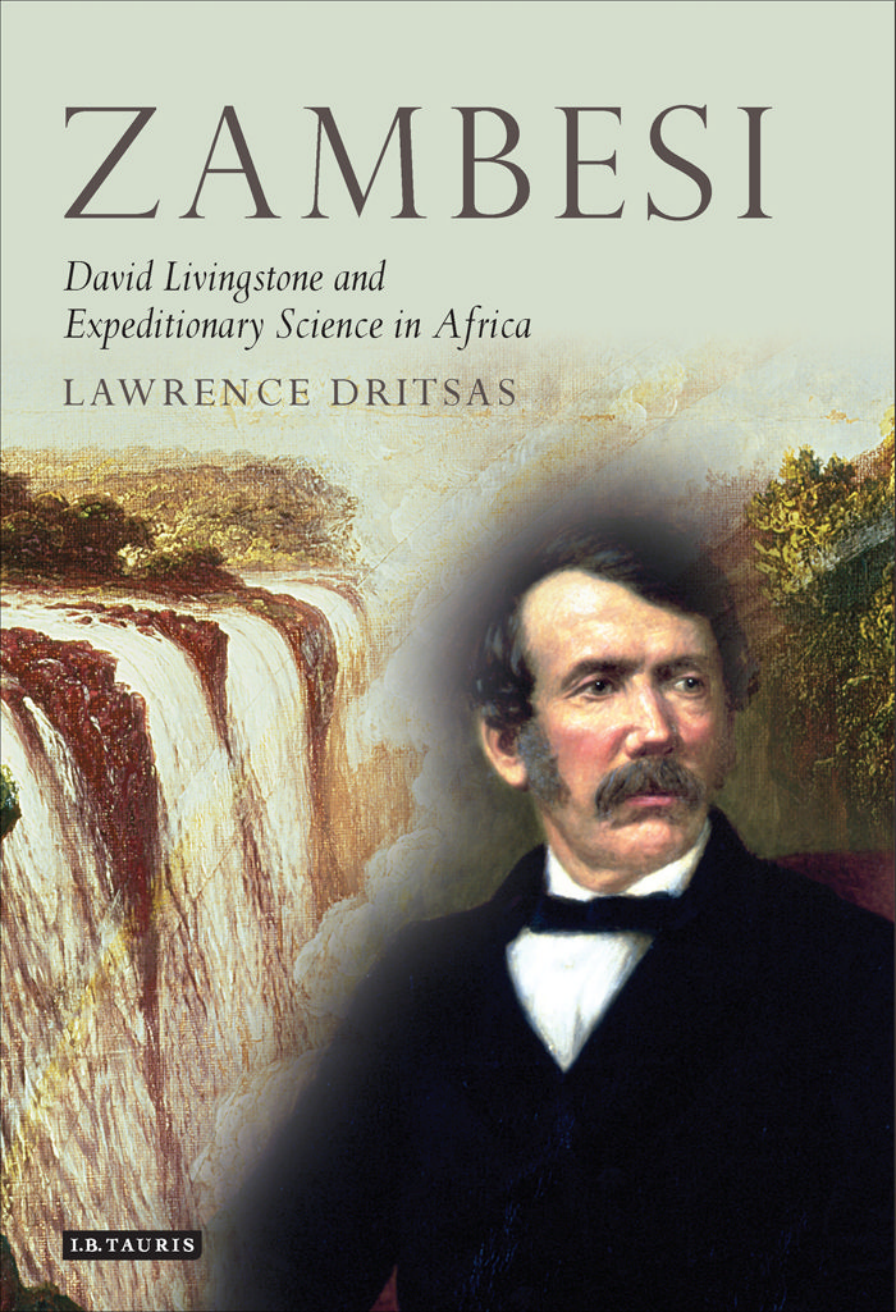
ZAMBESI

David Livingstone and Expeditionary Science in Africa

LAWRENCE DRITSAS



I.B.TAURIS

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For Andrew James

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In expressing my appreciation to everyone else—the friends, family and colleagues who all in their own ways have given me confidence and support over the years—I am left speechless. I therefore hope it is

not too forward to borrow some words Richard Thornton wrote to his teacher and mentor, Sir Roderick Murchison:

3 March 1858, Liverpool

> …I wished personally to thank you for all your great and continued kindness to me, in obtaining me the appointment, in helping me—often undeservedly—out of all the difficulties I got into and on every opportunity giving me advice, instruction, and encouragement, not only concerning my public duty, but private life. It shall always be my endeavour, by carefully obeying your instruction, by working diligently and reporting faithfully to justify the confidence you have placed in me, and to deserve your future countenance and help. You may be sure that I shall always have the greatest pleasure in communicating to you on every opportunity the results of my labours and I shall be always glad to receive any hints or instructions from you….

1 People and Places

While researching this book I spent one month in the chilled space (12°C) of the Economic Botany Collections of the Royal Botanic Gardens, Kew. Clutching copies of the entry books for Joseph Hooker's Museum of Economic Botany, I sought specimens that were collected in the field by members of the Zambesi Expedition. As I opened tiny vials of seeds, manhandled beams of wood or peered into jars of spirit, one after another, the handwritten and printed labels attached to the specimens revealed that, curiously, the Expedition was known by many names. 'The Zambesi Expedition', 'Livingstone's Second Expedition', 'Livingstone's Zambesi Expedition', even 'Dr. Kirk's Expedition' all appeared on the various labels. For many specimens there was no particular expedition indicated, only the collector's name and a date or location provided the clue that this cotton distaff or that block of raw latex was collected during the particular expedition I was interested in. I began to wonder, did the 'Zambesi Expedition', which I had been confidently researching, have a name at all?

Victorian popular periodicals and newspapers offered no more consistency than the old museum labels. For example, readers of *The Times* between 1857–1864 were regularly informed of the activities of 'Dr. Livingstone's Expedition', 'Dr. Livingstone's African Expedition' or 'The Livingstone Expedition'. The Royal Geographical Society used some of these variations in its publications and added 'Livingstone, or Zambesi Expedition' and 'The Central African Expedition' to the possibilities. Furthermore, the location of these activities equally challenged editors and as a result 'East Africa', 'Eastern Africa', 'South Africa', 'Southern Africa', 'South-eastern Africa', 'Central Africa' or 'South-Central Africa' were variously offered. It appears that in Victorian Britain no one was very concerned with consistency in naming this

project, so long as it was clear what was being discussed. My questions is how can this indeterminacy contribute to our understanding of this expedition today? How did the Victorians understand an expedition? And does the way that expeditions were planned and managed in the mid-nineteenth century reflect any of the indeterminacy we find in a name? By way of answering these questions, it will be helpful to first consider the Zambesi Expedition—a term used with consistency here despite the anachronism—as a sum of parts.

Conceptually and physically, the Zambesi Expedition was deployed into many different fields, and observed from many different vantage points. Politicians and men of science wrote letters of instruction for members of the Expedition. Naval officers and ships provided logistical support at the coast and surveyed the Zambezi delta. British diplomats placated Portuguese fears that the Expedition possessed ulterior motives to extend British power into an area that had been within Portuguese influence since the early sixteenth century. Politically, the project required bureaucratic moves within Parliament, the Foreign Office and the Admiralty. The Treasury, of course, had to be convinced that the expenditure was appropriate. Numerous scientific societies were involved in aiding the selection of members and analysing specimens and data. Steamships were built on the Mersey and Clyde to be used for transport on the Zambezi.

Official letters and despatches from the Expedition were sent to the Foreign Office. Letters from the field also went directly to various scientific, medical, commercial and missionary societies. The logistics of the Expedition were handled through the Office of the Chief Hydrographer in the Admiralty. These many correspondents had different expectations of the Expedition and different levels of risk invested in its success or failure—thus they required, and were sent, different information. Each facet of the Expedition: planning, financing, outfitting, and support, included inputs from powerful and distinct sectors of British society; each had its particular interests. Looking at the personnel lists, the various members of the Expedition from the leaders to the lowest stoker possessed different types of experience, held different views on scientific practice, were charged with particular tasks, and corresponded with different individuals and groups.

Given this variety of skills, activities, interested parties (with their many expectations), and the various locations of these, we might consider the Zambesi Expedition as many different expeditions at once, operating in different fields. One would be hardpressed to point at 'the Expedition' at a particular time on a map without waving a hand over Central Africa and Great Britain. Because of such dislocation, or lack of a singular location, a history of this expedition should present it not as a singular project or location, but as an aggregate of projects unified by goals, relationships, and responsibilities—that is what is offered here. Writing this way stands in contrast to the bulk of primary and secondary literature about the Zambesi Expedition, which uses language which constructs it as a unified whole.

But of course, even if the Expedition is best thought of a many expeditions, it was still considered then and is now thought of as a single project. In fact, by writing about how many dislocated activities were continually constructed and reconstructed into one project we offer a new and more thorough history of the Expedition. This method of writing also provides a foundation for the conclusion: the overall theme here will be that social structures provide the cohesion for a scientific project that has no single site where it may be unambiguously located. We cannot understand the many facets of the Expedition, be they scientific or humanitarian, without realising that they are all linked by social forces. Thus what is presented here is one anatomy, if you will, of the Zambesi Expedition. In another way of thinking this history is written in a style of reasoning related to that practised by mid-Victorian life researchers, analysis:synthesis.

Before commencing with the dissection, it will be necessary to step back and present an overview of events that will later be examined more thematically. This introduction will first describe the physical and social geography of the Zambezi basin in the years around 1860. Especially important here will be the effects of the *mfecane*, the movements of Ngoni northward from the area around Natal, and the reactions to this of Portuguese settlers and of the Portuguese colonial administration. We will see that Livingstone unknowingly took his expedition into a conflict zone. Following this, the six-year story of the Expedition will be presented as a straightforward chronology; this will allow the reader to grasp the general story before looking closely at the details.

