africa and Australasia. Acclimatization is intimately entwined with the rise of modern imperialism and with the marginalization and alteration of indigenous ecosystems and peoples. In both the French and British Empires, acclimatization discourses influenced politics, settlement schemes, and regulations for the transport, hygiene, and length of duty of European armies in the colonies. Physicians and anthropologists pondered the ability of Europeans to survive in exotic environments, while colonial functionaries, landowners, zookeepers, and naturalists formed acclimatization societies to promote the rational exchange of aesthetically pleasing and "useful" flora and fauna. Unintended plant, animal, and disease introductions accompanied European colonization, and they were a bane to later farmers.[1] In the nineteenth century, however, acclimatization generally denoted an intended and "scientifically" mediated transplantation of organisms.

Beyond its importance in questions of human health, acclimatization also functioned at other levels of Europe's colonial enterprise. By the 1830s, its constellation

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[1] Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900–1900* (Cambridge: Cambridge Univ. Press, 1986) treats mainly the unintentional introduction of biota.

of heterogeneous practices seemed to embody the utilitarian and manly ethos that permeated colonial science. Moreover, acclimatization touched on such major colonial settlement issues as animal health, labor management practices, modes of development, and the cultural needs of Europeans far from home. In 1860, the French colonial botanist Auguste Hardy, who directed the *jardin d'essai* at Algiers, summarized his views on the subject by declaring that "the whole of colonization is a vast deed of acclimatization."[2] More recently, an historian of anthropology has typified Darwin's era as "an age obsessed with the problem of acclimatization," and claimed that "[t]he utilitarian objectives of colonialism made acclimatization the fundamental scientific question it raised."[3]

By 1900, more than fifty acclimatization societies had formed around the globe, and most were in the European colonies.[4] They were driven by many motives—from scientific curiosity about the mutability of species, to nostalgia for the game birds and sport fishes of Europe. On the peripheries, and in Europe, these societies promoted colonization and functioned as a vast network for the exchange of ideas, techniques, and organisms. In metropolitan Paris and London, and even in the French provinces at Grenoble, it was common to find acclimatization societies linked with menageries, natural history museums, and agricultural and botanical societies. Kew Gardens and the Paris Muséum National d'Histoire Naturelle were hubs in the wheels of international scientific exchange and colonial agriculture.[5] Attempting to Europeanize the tropics and simultaneously render Europe more exotic and cosmopolitan, acclimatization organizations espoused a practical approach to science, one promising economic prosperity, improved diets and health, and aesthetic enjoyment.[6] This essay examines the social and scientific functions of acclimatization and acclimatization societies in Paris and London, and in two areas of colonial activity, French Algeria and the British dominions of Australasia.

FRENCH AND BRITISH THEORIES OF ACCLIMATIZATION

Today, the term "acclimatization" is used principally in respiratory physiology and exotic plant and animal management. In the nineteenth century, however, the word

[2] Auguste Hardy, "Importance de l'Algérie comme station d'acclimatation," reprinted from *L'Algérie agricole, commerciale, industrielle* (Paris, 1860), p. 7.

[3] Henrika Kuklick, "Islands in the Pacific: Darwinian Biogeography and British Anthropology," *American Ethnologist*, 1996, *23*, 3:611–38; quotation on p. 628.

[4] Christopher Lever, *They Dined on Eland: The Story of the Acclimatisation Societies* (London: Quiller Press, 1992), pp. 193–4. The appendix, "Chronological List of Principal Acclimatisation Societies," lists fifty-four groups founded from 1854 to the 1930s. Thirty-seven are in New Zealand, Australia, and Tasmania. Others, recorded mainly within the French cultural sphere, are in *Liste générale des membres de la Société Impériale Zoologique d'Acclimatation au 16 mai 1862* (Paris: L. Martinet, n.d.), pp. 93–5, and *Liste générale des membres de la Société Nationale d'Acclimatation de France au 3 mai 1884* (Paris: Imprimerie spéciale du Jardin d'acclimatation, 1884), pp. 71–2.

[5] See the papers presented by Marie-Noëlle Bourguet and Christophe Bonneuil in "Dossier thématique: De l'Inventaire du monde à la mise en valeur du globe: Botanique et colonisation," *Revue Française d'Histoire d'Outre-mer*, 1999, *86*, 322–23.

[6] For the general context of Australian scientific societies, see Michael Hoare, "The Intercolonial Science Movement in Australia," *Records of the Australian Academy of Science*, 1976, *3*, 2:7–28; *idem*, "Science and Scientific Associations in Eastern Australia, 1820–1890" (Ph.D. diss., Australian National Univ., 1974). On utilitarian science and its intersections with acclimatization in the French context, see Michael A. Osborne, "Applied Natural History and Utilitarian Ideals: 'Jacobin Science' at the Muséum d' Histoire Naturelle, 1789–1870," in *Re-Creating Authority in Revolutionary France,*

embraced an astounding range of uses and meanings. Many noted physicians and naturalists, including Charles Darwin and Alfred Russel Wallace in England, and the French zoologist Isidore Geoffroy Saint-Hilaire, attempted to clarify the concept's scope and definition. In France and its colonies, where the term came to signify a rationally forced adaptation to new environments, acclimatization connoted biological changes at physiological and sometimes structural levels. In the British sphere, the term tended to signify a transfer of so-called exotic organisms from one location to another with a similar climate. (In the parlance of the day, an "exotic" organism was one that originated nearly anywhere other than the country or place under study.) But if clarity of definition and precision of use were goals, they were seldom achieved. Enthusiasts often used the term "acclimatization" interchangeably with "naturalization" or "domestication," and definitions varied with cultural, temporal, and geographical context.

The term first appeared in eighteenth-century France, where it was associated with the botany of exotic plants and with Louis-Jean-Marie Daubenton's efforts to introduce merino sheep into the country. Daubenton traveled to Spain to study sheep breeding, experimented on wool quality and breeding at numerous sites in France, and dreamed of acclimatizing the tapir, peccary, and zebra.[7] During the Enlightenment, but also in the revolutionary era, the idea resonated with calls for utilitarian science. The Abbé Féraud wrote in 1787 that "acclimate" was a new word attributed to Guillaume-Thomas Raynal, a critic of European methods of colonization. According to Féraud, it signified being "habituated to a climate."[8] By 1835, the verb *acclimater* had gained legitimacy by appearing in the dictionary of the Académie Française, which defined it as "to accustom to the temperature and influence of a new climate," and provided examples of usage. These included the experiences of Spanish sheep in northern Europe and the difficulties facing European settlers in the West Indies.[9]

Simultaneous with Enlightenment calls for practical science, the writings of Jean-Baptiste Lamarck and a revival of Neo-Hippocratic perspectives on health and disease provided theoretical backing for the acclimatization doctrine. The French had

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1789–1900, eds. Bryant T. Ragan, Jr. and Elizabeth Williams (New Brunswick, N.J.: Rutgers Univ. Press, 1992), pp. 125–43; and Claude Blanckaert, "Les Animaux 'utiles' chez Isidore Geoffroy Saint-Hilaire: La Mission sociale de la zootechnie," *Revue de Synthèse*, 1992, *113*, 3–4:347–82.

