READING THE DISCOURSE OF COLONIAL SCIENCE

Roy MacLeod
University of Sydney (Australia)

Science has no nation; but nations have science, and in the era of European imperialism beginning in the last quarter of the 19th century, there arose an interest in making science serve the interests of imperial efficiency and colonial development. The interest was fresh – but hardly new – as for over two centuries, the nations of Western Europe, initially led by Iberia, had sought out posts for trade and strategic settlement. Whatever their original differences in motives and means – whether souls, gold, or spices – by the late 18th century, and whatever their allegiances to economic doctrine, Western Europeans were united on the principle by which colonies served as plantations or primary producers for the trade or manufacturing industries of the metropolis. Within this context, however, there grew a diverse range of rational projects which we collectively label "colonial science", and which were given their most distinctive forms in the colonial projections of Britain, France, and Germany. These persisted, albeit with important modifications, until the end of the Second World War.

Today, this subject is sufficient to attract an international audience. Once upon a time, this was not so. Indeed, until the 1970s, selling the history of colonial science to historians of science was like selling a little-known commodity low in a falling market. In the last ten years, however, for reasons which we may well want to examine, the meanings of this process have become increasingly interesting to historians of science in Europe, the sub-continent, and the Americas. At the same time, there are several schools of interpretation competing for attention. For some, colonial science is a museum of the moving image, in which Europeans are displayed constantly moving south and east. To others, the important narratives are those in which ambitious locals use scientific knowledge to help frame a response to the external domination of an international culture. What is problematic about this process has been the subject of growing concern, spurred by conferences in 1981 in Melbourne and 1990 in Paris, as historians have exposed a range and variety of colonial experience, reflecting to some extent contrasting cultures, questions, and styles in historical research.

Following the pioneering work of Basalla, Fleming and Cohen, we have seen diffusionist models and models of colonial nationalism rise and fall. We have seen a plethora of case studies, relocating scientific, medical and technological institutions in a wide variety of cultural settings (Chambers). In the history of colonial medicine, we

have discovered the medicalisation of the knowable world, and the incorporation of European professional regimes into settler settings. We have also seen the "tropicalisation of Europe", and the incorporation of medical practice into a Hippocratic framework of medical environmentalism. In the history of technology, we haved seen emerge an instrumental language – tools of conquest, and assimilation, enveloped in settlement, trade, and the material culture of colonial life. In the history of science, the picture has become even more rich. The legacy of the Crystal Palace, incorporated in the great museums and international exhibitions of the 19th century, have left a dominent impression. From the metropolis, we see the language, methods and projects of science constructed as a means of enlarging Western knowledge, and as a civilising practice. From the periphery, science becomes appropriated as an instrument of self-identity and as a dimension of colonial culture itself. The history of colonial science becomes a record of civilising missions and practical men, within different imperial systems, flexibly adopting and reinventing languages by which European science is made to advance the interests of both the coloniser and the colonised.

Within the last five years, the domain has become more confident and sophisticated. We have rejected globalist world systems and modernisation theories, bred of Chicago School; and have qualified the traditional interpretations, coming from classical and Marxist economics, that discuss imperialism as primarily an economic phenomenon. We have dismissed easy Eurocentric models that have minimised local contributions and trivialised local initiatives. We have overtaken a limited centre-periphery view of the world – and if centres still exist to be privileged, we see instead of a few metropolitan centers, a mutiplicity of centres, determined by the needs of knowledge, and located increasingly in the colonial world. Qualifying the canons of Mertonian sociology, we now celebrate diversity as much as universality in science; overtaking what Lafuente calls the omni-powerful and omni-present metropolis, in search of the varigated, irreverent and quixotic periphery.

Certainly, among British historians of science, slow to read the literature of imperial history, there has been a sharp learning curve, as we have had to distinguish clearly between the activities of white "settler" colonies, given representative governments – that is, of Europeans in "European countries overseas", where indigenous populations were assimilated, segregated, or destroyed; – and regions of "alien rule", where a small number of European colonists controlled settled indigenous populations, which were neither assimilated nor destroyed, and which were governed directly from the colonial offices of London and Paris, The Hague and Berlin. As between metropolae, cultural differences have been made more clearly visible, enabling us to categorise rival imperial traditions, and assess the consequences of Spanish, French, Dutch and British law and institutions, and competing economic philosophies of mercantilism and free trade.