Before beginning, a final note on names and spelling. Historians should always strive to follow the usage of their historical actors. In order to preserve the contemporary experience of the Expedition and of the Victorian English used by its members, the spelling of place names in all quotes will remain as in the original. Most often it will be phonetically obvious which town or feature was intended. Rarely, an entirely different name appears; when this occurs, an explanation will be offered. 'Zambesi' was the most common spelling at the time; this is why I preserve it for the proper name of the Expedition and as the title of this book. Today, 'Zambezi' is the more common spelling and I use this throughout when referring to the river itself. Similarly, because neither the modern countries nor the colonial precursors of Malawi, Zimbabwe, and Zambia were even remotely imagined in the 1850s and 1860s, the location of events will not be considered in terms of those political entities. Only 'Mozambique', which already had some geographical meaning by this time, may be used in particular circumstances. For the areas along the river and its tributaries, which includes the Shire River and Lake Malawi, the collective 'Zambezi Basin' is used. The lake that is now most commonly called 'Lake Malawi' in English was variously called 'Nyinyesi' or 'Nyassa' by the members of the Expedition and eventually settled to 'Lake Nyasa' during colonial times, when Malawi itself was known as Nyasaland. I use 'Lake Nyassa' when writing about activities in the nineteenth century because that was what the explorers settled upon and how it appears Livingstone's *Narrative of an Expedition to the Zambesi*. A last point to direct the reader: the Shire River should not bring up images of the friendly homeland of Bilbo Baggins and is correctly pronounced '*shee*-ray'.

THE ZAMBEZI BASIN: PEOPLE AND PLACES

The Zambezi flows east to west across 3000 km of Africa, entirely contained in the southern tropics. Its major tributaries include the Chobe, Kafue, Luangwa and Shire; the latter drains Lake Malawi. The Expedition spent the majority of its six years in the region along the final 400 km of the Zambezi between Tete and the delta, including

1. Elephant Marsh, Shire River

the lower 200 km or so of the Shire. Below the Cahora Bassa gorge, impassable cataracts until it was dammed in 1974, the Zambezi is wide and generally very shallow except where briefly constrained by another gorge, the Lupata. Before the Cahora Bassa and Kariba dams were built, immense quantities of sand brought down from the interior during the rainy season were deposited in the lower Zambezi, leaving a wide river bed of ever-changing channels. Navigation was difficult in these meanders and then could not continue above the Cahora Bassa cataracts. Likewise, the Shire possesses cataracts which begin about 10 km upstream from the modern town of Chikwawa in Malawi. Below Chikwawa, the Shire follows sinuous channels through the Elephant Marsh which can also be very shallow in the dry season.

When the Expedition's first ship, the *Ma Robert,* first steamed up the Zambezi in May 1858, the members of the Expedition appear to have had limited knowledge of the region they were entering. Livingstone's first book, *Missionary Travels and Researches in South Africa*, published in late 1857, was for most people in Britain at the time the only readily available source of information about the river and the people who lived along it, and his experience of the lower course of the Zambezi was only a flying visit. By 1857, even in Portugal, the interested public was only recently beginning to receive up-to-date information

about this outpost of the Portuguese empire. As the historian Malyn Newitt explains, before the publication of *Memoria Estatistica sobre os Dominios Portuguezes na Africa Oriental* in 1835 by Sebastião Xavier Botelho, very little information circulated in Europe concerning Zambesia.[1] An exception to this, limited to the readers of the *Journal of the Royal Geographical Society*, was a report made in 1832 by Captain William Owen that was based upon the journals of three naval officers of HMS *Leven*. The officers all died of fever on a reconnaissance up the river in July to October of 1823 but their journals were recovered.[2] Notably, the officers recorded that the river was extremely difficult to navigate.

The general story of Portuguese settlement on the river since the early sixteenth century was known in Britain, but precise details about the geography of the region and the social and political situation in the late 1850s appear to have been either unavailable or unsought when planning the Expedition. Subsequent scholarship has provided a much clearer picture than the explorers had themselves. After the voyage of Vasco da Gama from Lisbon to Calcutta in 1498, the Portuguese built up a strong trading network in the Indian Ocean based at Goa. The Ihla de Moçambique, an island located off the northern coast of modern Mozambique, was selected as a site for a factory and later a fort in 1507 and became an important part of this network. Other important towns were Quelimane and Sofala further south on the coast of the mainland. Established on the coast, the Portuguese soon followed Muslim traders and the lure of gold and ivory up the coastal rivers of south-eastern Africa, including the Zambezi. They established trading posts on the Zambezi at Sena and Tete by the early 1530s. But, to properly understand the extent and experience of the Portuguese in South-eastern Africa it must be kept in mind that the 'official' sites of Portuguese activity are only part of the story. Many men regularly left or escaped the life of the military forts and trading posts (*ferias)* to make their own way in the interior; the existence of hundreds of such individuals was reported as early as 1528.[3] The tradition of such independent persons, who self-identified with Portuguese culture but lived well beyond the control of the Portuguese Crown, continued until the early twentieth century and the consolidation of colonial authority. These men were known as *Sertanejos,* or 'backwoodsmen'

2. Field of the Zambesi Expedition

and they contributed significantly to the history of Zambesia and to the work of the Expedition although the explorers were not always clear as to their political status and they use terms to describe these men that may mislead us. For instance, many of the 'Portuguese slavers' whom Livingstone describes were quite independent of the colonial administration. A 'Portuguese' in Mozambique in the mid-nineteenth century was not necessarily loyal to the Portuguese Crown. A more careful taxonomy of the Zambesian 'locals' will be provided later.

In the late 1850s the official spaces of Portuguese Zambesia were administratively divided into three captaincies: Quelimane, Sena and Tete. Each captaincy was further divided into *prazos*, which were large land concessions granted by the Portuguese Crown. The holder of a *prazo* had full jurisdiction over the free Africans (*colonos*) who lived within it. Newitt argues that *prazos* are better thought of as African chieftaincies in their own right as they were 'areas of tribute collection and jurisdiction, surrendered by the different African monarchies and with traditional boundaries that had never been surveyed'.[4] Power on a *prazo* was exercised through the Chikunda, military slaves who were essential to its administration. Primarily composed of young boys taken on raids further inland, the Chikunda, like the Mamelukes of Egypt or the Janissaries of the Ottoman Empire, were the enforcers of the *prazo*-holders in the eighteenth and nineteenth centuries; a fully-armed militia class which had a distinct ethnic identity and no ties of kinship to the governed population.[5] The Chikunda collected taxes and policed the local inhabitants of the land, who were called *colonos*. The Chikunda were slaves, but they had power to exercise. The role of the Chikunda in Zambesia was vital. Where the total population of the whites, Indians and mixed-race persons along the Zambezi was probably no more than 500 or so in the late 1850s, there were probably tens of thousands of Chikunda overseeing the still more populous *colonos*.[6] The slave-raiding caravans that Livingstone described in such detail in order to shock Victorians into donating money were often Chikunda operations. Chikunda men were also expert canoe men and were certainly in the employ of the Expedition on numerous occasions.

Despite the power of the Chikunda militias and the presence of government forces, growing political insecurity meant that the majority of the *prazos* around the Crown towns of Sena and Tete had fallen unoccupied by the mid-nineteenth century.[7] The cause of this

3. The Exhibition's House at Tete

insecurity was the arrival of various groups of Ngoni, who were called *Landeens* by the Portuguese, at the southern banks of the river from the early 1830s. These Ngoni were branches of the wider movement of the Zulus across southern Africa in the migrations known as the *mfecane*. The Ngoni were powerful and regularly arrived on the Zambezi demanding tribute; they were usually paid. The members of the Expedition recorded these events in detail, clearly stunned by seeing Europeans pay tribute to African kings.

These incursions by the Ngoni caused the authority of both the *prazo*-holders and the colonial government to diminish. Into the vacuum stepped powerful *sertanejo* family clans who consolidated their independence and built fortified towns. These families, such as the Perieras of Macanga, the Da Cruz of Massangano and the Vas dos Anjos of Massingire resisted any superior authority and occasionally received recognition from the Portuguese crown as sovereign governments in their own right, with defined territories.[8] Already by Livingstone's time the militias raised by these clans included many Chikunda who had left their traditional position on the *prazos* when they fell apart.[9]

Often the leaders of these independent clans were of mixed-race, typically Afro-Portuguese and some Goanese. They took Portuguese as well as African names. The 'white' Portuguese referred to these clans as *muzungos*, a local term for a white person, in order to distinguish them from other, darker, African leaders who did not self-identify as

Portuguese. Regular skirmishes and sieges between these clans and government officials from the coast—along with other chieftaincies in the region—were the dominant feature of disrupted life along the Zambezi in the nineteenth century. Meanwhile, the Ngoni threat hung over the heads of all the residents. The period of these 'Zambezi Wars' lasted from roughly 1840 until 1902. This was generally a time of limited government control and instability. Garrison towns and prazos were suffering from a lack of maintenance and investment.

In September 1858, a few months after entering the Zambezi, the Expedition steamed straight into a siege at Shamo, near the confluence of the Shire and Zambezi, witnessing the deployment of Portuguese Crown troops and local militia against the main fortress of Paul Marianno Vas dos Anjos II, a *muzungo* clan leader. The Britons attempted to maintain neutrality and did not join the fight, although the Expedition's surgeon, John Kirk, provided medical care to the victorious but wounded government officials and received a commendation from them for this.

The members of the Expedition tried to make sense of Zambezian politics by referring to the ongoing wars and battles as conflicts between rebels and 'government'. This was a reasonable assumption, but does not reflect the nuance of the situation. In Europe, Portugal claimed sovereignty over the entire Zambezi as far as Zumbo. On the Zambezi *circa* 1860 we can identify at least five sources of authority: outposts of crown control in the form of garrison towns, those *prazos* that remained intact under strong owners, traditional chieftaincies, Ngoni leaders and the essentially independent *muzungo* clans that nonetheless associated with Portuguese culture. The colour of a person's skin or the language they spoke would have been little indication as to where allegiances were placed. It is no wonder that these ongoing feuds and shifting alliances perplexed the members of the Expedition, and their diaries and published accounts reflect the confusion. Nevertheless, it has been argued elsewhere that the presence of the Expedition, by making the weaknesses of Portuguese rule in Zambesia public in Europe, spurred Lisbon to build and enforce a more effective government in Mozambique.[10] Whatever their local cause, the later Zambezi Wars had this exact motivation and Portuguese control was extended later in the century.

AN OVERVIEW OF THE EXPEDITION

The plan developed for the Expedition was straightforward. It would reach the delta of the Zambezi and proceed as quickly as possible to the Batoka highlands beyond Victoria Falls. Once there, the explorers would construct an iron house, set up cotton gins and sugar mills, begin planting crops and explore the surrounding countryside. Their main work would be cataloguing the natural resources of the country with an eye to future trade. They also hoped that the Africans (who, it was assumed, would gather around their base) would benefit from observing the moral conduct of a British community. After two years the Expedition would return to the coast with reports and specimens. The Government would then decide upon an extension. Correspondence between the field station and Britain would be facilitated by scheduled stops at the delta by Admiralty ships that regularly patrolled the Mozambique Channel for slavers. The entire plan rested on one important but uncertain detail, the navigability of the Zambezi.