[7] Histories of the term and changes in its definition and use may be found in Michael A. Osborne, *Nature, the Exotic, and the Science of French Colonialism* (Bloomington, Ind.: Indiana Univ. Press, 1994), pp. 62–72. On the related problem of domestication, see Jean-Pierre Digard, *L'Homme et les animaux domestiques: Anthropologie d'une passion* (Paris: Fayard, 1990), pp. 85–103. See also Lever, *They Dined on Eland* (cit. n. 4), pp. vii–ix; Warwick Anderson, "Climates of Opinion: Acclimatization in Nineteenth Century France and England," *Victorian Studies*, 1992, *35:*135–57, esp. pp. 137–8. On Daubenton, see Camille Limoges, "Daubenton, Louis-Jean-Marie," in *Dictionary of Scientific Biography*, ed. Charles Gillispie, vol. 15, pp. 111–14.

[8] Abbé Féraud, *Dictionnaire critique de la langue française*, 3 vols. (Marseille: Jean Mossy, 1787), vol. 1, p. 20. The term is absent, however, from Adolphe Hatzfeld and Arsène Darmesteter, with the assistance of Antoine Thomas, *Dictionnaire général de la langue française du commencement du XVIIe siècle jusqu'à nos jours*, 2 vols. (Paris: Librarie Ch. Delagrave, 1890–1893). See also Guillaume-Thomas Raynal, *L'Anti-colonialisme au 18ème siècle: Histoire philosophique et politique des établissements et du commerce des Européens dans les Deux-Indes*, introduction, choix de textes et notes par Gabriel Esquer (Paris: Presses Universitaires de France, 1951).

[9] *Dictionnaire de l'Académie Française*, 2 vols., 6th ed. (Brussels: J. P. Meline, 1835), vol. 1, pp. 17–18.

Figure 1. *Louis-Jean-Marie Daubenton and merino ram at the Jardin d'Acclimatation in Paris. The statue, executed by the sculptor Godin and dedicated on 13 November 1864, celebrates the Société d'Acclimatation's continuation of applying natural history to the problems of agriculture.*

long celebrated Hippocratic medicine, and the Hippocratic treatise "Airs, Waters, Places" informed French acclimatization theory, as well as their distinctive approaches to medicine and medical geography.[10] Among the major medical questions of the era was whether, and if so by what means, Europeans could adapt to life in the colonies. References to acclimatization and "seasoning" appeared with increasing

[10] Michael A. Osborne, "The Geographical Imperative in Nineteenth-Century French Medicine," in *Medical Geography in Historical Perspective,* ed. Nicolaas A. Rupke (*Medical History Supplement,* no. 20, in press).

frequency after 1830, when the French began grappling with the problems of settling Algeria, and British administrators pondered the future of their Australasian and Indian interests.[11] European ideas of civilization, medicine, and morality, evolving in tandem with imperialism, made acclimatization a problem of interest to geographers, physicians, naturalists, and amateurs.[12]

The acclimatization movement's godfather and major theorist was Isidore Geoffroy Saint-Hilaire, a naturalist at the Paris Muséum National d'Histoire Naturelle. This zoologist—and his more famous father, Etienne Geoffroy Saint-Hilaire—believed that animal life was constructed upon a single, unified plan. In contrast to Georges Cuvier, who tried to excise evolutionary thought from biology, the Geoffroy Saint-Hilaires promoted a variant of Lamarckian transformism and investigated human and animal teratology. Isidore Geoffroy Saint-Hilaire portrayed his transformist theory as a moderate alternative between the extremes of Cuvier and Lamarck. In his view, animals were endowed with vast adaptive potential, and could be forced to acclimate to a wide variety of environments.[13] This theory of limited variability of type provided the rationale for numerous experiments on the acclimatization of exotic animals. Faith in the malleability of animal and plant form and function typified the French approach to acclimatization, and helps explain why the French attempted to introduce everything from ostriches to yaks and llamas both in their own country and in its dependencies.

In midcentury France, acclimatization agreed comfortably with monogenist racial theories and seemed to provide an explanation for the diversity of humanity. Polygenists, however, like the military physician, medical geographer, and anthropologist Jean Ch. M. F. J. Boudin—and many other members of Paul Broca's Société de Anthropologie de Paris—denied that acclimatization could happen or doubted that its minor imprint on racial attributes could be passed on to future generations. Using vital statistics collected to monitor the success of European troops and settlers in Africa, Boudin argued that the various races of humanity maintained their health

[11] On medical statistics and the problem of "seasoning," see Philip D. Curtin, *Death by Migration: Europe's Encounter with the Tropical World in the Nineteenth Century* (Cambridge: Cambridge Univ. Press, 1989), pp. 44–7, 66, 109–111.

[12] There are several studies of the medical aspects of human acclimatization, especially in relationship to ethnicity and colonial activity. Among the more relevant and recent are David N. Livingstone, "Tropical Climate and Moral Hygiene: The Anatomy of a Victorian Debate," *British Journal for the History of Science*, 1999, *32:*93–100; *idem*, "The Moral Discourse of Climate: Historical Consideration on Race, Place, and Virtue," *Journal of Historical Geography*, 1991, *17:*413–34; *idem*, "Human Acclimatization: Perspectives on a Contested Field of Inquiry in Science, Medicine and Geography," *History of Science*, 1987, *25:*359–94; and Mark Harrison, "Tropical Medicine in Nineteenth-Century British India," *Brit. J. Hist. Sci.*, 1992, *25:*299–318. See also the special section on "Race and Acclimatization in Colonial Medicine," *Bulletin of the History of Medicine*, 1996, *70*, which includes: Warwick Anderson, "Disease, Race, and Empire," pp. 62–7; Mark Harrison, "'The Tender Frame of Man': Disease, Climate, and Racial Difference in India and the West Indies, 1760–1860," pp. 68–93; Warwick Anderson, "Immunities of Empire: Race, Disease, and the New Tropical Medicine, 1900–1920," pp. 94–118. For French perspectives, see Anne-Marie Moulin, "Expatriés français sous les tropiques: Cent ans d'histoire de la santé," *Bulletin de la Société de Pathologie Exotique*, 1997, *90*, 4:221–8; Michael A. Osborne, "European Visions: Science, the Tropics, and the War on Nature," in *Nature et environnement*, eds. Christophe Bonneuil and Y. Chatelin (Paris: Editions de l'Office de la Recherche Scientifique et Technique d'Outre-Mer, 1996), pp. 21–32; Richard Fogarty and Michael A. Osborne, "Constructions and Functions of Race in Late Nineteenth Century French Military Medicine," in *Race in France: A History*, eds. Sue Peabody and Tyler Stovall (forthcoming).