Just as categories of empire and styles of imperialism reflect differences in colonial history, so competing perspectives have emerged in the historiography of colonial science. Attempts to categorise differences between national styles in science overseas have produced models of an almost ptolemaic complexity. Deepak Kumar can easily be excused for speaking in this context of a "kaleiodoscope of imperial science".

And while such debate is healthy, constructive consensus and collective engagement with the issues has been confused by a cross-fire of approaches.

Perhaps the single most long-running debate in the field has featured, on the one hand, historians who prefer to see the extension overseas of the so-called exact sciences, notably in certain German, Dutch, and French contexts, as a "vector of cultural imperialism" which escapes the contaminating social and economic effects of colonial life, and which metropolitan scientists nevertheless manipulate for their own ends (chiefly, the ends of basic research). In the process, they conveniently support the extension of metropolitan political power, in which colonial interests are unavoidably secondary. An alternative view is offered by historians who prefer to see the extension of European science as a more or less functionally characteristic element of political and economic life, in which, far from being uncontaminated, natural knowledge both serves and is seen to serve both imperial and colonial interests, and as much the interests of settlers and producers as scientists themselves. Colonial science is indeed influenced and shaped by the metropolis, but from the process emerge new models of the world, and new disciplines of research, previously unfamiliar in the metropolis.

In some respects, this debate – elements of which will be familiar to readers of *Isis* - recalls the old internalist-externalist debate, but in a new guise, one that makes competing claims for the privileging of certain disciplines, and certain ways of thinking. Historians arriving fresh to this debate often comment on the fact that the relevant scholars are talking past each other and are, moreover, overlooking the changing place held by scientific activity in the wider context not only of economic and technological, but also of cultural history. Inevitably, differences in theoretical assumptions favour different explanatory preferences. The debate is messy, and cries aloud for agreement on boundary conditions and theoretical adequacy. At the moment, resolution seems distant. As we have pursued different frames of meaning, it is not surprising that a general analytical framework has eluded us.

Happily, in the meantime, a newer discourse is emerging, promising to replace the familiar, formulaic accounts of learned societies and government policies that tended to dominate the first ten years of our field, with dynamic accounts of individuals and interests in action, focussing on the accidents and incidents of colonial life, and the facts of colonial discovery, appropriation and use. It is to be hoped this will bring in its wake a more liberal historiography, avoiding hierarchies of learning, and what Edward Said has called a grand theory of systematic totalisation. Instead, he, and others concerned with the colonial discuse, would prefer us to see the world not as a series of formal boundaries, but as a series of interconnected secular spaces, humanly constructed, and criss-crossed from tropic to pole by irregular geometries, without dogmatically sanctioned privileges, in which science becomes part of the larger history of colonial negotiation.

What is interesting about this colonial discourse, flowing from the orientalist debate and literary scholarship, is its inherent appeal to a new universalism, one which replaces a linear conception of science as a Mertonian given, with a horizon along which the boundaries and institutions of science are responding to the colonial experience itself. In practical terms, this requires historians to lift their eyes from their traditional absorption

with government archives, and the formal sentiments of official discourse, and to look out the hermeneutic narratives of individuals – or figureheads and styles. A beginning has been made by historians of trade, exhibitions and travel, who inform our reading of policy and personalities with the language of commodities, barter, and exchange. Today, postmodernists tell us, "locality proclaims itself cosmopolitan" and fragments the global discourse. Yet we see that the history of that colonial fragmentation has taken place within a global whole. And that whole has reference to our present, as well as to the past. As Homi Bhabba puts it, the culture of Western modernity must be relocated from a post-colonial perpsective. Former empires demand to be considered not only as History, but also as present systems.

In this sense, economic historians and historians of colonial science are approaching a common task. Both must weigh how agency and contingency combine to transform the protocols of established power relationships. It is clearly as impossible to view science in cultural isolation, as it is to envisage a view of nature that is ideologically neutral. European ideas have left an indelible mark on post colonial science. But the limitations of Europe's legacy have to be seen in the context of post-colonial expectations. Undoubtedly, British science in India, for example, helped to develop what Suhash Chakravarty has called a "core culture" of imperialism. By the same definition, it also created a "culture in-between cultures", a component of colonising influence, but also a culture relevant to post-colonial identity. We do not have to throw away our modernist belief in the internationalism of science, or in the universalism of objective knowledge, to accept that 'knowledge sites' not only exist throught the world, but also produce hybrids and ambivalences which are part of a wider cultural identity.