HMS *Pearl* arrived at the delta of the Zambezi on 14 May 1858 with the Expedition on board. Navigational charts for that coast were incomplete and the main channel was unknown. The first month was spent first putting together their river steamer, the *Ma Robert,* and then, with the officers of the *Pearl,* surveying the delta and looking for the entrance to the river.[11] They found the main channel on 11 June. The plan called for the *Pearl* to take all the equipment upstream to Tete, unload, return to sea and continue its voyage to Ceylon. It quickly became clear that the river was much too unpredictable to risk the larger ship, which had already grounded once. Reluctantly, the stores were unloaded onto a small island at the head of the delta for the *Ma Robert* to shuttle to Tete using the Portuguese garrision towns of Shupanga and Sena as relay depots. Kirk took command of 'Expedition Island' on 17 June, watching over the stores with Thomas Baines and Richard Thornton while Livingstone would soon take command of the steamer. The naval officer who was supposed to command the *Ma Robert*, Norman Bedingfeld, resigned by the end of July 1858 due to differences of opinion with Livingstone about the care of the *Ma*

Robert. The circumstance of Commander Bedingfeld's resignation is dealt with at length by Livingstone's biographers. The event at least shows us that there were some problems developing concerning the division of authority and that Livingstone's self-taught management style was not amenable to some.[12]

For months following the departure of the *Pearl* stores of equipment were strewn along the river at Expedition Island, Shupanga, Sena and Tete. It was only by 3 November 1858 that the entire staff with most of the stores unified at Tete, almost four and a half months after unloading.

Finally, they could prepare to investigate the Cahora Bassa gorge and see what difficulties it presented to navigation. The plan now called for moving all the equipment and people quickly upriver from Tete in order to find a location for the permanent base on the Batoka Highlands. They proceeded to perform two gruelling inspections of the gorge by foot. The first lasted from 8 to 13 November and the second from 22 November to 8 December. On the second journey they were guided by José Anselmo de Santanna, a ocally powerful trader who was leading a Portuguese 'resettlement' of the lands above Tete towards Zumbo. Upon inspection, the gorge turned out to be totally impassable. This was a major setback to which the first response from Livingstone was denial and in his journal he wonders if he could dynamite the rocks to make the gorge navigable. Reports of this setback brought heavy criticism of the project in Britain and questions were asked about why this was not foreseen and whether or not Livingstone had misrepresented geography to achieve support. Livingstone had bypassed the cataracts on his previous journey downriver and so could not be blamed directly, although he was aware of their presence through informants, as a letter to Murchison sent ahead from Mauritius in August 1856 demonstrates:

> I am aware of no obstruction to navigation from the bottom of the Eastern ridge of the Delta except one named Kebrabasa [Cahora Bassa], about 20 miles above Tette. There a number of jagged rocks jut out of the stream across the river forming in high water a dangerous rapid, and at low water the flow is so zigzag the canoes must be taken ashore and hauled along the bank. It is near the district called Chicovai; but being on foot when we came near

> that point we were obliged to leave the river to avoid crossing the troublesome rivulets which the Zambesi in its rise had filled, and we did not know till we arrived at Tette, that we had thereby missed the opportunity of examining the only impediment we are likely to meet with in our returning upward course.[13]

Missing this 'impediment' resulted in this major setback for the Expedition. We may ask if such available information should have made everyone less optimistic about reaching Sesheke from the start. Similarly, the Cahora Bassa are described as 'Grandes Cataracts' on Jean Baptiste Bourguignon d'Anville's authoritative map of 1749.

Even after their direct observations of the cataracts, Livingstone's optimism versus others' pessimism persisted. This is apparent, for example, in the differences between Baines's gloomy account of the river and Livingstone's more optimistic stance that both appeared in the 1861 issue of the *Journal of the Royal Geographical Society*. Such differences among colleagues challenged the Expedition's overall credibility. Portions of Baine's journals had already been read to the RGS in January 1859 and later appeared in the *Proceedings of the Royal Geographical Society*.

So, by December 1858 it was clear to the members of the Expedition that the Zambezi above Tete was no longer an option and that the original plan to set up the base on the Batoka Plateau was impossible. Livingstone still believed that a purpose-built boat could force the rapids in the floods but was unable to test this theory. An alternative had to be sought or the Expedition was ruined before it was really started. To save time, three projects were decided upon. Based on information gathered from Portuguese settlers, Livingstone and Kirk would take the *Ma Robert* up the Shire River to see what the region looked like and if it offered any alternatives for them. Thomas Baines and Charles Livingstone would remain at Tete with orders to go back to the Cahora Bassa in January 1859, during the rainy season, to see if higher water would improve its navigability—it did not. Meanwhile, Thornton investigated the coal seams reported to be near Tete and was able to make favourable reports. The *Ma Robert* often used this source of fuel.

The preliminary investigation of the Shire performed in early 1859 was inconclusive but tantalising. The river appeared navigable in its

lower reaches and the Portuguese living in Sena informed Livingstone that two large lakes were located in the highlands above the river. He and Kirk returned to Tete on 2 February 1859, and spent a few weeks writing reports and preserving specimens. They also prepared for a much longer journey to the Shire highlands, now firmly the new focus of the Expedition's energies. Livingstone and Kirk departed on 14 March, again leaving Baines and Thornton at Tete. Once on the highlands they climbed the escarpment and visited Mount Zomba and Lake Shirwa. Kirk and Livingstone were on the highlands until early May. They were very optimistic in their observations and foresaw a new cotton-producing region. After they returned to the *Ma Robert* on the Shire River they went straight to the delta to see if an Admiralty ship was waiting to drop supplies. None came, so they made their way back to Tete to arrive on 23 June, after six months' absence from the other leading members of the Expedition.

At Tete, Livingstone assessed the situation and was extremely displeased with Thornton's performance and dismissed him. He also suspected Baines of stealing from the stores but refrained from dismissing him immediately. Biographers and historians differ widely over their interpretation of these events, but there are a few facts. The artist and the geologist had been left at Tete for the better part of a year, watching the stores and given other small tasks. They were often sick with fever or other ailments while both of the Expedition's physicians were off exploring. Even if Thornton had not performed as Livingstone expected, his later career indicates that the rash decision should have been rethought. When dismissed, Thornton did not go home. He stayed at Tete and continued his geological research locally and then accompanied a Portuguese caravan to Zumbo. He then made his way to Zanzibar where he met Carl Von der Decken and joined his expedition to Mount Kilimanjaro. Thornton returned to the Zambezi in late 1862 and through the intercession of Roderick Murchison, was asked by Livingstone to rejoin the Expedition. He died of fever in April 1863 and was buried near to Murchison's Cataracts on the banks of the Shire river. His geological notes were never published in full.

With the accusations of theft, Baines's situation with Livingstone was deteriorating, but not yet critical. He was again left to watch the stores in Tete while the rest of the Expedition left on 11 July to travel

to the coast and meet a ship on 31 July. After the rendezvous they steamed up the Shire to Chibisa's village. Chibisa was a Man'ganga chief who would often assist the Expedition and whose village was just below the cataracts of the Shire. They left the *Ma Robert* at Chibisa's and walked up to the Shire Highlands where they explored until October. On return to the boat, Kirk and George Rae, the engineer, were sent overland to Tete as the river was too low to risk navigation. Once at Tete, Kirk had orders to perform the unpleasant task of examining the stores to see if Baines had stolen items; his findings were inconclusive. At this point Kirk, Baines and Rae hired canoes to reunite with Livingstone at the coast to meet a ship to be sent by the Admiralty from Cape Town. Thus all of the members of the Expedition were on the coast in November 1859 to wait for new supplies and to learn if the Government would approve an extension beyond the initial two years. Permission was granted, new supplies taken on board and they returned to Tete in early 1860. Baines was dismissed and sent away on HMS *Lynx* to Cape Town. He claimed total innocence of theft and demanded a formal hearing, but none was granted. His subsequent career saw him continue to explore in southern Africa for many years. His paintings of Victoria Falls, made on site in 1862, are now iconic images.

Much of 1860 was spent on a trip to visit Sekeletu and the Makololo of Linyati, in the centre of the continent. Livingstone had left a group of Makololo assistants waiting at Tete in 1856 and he wanted to return with them to their home. The caravan left in April of 1860 from Tete and returned in November the same year. It was a long trek that confirmed once and for all that the Zambezi would not serve as a conduit for commerce with the centre of the continent. There were too many cataracts along the middle stretches of the river. When returning, some of the canoes they travelled in were upset in the upper rapids of the Cahora Bassa and, tragically, most of Kirk's notes of the trek were lost. After the group reached Tete, they set out for the coast in January 1861. This was the last voyage of the badly corroded and much maligned *Ma Robert*. The steamer sank into the sandy bed of the river near Cheba, a few miles upstream of Sena.

Hiring canoes, the Expedition completed the journey to the coast. In February a new steamer, HMS *Pioneer* arrived, towed by HMS *Lyra,* and

accompanied by HMS *Sidon,* which carried the first missionaries of the Universities' Mission to Central Africa (UMCA). This group intended to travel to the Shire highlands, now famous due to Livingstone's optimistic despatches, and set up a permanent mission station. The *Lyra* also carried Charles Meller, the second botanist appointed to the Expedition.

Though the UMCA was not, strictly speaking, part of the Expedition there was no possibility that the two projects could remain separate. The missionaries looked to Livingstone for advice and inspiration. The famous explorer was not prepared for this responsibility and there were two major logistical problems. First, the Zambezi and Shire were not reliably navigable for a steamer like *Pioneer*, which simply drew too much water for the conditions. The mission would have to rely, as the Portuguese regularly did, upon large locally built canoes with their Chikunda crews. These were expensive and not always available. Second, the Zambezi was only used with the permission of the Portuguese who were beginning to formalise their administration of the river and had recently begun operating a Customs House at the mouth of the delta. The thought of a British civilising mission operating only at the convenience of the slaving Portuguese was anathema to members of the Expedition and UMCA alike. It was not a comfortable situation and not one that had been readily apparent to the missionaries before they left Britain.