[13] Goulven Laurent argues that Geoffroy Saint-Hilaire was fully transformist. See Laurent, *Paléontologie et évolution en France de 1800 à 1860: Une Histoire des idées de Cuvier et Lamarck à Darwin* (Paris: Editions du Comité des Travaux Historiques et Scientifiques, 1987), pp. 467–89.

only by remaining within a very narrow geographical range, and that analogies between supposed animal and human acclimatization were based on faulty reasoning and therefore invalid.[14]

By the late nineteenth century, Europeans had reconsidered the ideal of the settlement colony and were pondering new ways to exploit, fund, and develop colonial resources with fewer European agents.[15] Simultaneously, newer biological concepts cast additional doubts on the heritability of acclimatization. Around 1900, for example, French colonial agricultural experiment stations, some of which tried to use Mendelism and other quantitative crop-selection methods, supplanted older botanical institutions and techniques based on the theory of acclimatization. In general, French *jardins d'essais*, like those in Algeria, adhered to acclimatization. Focusing mainly on the diffusion of gardening plants and of those fit for cottage industries, the practice was to experiment on a wide variety of plants within the confines of the institution and to present experimental results in qualitative fashion.[16]

Eventually, the acceptance and diffusion of a viable germ theory, the advance of parasitological studies of tropical diseases, and the insufficiency of Neo-Lamarckian ideas of transformism rendered acclimatization a rather outmoded theory. In France, the writings of the physician Louis-Adolphe Bertillon, and especially the 1884 publication of Alfred Jousset's *Traité de l'acclimatement et de l'acclimatation*, signaled a medicalization of the acclimatization discourse and a turning away from the Neo-Lamarckian and adaptationist thinking that had favored its extension.[17]

In Britain, zoologists adopted the term "acclimatization" and transformed its meaning to suit their own scientific and imperial agendas. With rare exceptions—such as Alfred Russel Wallace, who integrated explanations of acclimatization into a selectionist and evolutionary framework—British acclimatization theory tended to be antitransformist, antiprogressionist, and antievolutionist.[18] These theoretical issues, as well as the founding and history of the Acclimatisation Society of the United Kingdom (1860–1867), are treated below.

ENVIRONMENTAL AND POLITICAL ECOLOGIES

Acclimatization activity, like colonization itself, forced consideration of environmental issues, including the conservation and preservation of indigenous flora and

[14] Michael A. Osborne, "The Vagaries of Acclimatization Theory and Transformist Biology in Nineteenth Century France," in *Jean-Baptiste Lamarck, 1744–1829*, ed. Goulven Laurent (Paris: Editions du Comité des Travaux Historiques et Scientifiques, 1997), pp. 529–41.

[15] Susan Sheets-Pyenson, *Cathedrals of Science: The Development of Colonial Natural History Museums during the Late Nineteenth Century* (Montreal: McGill-Queens's Univ. Press, 1988).

[16] Christophe Bonneuil, "'Penetrating the Natives': Peanut Breeding, Peasants and the Colonial State in Senegal (1900–1950)," *Science, Technology, and Society*, 1999, *4*, 2:273–302; *idem*, *Des Savants pour l'empire: La Structuration des recherches scientifiques coloniales au temps de 'la mise en valeur des colonies françaises,' 1917–1945* (Paris: Editions de l'Office de la Recherche Scientifique et Technique d'Outre-Mer, 1991), pp. 42–7. See also Christophe Bonneuil and Mina Kleiche, *Du Jardin d'essais colonial à la station expérimentale, 1880–1930* (Paris: Centre de Coopération Internationale en Recherche Agronomique pour le Développement, 1993); Christophe Bonneuil, *Mettre en ordre et discipliner les tropiques: Les Sciences du végétal dans l'empire français, 1870–1940* (Paris: Editions des Archives Contemporaines, forthcoming).

[17] See Osborne, *Nature, the Exotic* (cit. n. 7), pp. 90–7, esp. 95–6.

[18] Alfred R. Wallace, "Acclimatisation," *Encyclopedia Britannica*, 9th ed. (New York: Werner, 1898), vol. 1, pp. 84–90; *idem*, "Acclimatization," *Encyclopedia Britannica*, 11th ed. (Cambridge, 1910), vol. 1, pp. 114–19.

fauna.[19] Acclimatization was a part of colonial agriculture, whose practices have been identified as responsible for both massive environmental degradation and the birth of environmentalism.[20] Yet in the Maghreb, narratives of restoration and civilization, rather than illusions of a lost Eden, framed acclimatization.[21] In India, shortly before the First World War, Frank Finn, assistant director of the Indian Museum at Calcutta, wrote that habitat destruction and the unintended introduction of disease were considerably more damaging to indigenous species than acclimatized exotic organisms.[22] But fears of the coming extinction of "native" species and criticism of acclimatization were frequent from the 1870s onwards.[23] As a reviewer noted in *Nature*, "The English Acclimatisation Society fortunately came to an end, before it had time to do any harm here [in England]. . . . " But, he continued, as if to remember Frances Trevelyan Buckland's piscicultural prowess (discussed below), "its example has been mischievous in our dependencies."[24]

Colonial settlers employed exotic species to renovate the biota of their adopted countries. Thomas R. Dunlap has noted how acclimatization societies formed "part of the settler's continuing attempt to come to terms with their new lands, to find their place in the country and its place in them."[25] While it is probable that acclimatization societies introduced exotic animals that became pests and altered colonial ecosystems, the historical assessment of these events remains incomplete. Eric C. Rolls, for example, has concluded that Australian acclimatization societies can not be blamed for initiating the transfer of deer in 1806, or for the importation of more infamous biota, such as the fox, rabbit, and prickly pear, which came to plague settler agriculture.[26] A global history of acclimatization's environmental effects would be difficult to achieve, for each colony had a specific environment, and levels of integration with European cultural and economic orbits varied among locations. More-

[19] On environmentalism and acclimatization in the Russian context, see Douglas R. Weiner, "The Roots of 'Michurinism': Transformist Biology and Acclimatisation as Currents in the Russian Life Sciences," *Annals of Science*, 1985, *42:*243–60; *idem*, "The Historical Origins of Soviet Environmentalism," in *Environmental History: Critical Issues in Comparative Perspective*, ed. Kendall E. Bailes (Lanham, Md.: Univ. Press of America, 1985), pp. 379–411.