A link between the historiography of colonial science and the discourse of colonial culture, elaborated by Said, Bhabba and Thomas and others, seems to me to form a natural conceptual bridge over which we must begin to build a two-way relationship – between the histories of natural science as given, or lent, or appropriated or stolen; between producers of knowledge and their clients; between producers of technologies and their consumers. This traffic has both a theoretical and practical aspect – for the writing of history, and for our understanding of what occurs today. If we can move between a linear view of the world, and a translational view of the world, it may help us to compare rival and competing experiences – to avoid cultural monolingualism,while avoiding a monocular vision of political and strategic interest. Without dismissing the obvious importance of political, economic or other motives for imperial science, it should be possible to see how the natural sciences, viewed as a product of European rationalism and Enlightenment, were co-opted into a wider cultural project, in the process producing resentments and contradictions that remain part of the post-colonial world.

As a first step, it is useful to seek agreement on the leading characteristics of our discourse. If it is too early to hope for a consensus, let me at least suggest seven lines of approach which I see as converging.

First, colonial science, in the increasingly structured form that emerges from the early 19th century, is collectively seen as an extension of European nationalism. European science comes to age within the lifetime of empire, and of course becomes as an empire in itself – identified with the same program of nationalism, authority, and

modernity. Science develops links between different metropolitan powers. Indeed, if we follow John MacKenzie in accepting that the interlocking relationships of the (great) powers can often be best understood through the common experience of empire, so the relationships between European science bear a common legacy. Within this framework, however, nation-states "overseas" are bearers of national values and not destroyers of them. This point helps give shape to this workshop.

Second, in their orientation overseas, Europeans establish claims to the occupation of intellectual space, as well as geographical place. The world, defined and mapped by Europe, becomes a conceptual laboratory for the exact and the natural sciences, and for the sciences of race, language, and culture. Cultural possession comes with military conquest, with "tools of empire", but more deeply with the naming of geological strata, plants and animals. Kew and the *Jardin des Plantes* become arbiters, not perhaps of wisdom, but of facility. European scientific institutions become centres of calculation, combining scientific and political interests. Within the colonial discourse, the language of diffusion first employs the metaphors of transplantation, irradiation, acclimatisation, assimilation – Western, physicalist and linear. The interpretation of colonial artefacts helps legitimise the scientific status of European naturalists, while colonial policy is secured by the invention of a tropical technocracy. Inevitably, the metropolis is reluctant to let its initiative pass to others, and seeks to define the terms of engagement. Only slowly, and by degrees, does this change, and change is not complete today.

Third, historians today re-write the experience of exploration as domination, enterprise as exploitation, and discovery as invasion. However, both in colonies of settlement and of alien rule, to be a colonial was to know a kind of security, to inhabit a fixed world. Within that world, local elites emerged, with a derived sense of alienation and a search for intellectual sovereignty - not necessarily independence, in the language of democratic institutions, but calling upon rationality and sovereignty in natural knowledge, linked to local power. The European relationship with this world is best seen not as a linear trajectory but as a dialectical embrace. The process involves a reordering of the national imagination. Well before the 19th century, European contact with the world overseas produced ambivalences, distortions, disorientations. Nature seen through European eyes was rationalised as "exotic", to be privileged as well as plundered. As Richard Grove reminds us, by the turn of the 20th century, and especially after the First World War, nature is reconstrued as an "environmental resource", and so becomes a factor of fresh economic importance. After the First World War comes a new power politics, shaped by widening imperial and colonial economic ambitions.

Fourth, today we speak of science *for* development, and science *in* development; so, looking to the past, we may speak of science *for* empire, science *in* empire, and science *within* the experience of colonial government. During the late nineteenth century, the conduct of "science overseas" becomes distinct and in some cases, distanced, from science at home. This is accentuated by site and provenance – the world of science overseas is the laboratory of the outdoors, its methods are travel, exploration; its culture, that of survey, collection, and display; its motives, perhaps inspired by a quest to complete a picture of the world, but relating as much or more to locality as to universals. Novelty requires Europeans to adopt a polychromatic view of the world. In India, the Englishman's

responsibility was, in Sir Henry Maine's phrase, "to keep true time in two longitudes at once". There emerge divisions of labour between those who prepare the texts and those who inscribe them. At first, theoretical leadership is remitted to the metropolis; gradually, it is acquired at the periphery, and in some cases, is consolidated there. Within the settler colonies, mimicry and deference give way to a territory of translation. The process is slow, the traffic is two-way, and is still far from being well understood.