To all these problems Livingstone offered a solution: the Rovuma River, which lay far north of the Zambezi. The river was beyond Portuguese control and Livingstone believed that it was an effluent of Lake Nyassa. If true, this would provide a new and independent route to the lake and Central Africa for the Expedition and the UMCA. The Zambesians could then be left to their internecine wars. Therefore, before the UMCA had a chance to unpack, Livingstone took them first to the Comoros Islands and then to the Rovuma. The trip lasted from 12 February 1861 until 1 May, when they returned to the Zambezi delta having failed to find a new route. In the Rovuma an old problem returned: they soon found that low water resisted their attempts to travel very far upstream. Once again rejected by an African river, Livingstone brought everyone back to the Zambezi and began the arduous process of transporting the UMCA with all its gear up the Zambezi and Shire to offload them at Chibisa's village.

In May and June 1861 Bishop MacKenzie and the UMCA were dragged up the Zambezi and Shire to the Shire highlands in an attempt to set up a mission station. It was the wrong season for taking a dangerously overladen steamer up the rivers and they frequently grounded on shoals for days. Moreover, Livingstone was beginning to worry about government support for the Expedition and he suspected that the engineer sent out with *Pioneer* was an informant for Captain John Washington in the Hydrography Office, who controlled the Expedition's purse strings.[14] To make matters worse new bands of slave raiders—some Yao and others apparently Chikunda—had begun to operate in the Shire highlands causing widespread disruption and, consequently, crop failures. Nevertheless, they completed the trip and after some reconnaissance, the UMCA settled at Magomero, near modern Zomba.

Once they finished transporting the missionaries, Livingstone, Kirk and Charles Livingstone took a small team of porters back to Lake Nyassa in order to determine how far north it extended. The trip lasted from early August until November 1861 and was a trying experience for all involved. They were robbed, often extremely short of food, experienced difficulty in gaining permission to travel from local leaders and consequently were unable to reach the northern end of the lake. The small sailboat they took with them was not suitable for the high waves produced by the gales that quickly rose on the lake and frequently needed to pull in. For geographers in Britain, not to circumnavigate the lake, or at least determine its northern extent, and not to determine where rivers flowed into or out of the lake were the greatest failures of the Expedition. The 'Nile Controversy' of the 1860s and 1870s, which found competing claims about the hydrology of central Africa debated openly and vociferously, would have been significantly curtailed by a more complete survey of Lake Nyassa in late 1861. It must be remembered that the Zambesi Expedition was in the field at the same time Burton and Speke, and then Speke and Grant were searching for the source of the Nile; the findings of all these expeditions were being synthesised into a wider picture.

While the boat struggled on the lake, a land-based caravan of Makololo tribesmen that was ordered to follow the boat's progress encountered resistance from the topography and from Swahili

traders and Ngoni further north. It was partly the insecurity of the land party that forced a retreat from the northwards progress. The situation was simply too precarious to push on. On the return trip the Makololo severed their ties with Livingstone. They then took cunning advantage of the political instability in the Shire valley and quickly set themselves up as a new power, taking control of important chieftaincies and raiding the *aringas* and *prazos* further south. The Makololo became an important ruling class in the upper Shire and never failed to remind everyone of their 'English' connections. They became important actors in the later history of the Shire Valley and even figured in future border negotiations between the British and Portuguese.[15]

When the explorers returned to the Shire River on 8 November they immediately proceeded downstream, as word had arrived that a ship would soon meet them. Unfortunately, after only a few days, the ship grounded in the Shire and remained so for almost one month. Only the onset of the rains and consequent rise in the river finally freed the *Pioneer* and they reached the Zambezi on 11 January 1862. Two admiralty ships, HMS *Gorgon* and HMS *Hetty Ellen,* were waiting for them and carried more missionaries along with Livingstone's wife, Mary. Also on board was James Stewart, a Scots missionary who wanted to investigate the possibility of opening a cotton-producing industrial mission on the Shire highlands. Another steamer, the *Lady Nyassa,* also arrived in pieces that could be transported. The plan was to get this new steamer up to the lake as fast as possible where it could be constructed and put into service in support of the missions, engaging in the cotton trade and undertaking anti-slavery activities. It should be noted that *Lady Nyassa* was not a government ship. When his requests for a third steamer had failed, Livingstone self-financed its construction. In trying to take steam power to Lake Nyassa, Livingstone foreshadowed the later extensive use of steam navigation in support of missionary activity on the lake.[16]

In early 1862 a series of disasters provided further setbacks. By the end of January the UMCA had already lost a number of its members to fever including its leader, Bishop MacKenzie. Reports of these tragedies in Britain brought further criticism upon Livingstone who, in turn, blamed the missionaries themselves for poor sanitary practices. In April

1862, Mary Livingstone died of fever and was buried at Shupanga. On top of these troubles, the level of the Zambezi was too low for the *Pioneer* to carry the pieces of the *Lady Nyassa* to the bottom of the cataracts of the Shire for portage, and a decision was made to assemble the *Lady Nyassa* at Shupanga without its boilers. It could then be towed up, disassembled, carried thirty miles around the cataracts (on a portage road that had yet to be built) and reassembled on the upper course of the Shire where it would steam into the lake. This was a massive undertaking to propose; the engineer, George Rae, would be required to construct three temporary shipyards, complete with cranes, on the banks of the Zambezi. While waiting for the construction to progress, Livingstone took Kirk and a crew in *Pioneer* back to re-examine the Rovuma.[17] They left the Zambezi on 6 August and returned 23 November. Clearly frustrated by topographical realities, Livingstone dragged his staff up the Rovuma in small boats through water at times only inches deep hoping to find that it flowed from the lake. Kirk and the others followed quietly, though their journals record their doubts. The Rovuma proved to be unsuitable for navigation.

By January of 1863 the *Lady Nyassa* was ready to be towed and with much difficulty was brought by *Pioneer* to the foot of the cataracts. Because of news that the UMCA was struggling to feed itself, the members of the Expedition assisted by going overland to Tete to purchase more supplies for them. This was a difficult journey and the effort killed Richard Thornton in April. Furthermore, news arrived that the Government intended to recall the Expedition by the end of 1863. Seeing that there was no more work to be done, Kirk and Charles Livingstone, along with other crew members, departed for Britain on 19 May. Livingstone could not leave immediately because the river was again too low for transport and he would wait for the rains at the end of the year to take both steamers back downriver. In the interim he explored the lands to the west of the lake, a flying march that demonstrated the extent of Swahili influence upon the slave trade centred at Nkhotakota on Lake Nyassa. The UMCA also began to close down its operations. In June 1863 their new leader, Bishop Tozer, moved the mission south to the top of Mount Moramballa, hoping to find respite from fevers in the altitude. They fared little better in the new location and in December 1863 the UMCA moved to Zanzibar.

Livingstone left Zambesia in January 1864 and took the *Pioneer* and *Lady Nyassa* to Zanzibar. In April he sailed the *Lady Nyassa* to Bombay to sell her and returned to London in July 1864. There was no great celebration or welcoming committee on the Expedition's return. Later that year Livingstone gave a special evening lecture to the annual meeting of the British Association for the Advancement of Science in Bath; it was another polemic against the slave trade and a description of the economic potential of central Africa. Livingstone also proceeded to prepare his second book, *Narrative of an Expedition to the Zambesi and its Tributaries*, which came out in 1865.

It should be noted that activities related to the Expedition were not restricted to the field. Through all its duration, metropolitan-based bureaucratic and scientific work supported and analysed the fieldwork. The Expedition was formally sponsored by the Foreign Office, which was ultimately responsible for the cost. The day-to-day bureaucratic work of managing the finances and organising regular shipments of supplies and correspondence was handled by the Admiralty through its Hydrographic Office. Any personnel, diplomatic or logistical issues were handled by these two offices. The Government turned to the scientific community for assistance with the Expedition's reports of the natural history of the region; all data and specimens were government property. In order to ensure their proper treatment botanical specimens were sent to Kew Gardens and zoological specimens to the British Museum of Natural History for 'first refusal'. Portions of despatches sent to the Foreign Office containing scientific information were copied out and forwarded to these institutions. Much of this book will look at what happened to all this information.

SUMMARY OF CHAPTERS

This book will follow a loose chronological order that emphasises key themes concerning scientific practice on the Zambesi Expedition. In chapter 2, a 'history of histories' about Livingstone and the Zambesi Expedition will be reviewed in order to show how a century and a half of writing has shaped the way we understand the Expedition today. An attempt is made to understand the gaps in our knowledge about Livingstone's scientific companions. Then, relevant literature from

science and technology studies and geography is reviewed in order to develop an appropriate method for describing the geographically-extended practices of expeditions. In this way we understand both how we come to know about this Expedition and how I argue we need to approach the study of expeditions more generally

The following chapters will look much more closely at the activities of the members of the Expedition. In chapter 3, the formative period of the Expedition, early 1857 to March 1858, is considered in depth. The Victorian concept of the civilising mission is examined as the dominant ideology of the project. The interests of science, evangelism, commerce and philanthropy contributed to the negotiations that went on inside the Government to secure support and funding for the project. It is argued here that science both advised Government on how to outfit the Expedition and provided justification by offering the possibility of results that would, in turn, support the civilising mission project. Thus, while 'Christianity, Commerce and Civilisation' are traditionally offered as the main themes of the Zambesi Expedition, 'Science' is added as a fourth, vital consideration.

In Chapter 4 the analysis moves to the field. A focused study of the role of technology in fieldwork is undertaken. The Victorians revelled in the advancements of their age and defined themselves by their mastery of technology. The members of the Expedition based their assumed superiority over the Zambesian locals upon technological skill, especially their abilities to understand the environment and to command power. The strongest symbols of this were steam navigation, mastery of scientific instruments and taxonomic classification systems. This chapter uses evidence taken from their journals and correspondence to provide a detailed examination of the use of technology in the field. Questions are also raised about the tensions between the different goals of the Expedition and conflicts between the different practices used to achieve them.

Fieldwork is also the subject of Chapter 5. The emphasis here is on practice as an activity that serves to link local collection sites to local analysis sites through social networks that rely upon trust, credibility and authority to be maintained. The role of information provided by local informants is considered in depth. This examination serves to challenge post-colonial critiques that may be too quick in their rejection of a role for local or indigenous knowledge within imperial

systems of knowledge production. By tracking carefully the trajectory of data and specimens from the field to the museum, the importance of local knowledge to the scientific project of the Expedition is revealed.

Chapter 6 returns us to the metropolis examined in Chapter 4 and asks how the information gathered by the explorers was received by the scientific community. The presentation of information gathered by the Expedition in different kinds of literature is considered. Different results were discussed in different spaces and were analysed with different standards of evidence. In this chapter, the voices of the critics of the Expedition are the loudest. The dialectic between the critics and the explorers provides a view into the internal standards of the scientific community and the modes by which African nature could be understood in metropolitan locations.