[20] Richard H. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600–1860* (Cambridge: Cambridge Univ. Press, 1995).

[21] Michael A. Osborne, "La Renaissance d'Hippocrate: L'Hygiène et les expéditions scientifiques en Egypte, en Morée et en Algérie," in *L'Invention scientifique de la Méditerranée*, eds. Marie-Noëlle Bourguet, *et al.* (Paris: Editions de l'Ecole des Hautes Etudes en Sciences Sociales, 1998), pp. 185–204.

[22] Frank Finn, appendix to article on acclimatization, *Encyclopedia Britannica*, 11th ed. (Cambridge, 1910), vol. 1, pp. 119–21.

[23] Osborne, *Nature, the Exotic* (cit. n. 7), esp. pp. 145–71. On the conditions of colonial natural science in Australia, see Barry W. Butcher, "Darwin's Australian Correspondents: Deference and Collaboration in Colonial Science," in *Nature in its Greatest Extent: Western Science in the Pacific*, eds. Roy MacLeod and Philip F. Rehbock (Honolulu: Univ. of Hawaii Press, 1988), pp. 139–57; *idem*, "Darwinism and Australia, 1836–1914" (Ph.D. diss., Univ. of Melbourne, 1992).

[24] From excerpts of a review on the ornithology of New Zealand in Joyce M. Wellwood, comp. and ed., *Hawke's Bay Acclimatisation Society Centenary, 1868–1968* (Hastings, N.Z.: Cliff Press Printers, 1968), p. 24.

[25] Thomas R. Dunlap, "Remaking the Land: The Acclimatization Movement and Anglo Ideas of Nature," *Journal of World History*, 1997, *8:*303–19, quotation on p. 304. See also Ian Tyrrell, "Peripheral Visions: California-Australian Environmental Contacts, c. 1850s–1910," *J. World Hist.*, 1997, *8:*275–302.

[26] Eric C. Rolls, *They All Ran Wild: The Animals and Plants that Plague Australia*, rev. ed. (London: Angus and Robertson, 1984). Particularly relevant to acclimatization society activity are pp. 270–344.

over, it is likely that—except for Europeans themselves—indigenous species, rather that acclimatized exotic organisms, were much more disruptive to European-style agriculture in areas like the forests of eastern Australia.[27]

Even if questions remain about the impact of acclimatization on the environment, it is certain that its practice and its theoretical explanation advanced hand-in-hand with European colonialism. In Algeria, the French made sustained attempts to acclimatize tropical crops. The efforts found their rationale in mercantile economic theory, and in attempts to recover sources of cane sugar, exotic spices, and fruit. These products were what France had lost two decades earlier when the "Black Jacobins" of its Caribbean colony of St. Domingue (Haiti) claimed independence during the Revolution.[28] The later emergence of metropolitan and colonial acclimatization societies in the 1850s, 1860s, and 1870s coincided in the British Empire with what Roy MacLeod has termed "colonial science," when local scientific interests gained increasing importance in the colonies.[29] George Basalla, who vests "colonial science" with a somewhat different meaning, would also have colonial acclimatization societies emerging when colonial scientific activity was still largely dependent on metropolitan personnel, but European settlers had begun to found their own intellectual venues and scientific institutions.[30] In their criticisms of Basalla's account, both MacLeod and Ian Inkster are sensitive to the highly dynamic nature of colonial relations, and to the larger economic contexts and social matrices that shaped the genres of science taking root on Europe's periphery.[31] Whatever chronology one uses, the heyday of acclimatization was part and parcel of the founding and establishment of Europe's settler colonies.

Acclimatization was especially prominent during eras of economic protectionism, when tariffs favored new ventures such as llama culture and the cultivation of vanilla beans. The practice was common both in temperate climes, such as Britain's Australasian dominions, and in dependencies such as France's favored imperial outpost, Algeria. With llamas costing as much as 3,500 francs each, the projects could be expensive.[32] Draining private investment as well as colonial and metropolitan budgets, acclimatization also altered evolving colonial legal structures. In New Zealand, for example, laws protected acclimatized fish and game birds, and acclimatization societies assumed the role of issuing licenses for fishing. An 1895 amendment to the Animals Protection Act mandated that the minister of agriculture review and approve all importation of exotic fauna. So successful were the New Zealanders at acclimatization that, by the 1920s, one observer claimed, "The Game Animals of

[27] See, for example, Warwick Frost, "European Farming, Australian Pests: Agricultural Settlement and Environmental Disruption in Australia, 1800–1920," *Environment and History*, 1998, *4:*129–43.

[28] James E. McClellan III, *Colonialism and Science: Saint-Domingue in the Old Regime* (Baltimore, Md.: The Johns Hopkins Univ. Press, 1992).

[29] Roy MacLeod, "On Visiting the 'Moving Metropolis': Reflections on the Architecture of Imperial Science," in *Scientific Colonialism: A Cross-Cultural Comparison*, eds. Nathan Reingold and Marc Rothenberg (Washington, D.C.: Smithsonian Institution Press, 1987), pp. 217–49, esp. pp. 223–37.

[30] George Basalla, "The Spread of Western Science," *Science*, 1967, *67:*611–22.

[31] Ian Inkster, "Scientific Enterprise and the Colonial 'Model': Observations on Australian Experience in Historical Context," *Social Studies of Science*, 1985, *15:*677–704. On the concept of a "social matrix" of institutions and how they enable colonialism, see *idem*, "Prometheus Bound: Technology and Industrialization in Japan, China and India Prior to 1914—A Political Economy Approach," *Ann. Sci.*, 1988, *45:*399–426.

[32] Osborne, *Nature, the Exotic* (cit. no. 7), p. 26.

New Zealand consist wholly of species introduced from the continental areas of the Old and New Worlds."[33]

Frequently, political and financial support for acclimatization depended on a few key people. In France and Britain, the aristocracy opened its game parks to acclimatization societies and patronized the movement with influence and money. From the late 1860s, however, as detailed in the following sections, European acclimatization societies fell on hard times as their aristocratic patrons withdrew support, and tensions between amateurs and professionals began to emerge. In France, acclimatization first connoted association with Napoleon III's government and later, after 1871, with an outmoded royalism of uncertain parentage. By the century's end, links between metropolitan and colonial acclimatization societies had also weakened or disappeared altogether, as in the demise of London's acclimatization society. In the end, "[a] shortage of money and the failure of some animals to adapt saved the world from these societies' worst enthusiasms."[34]

Keeping in mind the intellectual, ecological, and political issues discussed above, the next sections examine the emergence and decline of acclimatization across two empires.