Fifth, imperial powers rarely, if ever, deny their colonies scientific institutions they possess themselves; on the contrary; few colonial establishments escape the weaknesses of their metropolitan models in the application of science to economic development. Technical education in India may have languished for lack of public and private support, but such support was also hard to find in England. Both British and Indian science suffered from poor contact with manufacturing interests. Indians and "transplanted Britons" naturally looked to other models – including America and Germany – with mixed results. Intra-imperial comparisons, beginning with Britain's "white colony" – Ireland – show elites choosing to neglect science – a process that may ensure social survival, but that may also ensure their absence from twentieth century science. In such cases, science appears to become peripheral to economic development, and imported technology becomes the dominant discourse.

Sixth, within the settler colonies, emerges a discourse of civility and civic virtue, redolent in architecture, and reflected in the segregation of local elites from local masses, and whites from indigenous peoples. For Englishmen, as E.M. Forster once put it, India was not a promise, only an appeal. Europeans in Africa and Australasia find it functional to see continuities between local institutions and those of the European past in evolutionary terms – in the language of the 'progressive' and the "non-progressive", the barbarous and the civilised. In settler and plantation colonies, colonial scientists are appointed, and take up residence, but may forever remain in intellectual exile, both from their own country, and from the countries they adopt. Yet, research strategies emerge – some trading in the criticism of European ideas, others drawing upon knowledge of locality, and eventually, a new kind of post-colonial science develops, its dependencies shared with the metropolis – a new kind of civil discourse, including researchers and developers. Colonial science becomes identified with local needs, but also with interests outside the locality. The relationship that so begins, continues, as inherently problematic.

Finally, there is increasing agreement that the history of colonial science, as a representation of the superiority of Western knowledge systems, reflects the time and circumstances of its invention. But categories that were usefully descriptive in the 1920s or 1960s cannot remain untested today. Whether there is an identifiable "science of the South" has become an open question, calling for new categories of explanation and description. Heidegger once said that boundaries are not places at which something stops, but places from which something else begins. There remains much room for discussing the relations between European science and the peoples it encountered. Evidently, for over three hundred years, in their envelopment by Europe, indigenous traditions and belief systems were neglected or destroyed, and native populations were constructed as being culturally inaudible. To paraphrase Marx, they were thought unable to represent themselves, and therefore had to be represented by others. Increasingly,

today, they insist on representing themselves. Surely this, and all it implies, must be registered as one of the civilising passions that underwrites future scholarship, and future research on science and society in the 20th century, "beyond the metropolis".

Civilising Passions – British and French

Imperialism is a generic concept, involving the exercise of power over a domain embracing both imperialist ambitions and what become colonial polices. When we look at comparisons between different European visions of empire, immediately, the problem of analysis becomes complex. First, we have to deal with four sets of variables – the individual metropolian societies, and rivalries between them, the changing world economy; and their participation in it and their relation to and with the cultures of overseas peoples. In comparing Britain and France, we have to compare these four variables against the individual history of each colony; the metropolitan exchange in each direction, the local scientific framework; and the local experience of dealing with local knowledge. Thus, already we have sixteen variables, or sets of variables. It is not my purpose to suggest that comparisons between such different systems are easy, or even possible. The legal and public histories of the two countries count against commensurability. Yet, in the attempt at comparison, one can theorise different descriptive models of colonial science, and perhaps suggest why, within basically similar privileging of natural facts, different colonial outcomes emerge.

If we attempt comparison between British and French colonial experience of science in the century following the Seven Years War, we can distinguish four phases: first, between the last years of the Ancien Regime and the end of the Second Empire; ca. 1770-1850, incorporating a transitional period between 1850 and 1870 that corresponds approxmately with liberal advocacy of Free Trade in Britain; a second period, coinciding approximately with the Third Republic and the High Victorian epoch and ending with the outbreak of the First World War; a third, beginning during the war and continuing until 1939, in which both countries seek to use science as a development tool; and a fourth, beginning at the end of the war, and continuing through the decolonisation of the 1960s, in which both countries sought in different ways to retain a postcolonial influence.