2 'Dr Livingstone I Presume?': Writing about the Zambesi Expedition

Trying to write a history of the Zambesi Expedition requires that we come to terms with its leader, the iconic David Livingstone. This explorer continues to attract great interest as a symbol—although a problematic symbol—of missionary zeal and international humanitarian aid. His birthplace in Blantyre is a Scottish National Memorial and he is buried in Westminster Abbey. Bronze statues to his memory are located in many of the places associated with his life and at others that are not. In Africa at least two cities and a town are named after him: Livingstone, Zambia along with Blantyre and Livingstonia in Malawi. Around the globe several natural features are named after him and dozens of other towns, roads, streets, places and closes. No historian who wanted to write a history of the Zambesi Expedition could ignore the vast amount of attention that Livingstone has attracted.

When trying to uncover the history of this Expedition we are also uncovering one of the most difficult periods of Livingstone's life. The Expedition was considered by many in the mid-1860s to be a failure and the great man lost many supporters because of this. Observers were puzzled and annoyed, it seemed that the Expedition had been ill-planned, badly managed and that Livingstone had misled the Government into funding a personal crusade with public money. In 1865 the *Fortnightly Review* published a review of Livingstone's *Narrative of an Expedition to the Zambesi* under the title 'Dr. Livingstone's Errors'. In a radical departure from normal editorial practice among

similar periodicals, the *Fortnightly Review* named its authors. Thus readers knew that it was William Desborough Cooley who proposed that Livingstone's great fame prevented proper scrutiny of the project at its outset and that this guaranteed problems. Cooley was a cantankerous critic of explorers, but yet a respected geographer and his views cannot be discarded as those of a crank. His review reminds us that the Zambesi Expedition is almost always treated as a part of Livingstone's own story; its failure was his failure. Therefore historians of the Zambesi Expedition have a problem: a history of the Expedition that does not have Livingstone at its centre is difficult to write. Yet, to properly understand the Expedition, we need to move Livingstone to one side and treat the Expedition itself as our primary historical object. This has rarely been done.

Looking back through the masses of writing about the exploration of Africa reveals that there are only two works, previous to this one, dedicated to the history of the Expedition. The first is, of course, the Livingstone brothers' own account of the Expedition, *Narrative of an Expedition to the Zambesi and its Tributaries and of the Discovery of Lakes Shirwa and Nyassa, 1858–1864*, published by John Murray in 1865. The *Narrative* was based upon the journals of Charles and David Livingstone. As a record of the Expedition the *Narrative* presents serious difficulties. Cooley, in the review mentioned above, argued that the *Narrative* only dealt with three distinct subjects: the journey to return the Makololo to Sekeletu in the middle of the continent; Livingstone's 'solo' exploration of Lake Nyassa and 'his political conduct in his consular office'.[1] Cooley does have a point about the imbalances in the text. Fully fifty percent of the *Narrative* deals with only eleven months out of the six-year duration of the Expedition.[2] Two periods are emphasised in this fifty percent: the return journey from Tete to Sesheke in 1860 and David Livingstone's exploration of the areas west of Lake Nyassa made in 1863 after Kirk and Charles Livingstone had left for Britain. The sections detailing these excursions bear strong similarities to the journeys described in his *Missionary Travels* of 1857 when Livingstone crossed large distances quickly with minimal baggage. In these situations he was the happiest and it seems that the *Narrative* purposefully emphasises similar events.

The *Narrative* is a difficult text: raw, immediate and inconsistent.[3] Written to be half travel narrative and half diatribe against the

Portuguese settlers on the Zambezi, it offers a wealth of ethnographic observations alongside calls for British action against the slave trade along the east coast of Africa. Readers were meant to be angered by the book. The solutions for the problems along the Zambezi are the same as in Livingstone's *Missionary Travels and Researches*, written in 1857: diplomatic pressure on the Portuguese to amend their evil ways combined with British-led legitimate commerce will lead to the eradication of the slave trade. In many ways the *Narrative* adds little to the work *Missionary Travels* made towards advancing the idea of a 'civilising mission' to Central Africa.

One reason why the *Narrative* is so imbalanced is that it was the work of many hands. It was compiled from September 1864 to April 1865 while Livingstone stayed as a guest of William Webb at Newstead Abbey in Nottinghamshire. The text was based on four draft volumes written by Charles Livingstone between January and August 1864 in Massachusetts where he visited his family after leaving the Expedition. To this framework, David added his own observations, polemics and basic information, and he also omitted parts of Charles's writing.[4] While at Newstead Abbey, David had the editorial assistance of his daughter Agnes, members of Webb's family, and occasionally John Kirk and Horace Waller. The illustrations which enrich the book were based upon John Kirk's photographs, Charles Livingstone's now lost photographs and Thomas Baines's paintings (for which he is not credited or named). Horace Waller and Charles Meller also contributed sketches. Nevertheless, David's ideology rings through the text loud and clear and it remains very much he and his brother's account of the Expedition.

Because the *Narrative* is only the Livingstone brothers' account, it is not a complete account of the Expedition. This is especially the case with natural history, which was purposefully omitted in order to let Kirk write a separate work on this topic; this never appeared. Readers of the *Narrative* are also challenged with the lack of an index, which may indicate that Livingstone's publisher, John Murray, was less willing to invest in this publication than it had been with *Missionary Travels*. Indeed, its sales were nothing like the phenomenally popular previous work and reviewers were generally critical of the text's inconsistencies.

Aside from the *Narrative* itself, a detailed historical treatment of the Expedition is found in *Livingstone's River* by George Martelli. This is

the only modern account—previous to this one—focused solely on the Expedition. Published in 1970 for a popular audience, this book foreshadows Jeal's critical biography of Livingstone by not obscuring the comments of Livingstone's detractors. No doubt Martelli, a writer and sometime African correspondent to the *Daily Telegraph,* was hoping to take advantage of the publicity surrounding the centenary of Livingstone's death in 1973. In *Livingstone's River* Martelli provides a study of personality clashes and political contexts. He made attempts to answer enduring questions such as the extent of Livingstone's imperial motivations and whether or not he knowingly misled the Westminster Government concerning the navigability of the Zambezi. Both are interesting and open questions. The most important contribution made by Martelli's book is his inclusions of the voices of the other leading members of the Expedition, many of whose journals and letters had recently been edited and published. These other viewpoints, missing from the *Narrative* itself, give a rounder picture of the Expedition. They also provide considerable fodder for those who wish to tarnish Livingstone's crown. Livingstone's management skills brought serious criticism from those who served under him, although prior to their publication, which is discussed below, these criticisms were hidden in private, unpublished diaries and correspondence available only to diligent historians.

Otherwise, most of the writing about the Expedition can be found in books about Livingstone himself. A great deal was written about Livingstone when he was alive, both in the press and through popular biographies. After he died in 1873, biographers quickly began to memorialise him. Since the publication of Blaikie's hagiography, *The Personal Life of David Livingstone* (1880), dozens of biographies have appeared. It would be impossible to review them all and many are in fact derivative of the main works. Previous to the middle of the twentieth century, these biographies, especially those written with a religious purpose, are generally sympathetic to Livingstone. While few try to frame the Expedition as a complete success, they do point to the Expedition's position as the first British foray into Central Africa.

After the Second World War, renewed interest in Livingstone's life arose within two contexts: the reinvigorated interest in European settlement in parts of Africa, followed by the moves towards

decolonisation from the later 1950s. The location for much of this interest was in Central Africa, where European settlers in the Rhodesias and Nyasaland turned to uncover, and in some ways to construct, a history of Europeans in the region. The centres for this activity were the Central African Archive in Salisbury, Southern Rhodesia and the Rhodes–Livingstone Museum in Livingstone, Northern Rhodesia. These institutions were actively seeking to purchase manuscript materials that related to the exploration of the region. Having such materials held on the African continent in modern facilities was a potent symbol designed to reify the European presence and, in the politics of the time, to lend tangent support to the controversial Federation of Rhodesia & Nyassaland. The acquisition efforts led to publication projects that would then make this history more widely known. Most important here as symbols of this project are the Oppenheimer Series and the Robins Series, which were both published by Chatto & Windus.

From the 1940s through the 1960s, these series published the private journals and correspondence of the first Europeans to explore and live in the region. Predictably, the Oppenheimer Series included a two-volume set of most of Livingstone's journals from the Zambesi Expedition (number 9, 1956) and an earlier volume (number 6, 1952) offered the journals of James Stewart, who spent over a year with the Expedition.[5] Through the Robins Series, the journals of Richard Thornton, the mining geologist on the Zambesi Expedition, were edited and published in 1963 by Edward Tabler.[6] The journals were difficult to edit because Thornton was not a very organised diarist, but nonetheless, his views on geology and the organisation of the Expedition are immediate and honest. Tabler included many of Thornton's letters to his family, which add a more narrative quality and detail his frustrations with Livingstone's management.

Thus, by the mid-1960s the biggest gap remaining in the primary sources available about the Expedition were the journals and correspondence of Dr John Kirk (later Sir), the natural historian to the Expedition. These were published by Oliver & Boyd in 1965 as *The Zambesi Journals and Letters of Dr. John Kirk*. The editor of the materials was Reginald Foskett, who was married to Kirk's granddaughter, Daphne Foskett (née Kirk).[7] Foskett's efforts made Kirk's descriptions of the events of the Expedition far more accessible, and his sober views

on the events of the Expedition and sometimes damning critique of both Livingstone brothers was a revelation to many readers.

Concurrent with these impressive bibliographic projects, more focused treatments of Livingstone's life were being written. Largely through the editorial work of the Rhodesian archives, it was never so easy to have access to the private thoughts of Livingstone and those who worked with him. Examples of studies that took advantage of the new sources are Frank Debenham's *The Way to Ilala: David Livingstone's Pilgrimage* (1955) and Michael Gelfand's *Livingstone the Doctor, His Life and Travels: A Study in Medical History* (1957). Debenham was Professor of Geography at Cambridge. *The Way to Ilala* was published with the aid of a grant from the Government of Northern Rhodesia and Debenham had access to the same archives that held many of the documents being published by the Oppenheimer and Robins projects. The book's greatest contribution was his detailed analysis of Livingstone's geographical methods. Written in the early, optimistic days of the Federation of Rhodesia and Nyassaland, Debenham's book hoped to provide more detail about one of its mythic founders. In the forward to *The Way to Ilala* Sir Arthur Benson, the Governor of Northern Rhodesia at the time of publication, wrote:

> We who work in Northern Rhodesia strive to work in the spirit and with the motives of Livingstone, and because of Livingstone our work is easier than the same work elsewhere. For him in this country all the trumpets will always sound.[8]

The author of *Livingstone the Doctor,* Gelfand, was South African and in the 1950s worked as a physician for the Southern Rhodesia Medical Service. He went on to be Professor of Medicine at the University of Rhodesia while pursuing research on regional history and African medical ethnography. *Livingstone the Doctor* is a biography, but predictably examines Livingstone's career from a medical perspective. The preface to this book was provided by C. Hely-Hutchinson, then president of the British South Africa Company. Again we see Livingstone held up as a colonial progenitor and inspirational figure although within this particular message we learn more about a specific aspect of Livingstone's life and, by extension, the Zambesi Expedition.