ACCLIMATIZATION AND COLONIALISM: THE CASE OF FRANCE AND ALGERIA

The first and largest of all acclimatization societies, the Société Zoologique d'Acclimatation, was founded in Paris in 1854. As noted above, the Paris group was tightly linked to Isidore Geoffroy Saint-Hilaire, and while he never visited the French colonies, his research on exotic species was important to all three zoos in the French capital.[35] A major goal of its members was to improve agriculture through the acclimatization and subsequent domestication of exotic animals. The origins of the Paris society were tied to colonial botany, and particularly to Algeria, where the French government operated some two dozen botanical gardens.[36] As in Britain, experience with colonial botanical gardens and plant exchanges informed acclimatization activity.[37]

Supporters of the new Société Zoologique d'Acclimatation included Baron Montgaudry, a nephew of Georges Buffon; a substantial cluster of Muséum naturalists; and landed and wealthy notables such as the Baron A. de Rothschild and Counts Eprémesnil, Séguier, and Sinety. By 1860, more than twenty-six hundred people—diplomats and heads of foreign states among them—had joined the society. Most importantly, the group secured the patronage of Napoleon III and received land for a large zoo on the western edge of Paris in the Bois de Boulogne. The zoo, or Jardin

[33] T. E. Donne, *The Game Animals of New Zealand: An Account of their Introduction, Acclimatization, and Development* (London: John Murray, 1924), p. v.; Wellwood, *Hawke's Bay* (cit. n. 24), pp. 229–47, lists a series of animal protection acts.

[34] Rolls, *They All Ran Wild* (cit. no. 26), p. 270.

[35] Michael A. Osborne, "Zoos in the Family: The Geoffroy Saint-Hilaire Clan and the Three Zoos of Paris," in *New Worlds, New Animals: From Menagerie to Zoological Park in the Nineteenth Century*, eds. Robert J. Hoague and William Deiss (Baltimore, Md.: The Johns Hopkins Univ. Press, 1996), pp. 33–42.

[36] Michael A. Osborne, "The System of Colonial Gardens and the Exploitation of French Algeria, 1830–1852," in *Proceedings of the Eighth Annual Meeting of the French Colonial Historical Society, 1982*, ed. E. P. Fitzgerald (Lanham, Md.: Univ. Press of America, 1985), pp. 160–8.

[37] Christophe Bonneuil, "Une Botanique planétaire," *Cahiers de Science et Vie*, April 1999, *50:*48–57.

Figure 2. *When the Jardin d'Acclimatation opened in October 1860, Parisians found this artificial mountain populated with symbols of colonial conquest, including wild sheep from Algeria and Angora goats supplied by defeated Algerian patriot Abd-el-Kader.*

d'Acclimatation, opened in 1860 as a showcase of colonial flora, fauna, and peoples. The group obtained organisms through diplomatic and military channels, and by exchange with the Paris Muséum's menagerie and other European zoos. In this manner, the Jardin d'Acclimatation gave acclimatization a cultural presence not seen in other European capitals. Through ethnographic displays and lectures, school children and the polite public of Paris learned much of France's *outre-mer* and the peoples and resources contained within the colonial empire.

The work of the Paris society was conducted mainly by commissions and committees. Among the most active was a Permanent Commission on Algeria. This commission, composed of nineteen members in 1860, included metropolitan savants; military men such as General Eugène Daumas, director of Algerian affairs at the Ministry of War; and experts on tropical hygiene, agriculture, and botany. Commission members functioned as consultants to the French government on colonial agriculture and settlement. Like French geographical societies, the acclimatization society also provided a venue for the discussion of colonial topics. Admittedly, as in failed projects for yak and llama culture, acclimatization schemes tended toward the fantastic. Yet they held out the possibility that France would one day transform Algeria and make it French. The society examined crops such as bamboo and quinine; conducted experiments designed to stimulate a silk industry; and also tried to initiate other industries such as llama culture and resettlement schemes for exotic plants, animals, and sometimes peoples. Although the Algiers Jardin d'Essai functioned as the society's principal colonial "laboratory," other sites were offered. In the 1860s, for example, Archbishop Charles Lavigerie of Algiers offered the labor of the hundreds of orphans living on farm-schools in his archdiocese. The children were pre-

pared, he wrote, to acclimatize and cultivate Egyptian cattle and other exotic ruminants.[38]

Acclimatization also played a social function in the lives of French colonists and colonial officials. Prince Jerôme Napoleon, honorary president of the Jardin d'Acclimatation as well as minister of Algeria and the colonies, joined with the minister of the navy to order the formation of colonial branches of the Paris society in Algeria, Cayenne, Réunion, Martinique, and Guadeloupe. State sponsorship had its benefits, and plants and animals flowing to and from the colonies usually traveled on government ships at no cost. The largest of the colonial branches was at Algiers, which in 1859 listed fifty-four members. The research program at the Algiers Jardin d'Essai, which hosted numerous experiments on useful organisms including ostriches, Chinese yams, bamboo, and cochineal beetles, was designed to complement and not compete with crops easily grown in France, such as grapes and wheat. Few of these ventures succeeded, but prior to about 1870, systematic exotic crop acclimatization seemed the ideal way to achieve a return on commercial investment. The Paris society and its colonial branches promoted colonization, even when its projects failed and its core ideology of biological transformism came under attack.

On the whole, the French tended to concentrate on acclimatization for agriculture, and sometimes on using familiar animals in new ways—such as eating horses at the end of their lives of labor. Hippophagia, and hippophagic banquets, were promoted by Isidore Geoffroy Saint-Hilaire and by acclimatizers in Paris, Nancy, Algiers, and throughout France. This practice was understandably less popular in Britain, where different ideas of "humane" behavior prevailed.[39] As the next section shows, not only hippophagia, but social goals and scientific ideas as well, distinguish the history of British and Australian acclimatization from that of France.

ACCLIMATIZATION AND COLONIALISM: THE CASE OF ENGLAND AND AUSTRALIA

In the British Empire, small clusters of businessmen, scientists, and publicists spurred acclimatization, although the aristocracy was not entirely absent from the movement. Since the eighteenth century, botanical acclimatizations had been conducted under the patronage of the East India Company, Joseph Banks, and other notables. When Victoria came to the throne in 1837, the empire possessed eight botanical gardens. At Victoria's death in 1901, there were more than one hundred, about fifty of which were in India and the Australasian colonies. These institutions—at Calcutta, Bangalore, and elsewhere—were brought under the nominal control of the Royal Botanic Gardens at Kew in the 1880s.[40] In contrast to France, British acclimatization had prospered on the periphery long before a metropolitan acclimatization society formed in London in 1860. Within a decade of settlement, game animals had been imported to Australasia. For example, Dr. John Harris imported

[38] [Charles] Lavigerie, "Essais d'acclimatation en Algérie," *Bulletin de la Société Impériale Zoologique d'Acclimatation*, 1869, 3rd. ser., *6*:506–8.