The first period – ca 1780 to 1850 – coincides with the end of the First British Empire and its loss of the American colonies, and the decline in formal French influence in India and the Americas. During this period, there appear many similarities in the overseas experience of British and French science. Strong central influences – the Royal Society, the Royal Institution and the Admirality in Britain, the Academie des Sciences and the Acclimatation societies in France – radiate influence from the periphery and present promising colonial opportunities to European audiences. Australia and Algeria are represented as lands of opportunity, where the native inhabitants are to be tolerated, rather than feared, and where profits go to those with ideas and talent. Travellers, collectors, and acclimatisers in both places extend their colonial experiences to other regions – France to Indochina, the British to Africa, both to China. Similar scientific formations diverge from commerical patterns. Trades in basic foodstuffs and manufactured materials – sugar, textiles – necessary to Britain, have few counterparts even

in the luxury trades in France. Between 1850 and 1870, there is an interesting period of transition in the political circumstances of both countries; as Britain, in many ways sought to reduce its imperial posture. After 1870, important changes occur within Victorian England and France of the Third Republic. Some impact on the nature of French and British colonial policy – or rather, on British policies, because London's relations with with its colonies in central Africa, Asia and the Caribbean was wholly different from its relationship with the white settler colonies, on their way to representative government. In the former, similarities with French rule were arguably more pronounced than with the latter.

Representative governments indeed developed their own way of working. Within the white British colonies, there were colonial entomologists and astronomers; but these were commonly requested by colonial governments, rather than sent by the metropolis: a set of relationships qualitatively very different from the French officials sent to administer Algeria; but not so different from British officials sent to the Caribbean. India, always a special case, seems in some ways to manifest its own scientific subculture; one which is highly dependent on British norms, and therefore inherently representative; but also one tightly and formally bound to systems of reward and regulation from London:

Both countries had their scientific heroes and their model administrators and apologists. Some British politicians saw exemplars in German capacity to dominate their environment better than the epicine French; arguably, some French political observers modelled their behavior on British experience. But on the ground, colonial scientists of both flags, if not separated by huge distances, and despite having no official relationship with one another, could nevertheless entertain cordial relations, and sometimes make common cause, reminiscent of 18th century contacts between Arthur Philip and La Pérouse, Joseph Banks and the *Académie des Sciences*. What differences emerge, we find at the level of explanation. All imperial rhetorics in the period used the language of the civilising mission, and both were eminently practical in their application. What we find when we examine the reality beneath the language, is a difference of emphasis - often between the discourse of imperial parties and government policy, and what takes place on the ground. For this reason, it is well to interpret the project of colonial science as inherently one of civilisation through practice – with possibly more of an emphasis on ideas in the French case, and more on techniques in the British.

From the Berlin conference of 1884-85, we see some of the similarities and differences accentuated. Governments everywhere reacted, jockeying for position and rank in Africa, North and East Asia, South America, and the Pacific. The impulse of discovery and collection gives way to the museum impulse – to survey, inventory and categorise subject peoples for the purposes of economic development. In France, chambers of commerce, trade councils and the press become mesmerised by an economic mirage (Mackensie). For Britain, minerals, followed distantly by agriculture, become a hallmark of colonial profit, but trade in manufactured goods remains the principal consideration; while for France, with a smaller manufacturing industry and less need to export, the empire serves more as a reservoir of military manpower and strategic influence.

It is with the experience of the Great War, however, that this orientation changes; and with it, the reasoning behind much of both French and British colonial policy towards science. With the war comes an intensification of rational method applied to statecraft and with this, the application of rationality, exemplified in science, to imperial efficiency. That this new attitude finds acceptance from India and the white dominions to Latin America and Asia, speaks to the persuasive power of the promise of science. From the 1920s, moreover, imperial markets were seen as important sources of replenishment for metropolitan economies depleted by the war. Development became a hallmark of British "constructive imperialism", not least towards the newly mandated territories in Africa; while the Imperial Bureaux, which had their administrative origins in bipartisan advocacy of social imperialism in the decades immediately before the war, are given a new visibility as projections of imperial political commitment. As Christophe Bonneuil has shown, the interwar years sees France reposition itself as an *organisateur d'empire*, with slogans stressing colonisation for progress and the importance of "*mise en valeur*". In this context, Bonneuil confirms what British imperial historians have been teaching for years: that the "colonial project", however important at the periphery, becomes important in Europe when it becomes a vital aspect of European domestic politics. In Britain, imperial policy, a prewar object of both liberal and conservative interests, becomes identifiably tagged with conservative interests in maintaining the empire itself, whatever the cost; while in France, the development project becomes associated with the planning ideology of the socialist left. The immediate consequences of these differences for the periphery were not greatly dissimilar; some, like David Fieldhouse, charitably argue that the second world war interrupted the experiment in "*mise en valeur*" before it could demonstrate results. But the lingering consequences of the institutions established could, and in some cases have, made decisive differences in the view of science taken by post-colonial countries.