The journals of Thomas Baines, the Expedition's artist and storekeeper, took much longer to appear, leaving a gnawing gap in

the sources through the 1970s. His journals from the Expedition were only published in 1982 as *Baines on the Zambezi, 1858–59* again with the help of Tabler, Thornton's editor.[9] Notably, a later journal of his exploration of Matabeleland for the South African Gold Fields Exploration Company was edited by Wallis and then published as part of the Oppenheimer Series much earlier, in 1946.[10] Wallis also wrote a biography of Baines, *Thomas Baines of King's Lynn* (1941) which includes some analysis of Livingstone dismissal of the artist from his own perspective.[11] Biographers and historians continue to take sides in the controversy though Baines's guilt or innocence can never be satisfactorily judged because he was never allowed a fair hearing on the matter.[12]

An example of historical writing that made use of all these new and easily accessible resources is *Livingstone's Lake* (1966) by Oliver Ransford.[13] Ransford's study is a history of the region around Lake Malawi, emphasising European contributions. His historical outlook is betrayed by how he organised the book. The first section, which deals with pre-colonial history, is titled 'Night', the subsequent section, which discusses the Expedition's visits to the lake, is titled 'Dawn'. Like many others, Ransford represents the Expedition as the first instance of European interest in the region, and therefore as the cause of subsequent missionary and colonial activity.

Since the 1960s four major biographies of Livingstone have appeared: Tim Jeal's *Livingstone* (1973), Oliver Ransford's *David Livingstone: the Dark Interior* (1978), Timothy Holmes's *Journey to Livingstone* (1993) and Andrew Ross's *David Livingstone: Mission and Empire* (2002). Jeal's biography was the most controversial as it went further than Martelli in challenging the myth of the great hero with the opinions of those who lived and worked with him. According to Jeal, Livingstone was a dark and brooding man, quick to form a grudge and whose personal drive blinded him to any opinions or facts that stood in the way of his goals. Extracts from the diaries of the other members of the Expedition were used to show that Livingstone was often stubborn, prone to jumping to conclusions and unwilling to accept defeat. Jeal implied that Livingstone was manic depressive.

Taking Jeal's analysis one step further and probably emboldened by it, Ransford argued in his biography that Livingstone suffered

from cyclothymia, a hereditary bipolar mood disorder that made him difficult to get along with. Ransford was medically trained, but the difficulties of retrospective diagnoses are numerous and we must place this book within the psychological trends that were popular in biography during the 1970s. Holmes's biography *Journey to Livingstone: the Exploration of an Imperial Myth* (1993) is more sympathetic but not particularly novel, and academic reviewers were critical. Holmes inspiration in writing the book was a collection of 'rediscovered' letters in the Livingstone Museum (formerly the Rhodes-Livingstone Museum) to which previous biographers had little access to.[14] Many were unpublished and he edited these for publication as *David Livingstone: Letters and Documents, 1841–1872* (1990).

Answering this critical trend in 2002 was Andrew Ross's *David Livingstone: Mission and Empire*. Himself a Scot, Ross argued that retrospective diagnoses and other forms of psycho-biography miss the working-class origins of Livingstone in the cotton mills of Blantyre; Livingstone was a rough man with strong convictions, nothing more. In many ways, Ross's book serves to rescue Livingstone's reputation and act as an apology for the great man's faults. Ross was the first Professor in the History of Missions at the University of Edinburgh. As such, he was the best placed to understand the religious side of Livingstone, the theology behind his version of the 'civilising mission' and his part in it. Based upon ever more available primary material Ross's biography is well researched although some reviewers found it overly sympathetic; others appreciated the reply to Jeal and Ransford.

In 1996, the explorer's life was examined in a large-scale exhibition, *David Livingstone and the Victorian Encounter with Africa*, sponsored by the Scottish and British National Portrait Galleries. In the catalogue to this exhibition, scholars representing many disciplines contributed essays concerning his life and its effects upon British life.[15] What the exhibition showed was that over the years the public has understood Livingstone as missionary hero, imperial progenitor, grandfather of African nations, cultural imperialist, terrible father, depressive monomaniac and a misguided, reckless humanitarian. In the catalogue to the exhibition, Felix Driver referred to this faceted history as Livingstone's 'after-life' and this life, *in memoriam*, has been used to serve many purposes.

All of these biographical studies of Livingstone make mention of the Expedition, but with one difference. When historians and biographers discussed its contribution to the region, it is portrayed as the first foray of European modernity to Central Africa (smoothly eliding the Portuguese in the process). When authors are sympathetic to European colonialism or evangelism then the Expedition is the dramatic first step, or, as Ransford styled it, 'Dawn'. However, when the Expedition is placed in the context of Livingstone's career it is the opposite, a nadir. Debenham is fairer than most and calls this period, 'Debits and Credits'. Jeal titles his sections about the Expedition 'Reversal' and 'Rejection'. Holmes titles part four of his 'Disaster on the Zambezi'. Ross unequivocally uses 'Failure and Defeat'. It seems that one cannot approach the Expedition from Livingstone's standpoint without perceiving, or being asked to perceive, a calamity.

The present book builds upon this past scholarship but intends to add to it by offering a new history of the Expedition. The premise here is that the Zambesi Expedition should not be so tightly linked to Livingstone's life. It was, after all, a government-run project and it was very much more than Livingstone's inevitable second expedition. Many metropolitan forces influenced the Expedition's planning and execution. The other European members of the Expedition had their own contributions and their own ideas. As previous biographers have noticed, the preserved writings of these other members can shed light on Livingstone, but they also shed further light on the Expedition itself. Even for those members whose journals have not survived, we can use correspondence to obtain some idea of their thoughts in the field. Charles Livingstone's letters to his wife are catalogued, largely through the work of one of editors to the David Livingstone Documentation Project, Gary Clendennen.[16] Charles Meller's correspondence with Sir William Hooker and Joseph Hooker at Kew Gardens is also available, but largely unpublished. George Rae, the engineer, is the one leading member about whom we know very little. Because there are these multiple sources available—the journals of David Livingstone, John Kirk, Thomas Baines, James Stewart and Richard Thornton, and the others' correspondence—it is therefore possible to construct a composite journal spanning the Expedition's entire duration: one diary with multiple authors. Multiple views can

be gained of the same events and differences of opinion between the leading members of the Expedition become apparent. Using such resources I hope to provide a scientific biography of this expedition rather than of one of its members.

We can even go further. In addition to the records of the Zambesi Expedition itself, the members of the Universities' Mission to Central Africa (UMCA) kept journals which offer some observations on the activities of the Zambesi Expedition. The UMCA was inspired by Livingstone's speeches in 1857 and was in some ways the missionary adjunct to the Expedition. The group arrived at the Zambezi delta in February 1861 and remained in the region until December 1863, having failed in plans to establish a mission station in the Shire highlands. Early accounts written by members of the UMCA such as Goodwin's *Memoir of Bishop Mackenzie* (1864) and Rowley's *The Story of the Universities' Mission to Central Africa, from Its Commencement under Bishop Mackenzie, to Its Withdrawal from the Zambezi* (1867) are vital pieces of evidence of what the members of the Expedition were doing. Likewise there is the journal of William Cope Devereux, on officer on HMS *Gorgon,* who accompanied the Zambesi Expedition for a few months in 1862.[17] Devereux records sharp comments about quality of leadership at the heads of both the Expedition and the Mission.

On the metropolitan side of the Expedition, the manuscript resources are equally decentralised and their current locations tells us something about the organisation of the Expedition itself. Correspondence and despatches sent to the Foreign Office are of course found in the National Archives in Kew but the record there is incomplete because the papers of the Admiralty's Chief Hydrographer, John Washington, were never included. These latter papers, held in four boxes enigmatically labelled 'MSS 120', were held in the Ministry of Defence Library before being moved to the Royal Naval Museum Archive at Portsmouth. There are also original manuscripts directly related to the Expedition held at the Royal Society; the many libraries of the Natural History Musuem; The Royal Botanic Gardens of Kew and Edinburgh and archives located in Harare, Zimbabwe; Livingstone, Zambia; Cape Town; Oberlin, Ohio; Blantyre, Scotland; Blantyre, Malawi and elsewhere. Many of the more distributed sources comprise the chance letter sent from the field to a family member, friend or supporter.

It should be clear by now that the 'archive' of the Zambesi Expedition is in no place in particular. There is no archive. Rather, our evidence for the Zambesi Expedition is found in many spaces and places. This is not a factor of disorganisation, but rather reflects how the Expedition was organised and contributed to knowledge in the mid-nineteenth century. The Expedition was not a unified project, but rather a suite of projects answering to different interest groups. There was never any reason to create or maintain a unified 'archive'. Due this archival dispersal, the Expedition has often received attention in histories of the period with specific themes based in part upon the location of relevant manuscripts.

The history of Geography is a good example of how scholarship on this Expedition has been focussed. Because the British exploration of Africa and the Royal Geographical Society are considered nearly synonymous, many researchers turned to the Royal Geographical Society's archives first. Therefore, the Expedition's contribution to the geography and the cartography of Africa is often presented as its main scientific achievement.[18] Historians and biographers have made great use of the readily available despatches from the Expedition as published by the RGS in its *Journal* and *Proceedings*. The strong connection between the RGS, Livingstone and Africa has been treated in depth by Felix Driver as part of his thoroughgoing analysis of the 'cultures of exploration' existing in Britain during the nineteenth century.[19] Historical practices recapitulate this popular connection between the RGS and expeditions to Africa. But such a view can be limiting or even misleading for unlike the journeys of Burton, Speke and Grant, the Expedition was not an RGS-funded project and its main purpose was not geographical exploration. The Zambesi Expedition was planned as a civilising mission that would need to do some exploration and scientific research to achieve its goals. They did not expect to make many geographical discoveries. There is good reason, then, to look beyond the well-travelled archives for the history of this particular expedition.