[39] See Anita Guerrini and Michael A. Osborne, "Eating a Horse" (forthcoming).

[40] For the history of Kew and colonial botanical networks, see Lucile H. Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Gardens* (New York: Academic Press, 1979). Estimates for British colonial gardens are drawn from Donal P. McCracken, *Gardens of Empire: Botanical Institutions of the Victorian British Empire* (London: Leicester Univ. Press, 1997), pp. 17, 19.

deer to Sydney in 1803. By the 1830s, partridge, hare, deer, monkeys, and other exotic animals had made the voyage to Hobart.[41] Acclimatization was also associated with Britain's natural history trade. The effort to procure exotic plants and animals for wealthy patrons or institutions, including the Zoological Society of London, brought collector-naturalists such as William Swainson and Alfred Russel Wallace to the far corners of the earth. Of all the introduced exotic organisms in Australasia, however, none would rival the Spanish merino sheep in terms of economic importance and success.

The connections between zoos and empire have long been explicit. Exotic animal collections constitute a record of the collectors' diplomatic activity and personal connections.[42] Members of the early Zoological Society of London benefited from the assistance of Sir Stamford Raffles. The chief architect of Great Britain's Far Eastern empire, as well as a fellow of the Royal Society, Raffles was instrumental in establishing a network of exotic animal collectors and colonial functionaries that sustained the London Zoo. Zoological Society fellows corresponded regularly with the Colonial Office, and with others who were well connected with the East India Company. For Englishmen at home and abroad, acclimatization often meant the importation of fish and birds for gentlemanly field sports. But the interests of zoologists and gentry could be quite different, and the Zoological Society of London failed to sustain a program of animal acclimatization intended to provide exotic game animals to the squirearchy.[43]

Around 1860 the subject of acclimatization was much in the news in Britain, and was aired at meetings of the British Association for the Advancement of Science. At least one luminary of British zoology, Richard Owen, advocated the importation of African ruminants whose flesh would improve the British diet, and a BAAS Committee on the Acclimatisation of Domestic Animals functioned briefly. But acclimatization, with its amateurish aspects and overtly utilitarian goals, gained only a tenuous place in the world of professional English zoology. Members of the BAAS committee did little, and one member, John Edward Gray, keeper of zoology at the British Museum, deprecated the sudden celebrity of acclimatization and cautioned against the importation of elands, alpacas, and llamas.[44]

The most prominent British acclimatizer was Francis Trevelyan Buckland, a surgeon-turned-writer and the son of the naturalist Reverend William Buckland. The Buckland family had a tradition of eating exotic animals, such as ostrich and crocodile, and young Frank had embraced his father's love of natural history as well as his eccentricities of diet and religion. Frank Buckland, and the majority of acclimatizers in Britain and the empire who recorded their rationales in print, approached acclimatization as merely a transfer of organisms between analogous climates. Natu-

[41] Rolls, *They All Ran Wild* (cit. n. 26), pp. 270–3.

[42] Michael A. Osborne, "The Role of Exotic Animals in the Scientific and Political Culture of Nineteenth Century France," *Colloques d'Histoire des Connaissances Zoologiques*, 1998, *9:*15–32.

[43] Adrian Desmond, "The Making of Institutional Zoology in London, 1822–1836," *Hist. Sci.*, 1985, *23:*153–85, 223–50. For the broader context, see David E. Allen, *The Naturalist in Britain: A Social History*, 2nd. ed. (Princeton, N.J.: Princeton Univ. Press, 1994). On animals and empire, see Harriet Ritvo, *The Animal Estate: The English and Other Creatures in the Victorian Age* (Cambridge, Mass.: Harvard Univ. Press, 1987), esp. pp. 205–88.

[44] On the BAAS activity, see Michael A. Osborne, "The Société Zoologique d'Acclimatation and the New French Empire: The Science and Political Economy of Economic Zoology During the Second Empire" (Ph.D. diss., Univ. of Wisconsin, 1987), pp. 343–47.

ral theology featured prominently in their ideas. Buckland's *Natural History of British Fishes* described the denizens of the "Great Fish Farm" of the North Sea and sought to show "the truth of the good old doctrines of the Bridgewater Treatises. . . . I steadfastly believe that the Great Creator . . . made all things perfect and 'Very Good' from the beginning. . . ."[45] Given that the Creation was good and perfect, man's only option was to slightly rearrange nature to suit his needs. Of the acclimatization of his favorite organism, Buckland wrote:

> By the acclimatisation of fish I mean that, not only is it possible to obtain from other countries fish not as yet known as British fish, but where as we have already in our waters some of the best fish in the world, that it would be desirable to improve their breed by transferring them from places where they are already found in abundance to other places having a similarity of soil and climate.[46]

W. Oldham Chambers, a fellow of the Linnaean Society, echoed these views. He argued that acclimatization was mainly a transfer of organisms, and one needed only "to select waters resembling as far as possible those from which the fish in the first instance were taken. . . ."[47] Buckland sought practical application of his ideas, and in 1864 placed salmon and trout ova on a ship bound for New Zealand and Australia. By 1880, brown trout, presumably all descended from the thousand or so ova he had sent, were established in Australasia. This accomplishment was surely, he modestly claimed, "the greatest feat of Pis[c]iculture of modern times. . . ."[48]

Inspired by the success of the Paris society, the Acclimatisation Society for the United Kingdom took form in the offices of the field-sports magazine *Field* in 1860. Buckland became the group's first secretary and later its naturalist-manager. Living mainly by his pen, he published in *Field*, founded a rival publication called *Land and Water*, and organized a Museum of Economic Fish Culture at South Kensington. He also brought out editions of his father's celebrated Bridgewater Treatise, Gilbert White's *Natural History of Selborne*, and several editions of his own extremely popular *Curiosities of Natural History*.[49] Like Buckland, the London acclimatization society focused mainly on introducing game birds and fish—animals of "practical and immediate utility to the country gentleman."[50]

The London acclimatization group funded Buckland's piscicultural investigations and began a fish breeding program that soon exhausted its treasury. Having contacts in France, where he had gone in 1849 to take surgical training at La Charité Hospital, Buckland established exchanges of fish ova and fry between the London society and the French government hatchery at Huningue, and made contact with members of

[45] Frank Buckland, *Natural History of British Fishes; Their Structure, Economic Uses, and Capture by Net and Rod* (London: Society for Promoting Christian Knowledge, [1880?]), p. x.