This inconclusive development school of thought has interesting counterparts in the field of colonial science where, depending on the context, it can be reasonably argued that European models were more, or less, conducive to postcolonial circumstances. Colonial economic theory, which drew upon Adam Smith to argue that a colony could advance more rapidly in wealth and greatness than any other human society, was disappointed by the backward leaning supply curve common to the imperial experience. In many colonial societies in Africa and the Pacific, where people lacked the' artificial wants' of the so-called civilised societies, local manufacturing rarely rose above inefficient applications of modern production. Outside India, there is a persisting problem of economic demand, which colonial science is never called upon to solve. It would take another twenty years for this situation to change, and then, often as part of the newer imperialism of multinational corporations.

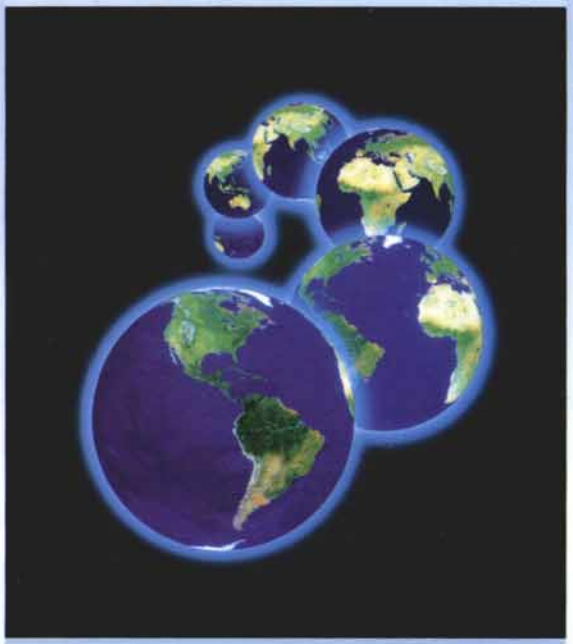
The fine structures of French and British colonial science have much to reveal, in their use of common strategies, and common networks, in their publication and in their interaction with later imperial powers, including the United States and the Soviet Union. In both French and British colonies, science was a tool not only of colonial power, but also an instrument of colonial nationalism. That science could be used as a nationalist enterprise, but in this case as an argument for the return of cultural sovereignty, brings

us full circle to our original premise. As the century and the millenium come to an close, new forms of writing are beginning to emerge – in literature, and in the literature of science, which take account of the intimacy and entanglements of these relationships, and their persisting legacies. We are well advised to follow the narratives they suggest, because imperialism is not over, and colonialism is not at an end. Nor, for that matter, are only those once described as living on the periphery destined to remain races apart. Instead, we are all postcolonial now.

▒

LES SCIENCES HORS D'OCCIDENT
AU XX^{E} SIÈCLE

SÉRIE SOUS LA DIRECTION
DE ROLAND WAAST



VOLUME 2

LES SCIENCES COLONIALES
FIGURES ET INSTITUTIONS

PATRICK PETITJEAN
ÉDITEUR SCIENTIFIQUE

ORSTOM
éditions

LES SCIENCES HORS D'OCCIDENT AU XX^{E} SIÈCLE

20TH CENTURY SCIENCES:
BEYOND THE METROPOLIS

SÉRIE SOUS LA DIRECTION DE ROLAND WAAST

VOLUME 2

LES SCIENCES COLONIALES
FIGURES ET INSTITUTIONS

COLONIAL SCIENCES:
RESEARCHERS AND INSTITUTION

PATRICK PETITJEAN
ÉDITEUR SCIENTIFIQUE

ORSTOM Éditions
L'INSTITUT FRANÇAIS DE RECHERCHE SCIENTIFIQUE POUR LE DÉVELOPPEMENT EN COOPÉRATION
PARIS 1996