A review of the historiography reveals further oversights. Only a limited amount of research has been done on the scientific products of the Expedition. This may reflect the fact that Kirk never published a popular account of natural history and his results were not publicised

very far beyond scientific literature. Further, the focus on Livingstone, who was not heavily involved with the scientific research has obscured the others' work. For example, the David Livingstone Documentation Project facilitated research on the Expedition by providing a catalogue of Livingstone's letters, but did not include the other leading members. Today, the extremely important Livingstone Online project again only presents Livingstone's correspondence. While the attention paid to Livingstone is certainly warranted and should be commended, it does limit our understanding of the Zambesi Expedition, where the great man was only one of many, all of whom were pursuing different projects. There has never been a list of the correspondence written by the other members of the Expedition. Moreover, manuscript collections that relate to the Expedition are held in scattered locations, across continents, and are not catalogued together or crossreferenced. An added problem faces the historian of science, who finds that in the published journals of Kirk and Thornton, scientific comments were occasionally edited out because editors felt they 'quickly became monotonous and of no meaning to the layman'.[20] Similarly, in editing Kirk, Foskett claims to have been more faithful but still indicates that he omitted 'rough notes' of unspecified content.[21]

Because the majority of published accounts have not considered the scientific results of the Expedition, other than through the RGS, few details have previously been published about this work. To emphasise the point even further, Martelli, Jeal, Holmes and Ross do not mention the archives of Kew Gardens as a location of manuscripts related to the Expedition, and neither do they mention Kew Gardens, Sir William Hooker or Joseph Hooker in their indices. Furthermore, Richard Owen and the British Museum are only mentioned by Holmes and Ross. These omissions, combined with a lack of research into the natural history specimen collections made by the Expedition, have contributed to the neglect of its non-geographical output, and perpetuated the impression that the Expedition was a failure. While Meller and Kirk are often acknowledged as collectors in popular literature, none of the standard histories have revealed other natural history collections linked to the Expedition: James Stewart and Baines assembled small botanical collections; Charles Livingstone made a large collection of bird skins and Horace Waller, a member of the UMCA, collected spiders

for Richard Thornton. Many of Stewart's specimens are held in the herbarium of the Natural History Museum and Charles Livingstone's birds are at that museum's ornithological annex at Tring. Baines's botanical collections are at Kew Gardens. Many of these specimens were considered new species at the time.

Exceptions to these oversights are found within the internal histories of botany and zoology, but these can hardly be considered popular accounts. (For instance, Kirk's itinerary on the Zambesi Expedition is published as an aid to taxonomists in the first volume of the *Flora Zambesiaca* (1960) and Zimbabwe's national botanical journal is titled *Kirkia*.) The lack of readily available detail concerning the scientific purposes of these explorers has also led to errors appearing in important studies of science and imperialism in the nineteenth century, which must at least mention the Zambesi Expedition. For example, Drayton indicates in his study of Kew Gardens that the Admiralty paid for Kirk to travel with Livingstone to the Zambezi and that at the time Kirk was acting as 'Political Administrator for the Foreign Office in Zanzibar': neither was the case. The Admiralty did not pay for Kirk and he joined the Foreign Office as an Assistant Consul *after* the Expedition.

In sum, the history of scientific practice on the Zambesi Expedition has been unintentionally fragmented and made incoherent. Previous historians have been at best reluctant to use the 'hard' scientific literature as source material. Until now, a thorough analysis of the scientific work of the Zambesi Expedition has not been undertaken. In order to fill this gap, the research for this book involved conducting a survey of scientific literature from 1858–1868 in order to identify any articles that utilise data or specimens collected on the Expedition. The results approach one hundred articles and are discussed at length in Chapter 6. An extensive investigation was then made into the fate of the specimens collected on the Expedition. The main repositories were Kew Gardens and the Natural History Musuems, although the list of articles which described the specimens indicated many other sites where the collections were eventually held, some outside the UK. Lastly, I consulted all surviving correspondence between leading members of the Expedition and scientific leaders in the metropolis. This correspondence is normally one-sided, as letters sent to the field have not survived as well. In the case of Kirk and Meller especially,

letters have been consistently overlooked unless the correspondence was with Livingstone. I use these letters extensively.

In documenting surviving material outputs, the accessions registers for the collections at Kew and the British Museum provided a wealth of information concerning field practices and the types of specimens acquired. By viewing a large number of the actual specimens, the identification of further manuscript evidence in the form of packing labels and those original field notes that remain attached to the specimens themselves provided further clues for investigating fieldwork practices. In contrast to much extant literature, then, this book demonstrates the importance of the manuscripts and material remains located in 'scientific' archives as well as the more commonly cited documents from the National Archives in Kew, the National Library of Scotland and other manuscript collections. I also use the evidence in the scientific literature to place science more centrally in respect to the Expedition's purpose and justification, a story too often obscured. By identifying and locating the 'products' of the Expedition it has been possible to work backward into the events that led to the creation of the documents and specimen collections. In a very real way the scattered archive of the Expedition reflects exactly the circumstances of its planning and implementation; as we shall see the Expedition was designed as many projects and to be in many places simultaneously. Its 'archive' still is.

A 'SEAMLESS WEB': VICTORIAN SCIENCE IN CONTEXT

Because this book will look so closely at scientific practice it is necessary that we investigate the character of scientific culture at the time of the Expedition. Two considerations arise. First, it is important we understand something of the general themes in the history of Victorian natural history: institutions, professionalisation, credibility in scientific authority and the role of expeditions. Secondly, we must refine the analysis and identify the specific issues dominating scientific discourse in particular places in particular ways at particular times. This section outlines relevant research which examines these themes in a mid-nineteenth century context in an attempt to place

the Expedition within its proper milieu. We can start with Bernard Lightman's heuristic:

> Whereas modern scholars find it necessary to isolate a particular context in order to study the complex interaction with science, Victorian scientists, and those intellectuals and members of the popular reading audience who were influenced by science, may have seen all of these contexts [social and economic] as part of a single, seamless web.[22]

The seamless web can be readily discerned when we look at the individuals and institutions that contributed to the Expedition. Key scientific advisers to the Government concerning the Expedition—Murchison, William and Joseph Hooker, Richard Owen, and Edward Sabine—were directors of important scientific institutions. The Expedition was formed by the Government with the support of these institutions and the advice of their staff. Studies of the role of these institutions by Richard Drayton, Nicolaas Rupke and Robert Stafford demonstrate the social and empirical control they held over particular disciplines: botany (Kew), zoology (British Museum), geophysics (Kew Observatory) and geology (Geological Survey and the Royal School of Mines).[23] The leaders of these institutions constituted an unofficial scientific 'cabinet' which advised the Government.

Support for the Expedition also came from many scientific societies which, with the exception of the Royal Society, were relatively new professional organisations, formed in the early decades of the century. Within geography, zoology, botany, astronomy or geology, societies provided a space for the discussion of findings, standards and methodologies.[24] As spaces where research was presented and commented upon, these societies provided a social venue where the standards by which the Expedition would be judged were constructed. It was very clear in the field that the European concepts being applied to African nature would need to be successful in such institutional spaces. By examining the internal rhetoric of these institutions we can link metropolitan scientific discourse to the field by revealing the normative pressure upon fieldworkers to uphold metropolitan standards.

These societies are also important if we want to look closely at British ideas about Africa. As discussion spaces, scientific societies brought

together 'Africanists' whom were both small in number and had little sense of an independent community.[25] For example, the RGS was an important metropolitan space for discussing specifically African issues and it offered themed 'African nights' regularly.[26] Lightman's heuristic is therefore instructive; we should not compartmentalise a discussion of African exploration: it was always part of the wider Victorian context.

The theme of institutions, including societies, relates closely to that of the professionalisation of science during this period. It was often through institutions that individuals gained the notoriety and patronage necessary to move forward in a scientific career. Natural history was a popular amateur pursuit in the middle of the nineteenth century, but this should be contrasted with the careers of a growing body of 'professionals' in the second half of the century.[27] James Secord's mapping of the Victorian scientific community and its shifting boundaries through the publication of one book, *Vestiges of the Natural History of Creation*, helps us to understand how scientific knowledge was consumed through the middle decades of the nineteenth century.[28] He provides a sketch of the delicate connections between the producers of scientific knowledge and the members of 'polite society'. His description of young geologists as 'barely middle-class bachelors', emerging from their cheap accommodation to attend soirées and *conversazione* on Pall Mall indicates vividly the boundary-crossing opportunities a scientific life offered to the young members of the Expedition, who were all in the early stages of their scientific careers. A key point made here and elsewhere is that scientific knowledge, from the early nineteenth century, was presented as a form of knowledge that transcended class.[29]

As appointees to scientific posts, the members of the Expedition were enrolled into a group of 'professional scientists' although at the low rank of field collectors. Such positions were known to be potential starting points for scientific notoriety. Many respected natural historians at the time had made their name through collections made in a little-studied region, not through their later theoretical work. Charles Darwin, Joseph Hooker, Thomas Huxley and Alfred Wallace, among others, all started out this way. The issue of professionalisation is critical if we are to understand why Kirk, Meller and Thornton

were so driven to succeed in their fieldwork on the Zambezi. Paying positions in science were extremely limited, although a transition of science from a gentleman's pursuit to a paid vocation was ongoing. The chance to collect in a new field was thus a tremendous opportunity.

Other examples demonstrate the role of professionalisation and the efforts made to secure funding for the Expedition. In his history of Kew Gardens, Richard Drayton links developments in botany (including the discovery of new plants by expeditions and the foundation of colonial botanic gardens) to the policies and strategies the Hookers at Kew used to 'secure their personal and professional ends through identifying themselves with the public interest'.[30] The potential commercial benefits of botanical research were continually highlighted while the idea of 'botany for botany's sake' was strategically downplayed when communicating with non-scientists. The rhetoric used to create (or possibly obscure) links between personal, professional and public benefits indicates two things for us: the values that were important within these spheres and the precarious nature of financial and political support for Victorian scientific research. We will see that gathering support for the Zambesi Expedition involved dealing with similar concerns.