[46] *Ibid.*, section titled "Fish for Acclimatisation," pp. 344–72; quotation on p. 345.

[47] W. Oldham Chambers, *The Introduction and Acclimatisation of Foreign Fish* (London: William Clowes and Sons, Ltd., 1884), p. 3.

[48] Buckland, *Natural History* (cit. n. 45), p. 318.

[49] Biographical details may be had in George C. Bompas, *Life of Frank Buckland*, 2nd ed. (London: Smith, Elder, & Co., 1885); G. H. O. Burgess, *The Eccentric Ark: The Curious World of Frank Buckland* (New York: Horizon Press, 1967); "Buckland, Francis Trevelyan," *Dictionary of National Biography*, vol. III, pp. 204–5. See also Roy MacLeod, "Government and Resource Conservation: The Salmon Acts Administration, 1860–1886," *Journal of British Studies*, 1968, *7*, 2:114–50.

[50] Grantly F. Berkeley in the *Dorset Country Chronicle*, quoted in Burgess, *The Eccentric Ark* (cit. n. 49), p. 105.

the Paris society.[51] After the London society's bankruptcy in 1867, Buckland became the government's inspector of salmon fisheries and continued to promote acclimatization of British salmon and trout in Australia and New Zealand.

On the periphery, the transfer of the Spanish merino sheep breed and the establishment of the wool industry in Australia predated the founding of Australasian acclimatization societies by some sixty years. The soldier, farmer, and politician John Macarthur (1766–1834) claimed credit for the establishment of the merino sheep in New South Wales. In fact, he was only one of a number of settlers who had obtained sheep from the Cape of Good Hope as early as 1793. Clashes with colonial governors and military superiors resulted in his return to England and subsequent resignation from the army. Promoting himself to British wool interests, he obtained eight merinos from King George III's herd and returned to New South Wales in 1805 with a letter ordering the governor to grant him four thousand hectares of land. Together with his wife Elisabeth and members of their extended family, Macarthur developed, publicized, and improved the Australian wool industry.[52] After 1820, infusions of merinos came from the French herd at Rambouillet, which had been developed by Daubenton, and herds in Saxony, England, and the United States. At midcentury, the pastoralists of New South Wales cared for more than twelve million sheep, and by 1891 the continent contained more than one hundred million sheep—the vast majority of them merinos.[53]

Macarthur had realized the conditions necessary for successful large-scale agriculture in early Australia. Although endowed with vast expanses of cheap and fertile land, Australia's population base and internal markets were small. Hence, commodities needed a large export market and had to maintain quality on long voyages. They also had to be economical in terms of volume and value ratios, and be produced with minimal labor costs. For several decades, only sheep grazing on native pastureland fulfilled these criteria. By the 1850s, however, as a series of gold rushes attracted thousands of prospectors who subsequently settled on the continent, the pastoral model began to falter. These new immigrants obtained grants of land far smaller than those of Macarthur's era, and could not survive by growing wool. It was within this context of economic transition and a search for new agricultural industries that Australia's businessmen and scientists formed acclimatization societies.[54]

Prominent in Australian acclimatization was Ferdinand von Mueller, director of the Melbourne Botanic Gardens and government botanist for Victoria from 1853 until his death in 1896. Von Mueller was well connected throughout the globe and exchanged seeds and plants with most of the world's scientific institutions. An advocate of transferring eucalyptus to places where it served as an antimalarial agent,

[51] Osborne, "The Société Zoologique d'Acclimatation" (cit. n. 44), chap. 6, "The Science and Activity of Acclimatization in the United Kingdom," pp. 320–89, esp. pp. 361–3.

[52] Biographical details from Rollo Gillespie, "Macarthur," *The Australian Encyclopedia*, 5th ed. (Terrey Hills, N.S.W.: Australian Geographic Society, 1988), vol. 5, pp. 1825–9; Margaret Steven, "Macarthur," in *Australian Dictionary of Biography*, ed. Douglas Pike (Melbourne: Melbourne Univ. Press, 1967), vol. 2, 1788–1850, I–Z, pp. 153–9.

[53] "Wool Industry," in *Australian Agriculture: The Complete Reference on Rural Industry/National Farmers Federation*, ed. Julian Cribb (Camberwell, Australia: Morescope, 1991), pp. 137–56. Figures from Anthony Barker, *When Was That: Chronology of Australia* (Sydney: John Furguson, 1988), pp. 125, 210.

[54] Bruce Davidson, "Developing Nature's Treasures: Agriculture and Mining in Australia," in *The Commonwealth of Science: ANZAAS and the Scientific Enterprise in Australasia, 1888–1988*, ed. Roy MacLeod (Melbourne: Oxford Univ. Press, 1988), pp. 273–91.

von Mueller also wrote a manual for plant acclimatization. In 1887, the Parisian society issued a revised edition of the manual as a book titled *Manuel de l'acclimateur ou choix de plantes recommandées pour l'agriculture, l'industrie et la médecine.* Von Mueller established contacts with the French consuls in Melbourne, such as the Comte de Castelnau, an honorary member of the Parisian society, who also held diplomatic posts in Brazil (Bahia) and Victoria; and with botanists such as Charles Naudin in France and Auguste Hardy in Algeria.[55] Academic scientists who joined von Mueller in promoting acclimatization included Frederick McCoy, government paleontologist for Victoria and the first professor of natural science at the University of Melbourne. McCoy, like von Mueller, Buckland, and Isidore Geoffroy Saint-Hilaire, rejected Darwinian evolution. However, like von Mueller and Buckland, McCoy also rejected French-style transformism and embraced natural theological explanations. The greatest achievements of acclimatization, he believed, had been merely to rearrange God's creation, that is, "*the bringing together in any one country the various useful or ornamental animals of other countries having the same or nearly the same climate and general conditions of surface*" (McCoy's emphasis).[56]

Von Mueller and McCoy were two of Australia's most famous naturalists. But no one worked harder or more successfully for acclimatization than Edward Wilson. Wilson, an owner of *The Argus* newspaper in Melbourne, played an important role in founding acclimatization societies in London, Victoria, New South Wales, Tasmania, and elsewhere. In Melbourne, Wilson used *The Argus* to lobby for introducing British songbirds and alpacas into the colony.[57] Wilson gained the ear of Thomas Embling, a member of the Victorian Parliament, who led a campaign with him to introduce alpacas and llamas. Wilson also secured government and private financing for an aviary for British songbirds. Still dreaming of a success on the scale of the Spanish merinos, in 1858 his efforts led to the importation of 276 alpacas, llamas, and alpaca-llama crossbreeds.

As Linden Gillbank has astutely noted, acclimatization societies could establish zoos as well as emerge from them. In Melbourne, members of the Acclimatisation Society of Victoria, which spun out of a faltering zoological society, would stimulate the foundation of Australia's first zoo, the Royal Melbourne Zoological Gardens. The Victorians organized their acclimatization society in 1861. Subsequently, the provincial government funded the group and granted it fifty acres of land with the proviso that it absorb a Zoological Gardens Management Committee. At center stage was the flock of alpacas and llamas, but success on the scale of the merinos could not be duplicated. The government withdrew support of the project in 1869 and

[55] A selection of von Mueller's correspondence has been published in R. W. Home and Sara Maroske, "Ferdinand von Mueller and the French Consuls," *Explorations: A Bulletin Devoted to the Study of Franco-Australian Links*, June 1995 (issued December 1997), *18:*3–50. For von Mueller's correspondence network, see Ferdinand von Mueller, *Regardfully Yours: Selected Correspondence of Ferdinand von Mueller*, ed. R. W. Home *et al.* (Bern; New York: Peter Lang, 1998–).

[56] Frederick McCoy, "Acclimatisation, its Nature and Applicability to Victoria," *Acclimatisation Society of Victoria, First Annual Report* (Melbourne, 1862), pp. 31–51, quotation on p. 36.

[57] Linden Rae Gillbank, "The Acclimatisation Society of Victoria," *The Victorian Historical Journal*, 1980, *51:*255–70, esp. pp. 259–62; *idem*, "The Origins of the Acclimatisation Society of Victoria: Practical Science in the Wake of the Gold Rush," *Historical Records of Australian Science*, 1986, *6:*359–74. For Wilson's activities, see also *idem*, "A Paradox of Purposes: Acclimatization Origins of the Melbourne Zoo," in *New Worlds, New Animals: From Menagerie to Zoological Park in the Nineteenth Century*, eds. R. J. Hoague and William A. Deiss (Baltimore, Md.: The Johns Hopkins Univ. Press, 1996), pp. 73–85, esp. pp. 74–82.

forced the acclimatizers to reconsider their goals. The Victorian society survived a few years longer than the London group, but in 1872 it was transformed into the Zoological and Acclimatisation Society. The name change signaled a change of emphasis, and brought with it an unintended legacy, the Royal Melbourne Zoological Gardens.[58]

CONCLUSION

Conceived in Paris, the organizational model of the acclimatization society—but not the theory of biological transformism that had engendered it—took root thoughout the globe.[59] Acclimatization societies emerged during a period when scientists in the French and British Empires collaborated across huge distances to develop the resources of their respective colonies. In so doing, the French and British described nature as being, respectively, predominately malleable or perfected but rearrangeable. The scientific activities of these groups reflected a Eurocentric—and often mainly French or British—vision of colonial agriculture, settlement, and development. Promoted as the incarnation of a cooperative and humanistic civilizing mission, acclimatization was also touted as a utilitarian activity that promised economic betterment and aesthetic enjoyment for Europeans. The colonized might benefit too, but only secondarily through such things as improved diets, which were themselves deemed necessary for labor control and colonial governance. In fact, the extension of export agriculture to French North Africa resulted in diminished diets and famine for the Algerian peoples.

In the colonies, the goals of the acclimatization movement anticipated, but fell short of, the universalistic scope for science proclaimed by the literature of late-nineteenth-century Europe. In French North Africa, contradictory leitmotifs infused acclimatization projects. The first was the crafting of an agricultural future that would be different from that of France and, in the case of Algeria, similar to that of the lost colony of St. Domingue. The second, which had the additional function of legitimating France's presence in the Maghreb, was that the French, as the rightful inheritors of Rome, would use their science and technology to restore the region to the fertility it had supposedly known under Roman rule. But Algeria, without vast expanses of natural pasture, never had exportable animal products to compare with the wool of Macarthur's merino sheep, the animal that so changed the early fortunes of Australia. Nor did Algeria have the mineral wealth and gold rushes that drew adventurers and settlers to Australia. What French North Africa had, of course, and Australia lacked, was a well-armed and tenacious resistance movement that bedeviled and circumvented European objectives for decades.

The rise of the acclimatization movement also signals a time when fascination with the exotic and a knowledge of colonial affairs had spread beyond Europe's scientific and administrative elites. The cultural semiotics of acclimatization were diverse. Even when projects failed, as most of them did, naturalists and amateurs

[58] Gillbank, "A Paradox of Purposes" (cit. n. 57).

[59] This theme is further developed in Michael A. Osborne, "A Collaborative Dimension of the European Empires: Australian and French Acclimatization Societies and Intercolonial Scientific Cooperation," in *International Science and National Scientific Identity: Australia between Britain and America*, eds. R. W. Home and Sally G. Kohlstedt (Dordrecht: Kluwer Academic Publishers, 1991), pp. 97–119.

gained greater knowledge of the care and physiology of exotic flora and fauna, and in some instances broadened their understanding of tropical hygiene. Moreover, the acclimatized exotic organism functioned as a symbol of Europe's power over nature and over far-off lands. Vested with visions of imperial superiority, acclimatized animals and plants provided material manifestations of science serving the interests of transplanted Europeans. Relying on exotic plants and animals, acclimatization schemes also tended to devalue indigenous methods of agriculture, and probably degraded colonial environments. By their very nature, acclimatization projects seemed to confirm that colonization was possible and that colonials were interested in science and had the abilities to conduct experiments. Thus, even in the face of considerable obstacles, acclimatization projects emboldened Europeans, enabled the continuation of colonial projects, and offered a reason to retain colonial possessions. Fortified by the hope of future success, France retained its colonies until public works projects, vaccination programs, tropical medicine, and newer methods of crop selection would render the colonies more profitable and habitable for Europeans.

The checkered history of acclimatization, like the persistence of epidemic disease, also signaled that much in nature was, in the end, beyond European control. The fact that so many acclimatization projects and societies failed served to mark the limits of European science. Of necessity, many of the social and cultural dimensions of acclimatization, such as the formation of scientific societies and the organization of exotic animal exchange, required a critical mass of settlers with disposable income and time. This circumstance, which peaceful Victoria had and colonial Algeria lacked, helps to explain why the Australasian settler colonies became successful epicenters of acclimatization activity. In this, the acclimatization societies occupied an important but ephemeral space within the evolving edifice of colonial science.