THE GEOGRAPHY OF EXPEDITIONARY SCIENCE

While in the field the members of the Expedition, seeing themselves as members of a professional community, strove to produce knowledge that was considered credible. Their knowledge could not be double checked and therefore, above all else, had to be trusted. Demonstrating that one had applied the appropriate and accepted methods was often an important factor in having one's testimony accepted. The negotiations establishing the credibility of such testimony were, and are, inherently social. These negotiations are also both a local and a distributed activity; they do not occur in one place and one time, but in many places over time. Negotiations about credibility occur in private rooms, at meetings of scientific societies, in universities, in scientific institutions and in scientific publications. The scientists of the Zambesi Expedition were familiar with these negotiations and sought credible status using methods which reflected the long history

of its construction that Outram and Withers have examined at length in the context of the Enlightenment.[31] Much of their work, which examines the role of credibility in situations where knowledge is obtained through testimony and at a distance, takes inspiration from Shapin's discussion of credibility and identity in the seventeenth century.[32] This research provides some useful heuristics for us: who was reporting is as important as what was being reported; how knowledge was reported was as important as what was being reported; and where the reporting took place was as important as what was being reported.

The methods implied by this research are rooted in the tenets of the Strong Programme in the sociology of scientific knowledge.[33] These tenets point towards a geography of expeditionary science that must also contribute to a social explanation for why the members of the Expedition constructed scientific knowledge in the way they did. In other words, there is no reason to make a judgement about whether the reported knowledge is 'right' or 'wrong', rather we must strive to provide a social explanation for scientific beliefs about the natural world. The spatial aspect—its geography—of this form of explanation is not, at first glance, altogether clear, although some work has been done to indicate where historical geographies of science can contribute.

Scholars have worked to classify the different spaces where knowledge is constructed and to offer models of the social relationships that occur within those spaces. Laboratory studies and research on museums and other scientific institutions as well as caves and pubs emphasise the particular structuring effects of those spaces on scientific practice and communication.[34] Latour and Callon visualised networks with centres and peripheries, with actors, actants and knowledge move along the threads of these networks with their attendant historical contingencies. The modern David Livingstone, in looking ahead to a geography of scientific knowledge, moved away from diffuse network models and built a more coherent taxonomy of the 'spaces of scientific knowledge' by considering separate spaces of production, consumption and circulation.[35] These spaces are connected through social interaction.

But these models have not been without critics and problems. In these attempts to map the social construction of knowledge the lack

of distinction between the spaces relevant to knowledge production, consumption and circulation has been noted; this realisation puts the taxonomies themselves in jeopardy. Livingstone has himself observed that there is a disturbance of 'any assumption that a clear boundary line can be drawn between acts of production and consumption'. Likewise Fabian, in his study of exploration along the Congo, emphasises that 'it is hard to keep the production and presentation of knowledge apart as separate phases.'[36] If the boundaries are not clear, we can certainly ask why have them at all? The important point here is in fact one taken directly from the Strong Programme. Field and metropolis, core and periphery or from another perspective, the sites of production, consumption and circulation are not essentially distinct from the standpoint of the Strong Programme if the same concepts are being applied in all places. Scientific practice could not successfully occur if there was such a distinction. The scientific concepts applied by a scientist are derived from a practising community of scientists. In the case of the members of the Zambesi Expedition, these concepts are those of mid-nineteenth century British science. No matter where our Victorian man of science may go he is still part of that community in terms of the scientific concepts he is applying, and the normative power of those socially-derived concepts travels with the conscientious practitioner.

Therefore, in studying expeditionary science we should think in terms of the socially successful application of concepts *about* the natural world to objects *in* the natural world. We should furthermore study this application of concepts as a historical event in its own right and as one that has its own geography. This allows us a robust method with which to consider the case of maintaining credibility and then to study how this credibility is revealed as a local epistemological issue that must be understood as a distributed sociological phenomenon.[37] In other words, debates about the credibility of explorers and the validity of the knowledge they produce should be examined in reference to the social processes which provided foundations for successful communication between men of science in the first place—wherever they are. It might appear that this argument leads to the negation of a geography of scientific knowledge but this is not the case. Rather, by locating science in particular spaces we can then query where and

how geographical factors come in to play *within* a social explanation for the construction of scientific knowledge. Furthermore, space and place could also be considered as having a material effect upon the construction of scientific knowledge. Such non-social effects have never been denied by the Strong Programme, but its goal has always been to provide a rigorous and naturalistic social explanation. Thus, a historical geography of scientific knowledge can be part of a social explanation while also adding to it non-social factors.

Following a symmetrical approach to expeditionary science that is informed by the Strong Programme allows for another problem in the historiography of expeditionary science to be dealt with more effectively. This problem has been the status of knowledge provided by local informants. Because the locals and the explorers were members of very different social groups we can expect that they employed different concepts to explain natural phenomena. Given the important normative power of these concepts in constructing scientific knowledge, we can begin to see how problems of credibility and verification arise. Withers has discussed these problems in relation to the mapping of the Scottish Highlands and he identified the key role played by the explorer as an intermediary between two social groups.[38]

Because the traveller or explorer acts to take the concepts of his scientific community to other parts of the world, the space between these different worlds is physically minimised. Metropolitan science is performed in the field insofar as the metropolitan scientist is in the field. Therefore local informants are not dislocated from metropolitan scientists—rather the two interact *directly*. For the analyst, therefore, it is only after strong distinctions between field/metropolis and epistemic/social are broken down that the role of local knowledge, and of the informants themselves, is revealed. The contingencies of travel and exploration remain important here, but a crude distinction between field and metropolis is removed. The explorers themselves are also revealed as more than mere conduits or transporters of information, rather they are the crucial link between previously separated social groups. They provided a necessary translational link between African and British knowledge about the natural world. In this book we will see how the members of the Zambesi Expedition filled this role.

The field and the metropolis, south-eastern Africa and Great Britain, on expedition and in a herbarium, these are all spaces within which the Zambesi Expedition worked. How might these different spaces have affected scientific practice? In a review of scholarship in the sociology of scientific knowledge, Steven Shapin argues that the investigation of the social interests which shaped scientific practice has led to the identification of four ways of understanding science: science is a 'mundane' activity; credibility is a process; scientific knowledge is 'embodied' in people and things; and scientific knowledge-making is a physically situated activity.[39] Overall, the impression is that science is an intensely 'local' activity.[40] Such questions succinctly raise methodological issues that confront historians of scientific expeditions—as travelling entities by definition how can they be local? To answer such issues I argue here that without opening up our historiography to be sensitive to the effects of space and place on knowledge construction, we lose the ability to understand expeditions in their historical context. This is particularly relevant to a history of expeditions, which, with their dispersed nature, challenge analysts with layers of activity that are local, regional and global. Looking closely at individual and located activities is important, but to understand an entire expedition we must, as Livingstone argues, 'attend to spatial considerations at a variety of scales'.[41] Examining the geography of science requires that we attend to the small spaces of science such as laboratories, ships, tents or conference rooms while at the same time thinking about the long-distance connections necessary for the science to proceed and function.[42]

CONCLUSION: WRITING THE ZAMBESI EXPEDITION

The sources discussed above point to a spatialised historiography of scientific practice. As a historical geography, influenced by the sociology of scientific knowledge, this book examines a particular incident in the temporal and geographical extension of British scientific culture: the Zambesi Expedition. A series of human dialogues will be examined: between local informants and assistants, between scientists in the field and scientists in the metropolis, and between the scientific

community and the Government. The image of African nature which the Expedition produced arises from these dialogues.

The rhetoric recovered from the primary sources will be assessed for evidence of the social interests structuring scientific practice. By comparing evidence from spaces as different as the grandiose claims made at public speeches and the grumblings of private journals, conflicts of interest will be revealed along with points of agreement. Expeditions depart from home shores full of expectations and these place very real pressures on practices in the field. Other pressures rise from standards of objectivity, accuracy and methodological rigour. In sum, expeditions are goal-oriented and these goals must be uncovered to determine how they compete with or support one another.

In tracking the results of the Expedition the representation of African nature in various locations will be examined. Differences between the private and public writing of the Expedition will be considered. Also, the mediation of field knowledge within metropolitan spaces of presentation is traced. Here especially, the local voice of the African, now in a totally foreign environment, undergoes multiple reiterations that must be understood if we are to understand the role of expeditions in contributing to the public image of Africa. In order to begin, therefore, we must consider the Expedition before it departed from Britain—at a time when any results could only be hoped for. Let me turn, then, to examine these hopes and the formation of the Expedition's brief.

3 'No Longer Unaided and Alone': the Formation of the Zambesi Expedition

INTRODUCTION

In line with its frequent attention to David Livingstone's activities, *The Lancet* in February 1858 announced to its readers the forthcoming 'Farewell Livingstone Festival', to be held in the Freemason's Tavern and celebrating the approaching departure of the Zambesi Expedition. The *Lancet* editor declared, 'Rarely has any expedition been dispatched more carefully provided with all that may conduce to its ultimate success. Dr. Livingstone goes forth no longer unaided and alone among the black races of Africa.'[1] Indeed, this was a new stage in Livingstone's career. In the period between his return to Britain in December 1856 and the departure of the Zambesi Expedition from Liverpool in March 1858, Livingstone was transformed from a lone, wandering apostle of the London Missionary Society into a national hero, icon of Victorian manhood, HM Consul, and leader of a government expedition which included, at times, some thirty subordinates and expended nearly £30,000. This latest endeavour provided the famous explorer with expansive funding and new opportunities, but also increased his responsibility to the public and the scrutiny of government oversight.

This chapter examines the Expedition's fifteen-month 'formation' period and charts the interests that influenced its final form. As the idea for the Expedition developed, many sectors of British society saw possibilities within it to forward their own causes; these ranged

from anti-slavery to geomagnetism. In general, the humanitarian and scientific interest groups saw in Livingstone aspects of themselves. For the abolitionists he was a great spokesman. For the scientists he was a careful measurer and collector. For the owners of cotton mills he was the potential developer of new resources and markets. As Felix Driver found in his study of the 'cultures of exploration and empire' during this period, Livingstone's enduring mythic status was in part due to his simultaneous appeal to a wide range of Victorian and later interests. The form the Zambesi Expedition took was constructed through the interplay of these various interests.

As a subject for biographers and historians, the formation of the Zambesi Expedition has been widely studied from the standpoint of Livingstone's career. Tim Jeal, in his biography of Livingstone, isolates the period in a separate section simply titled, 'Fame'. Andrew Ross more recently titled his chapter on this period 'Years of Triumph'. George Martelli considered how 'The Expedition Prepares'. What most biographers seek is an explanation of how Livingstone came to head the Zambesi Expedition. Given the fact that the lonely explorer had no experience of commanding British expeditions, this is an interesting question. In fact there are two historical questions to answer here: why was there a Zambesi Expedition and why was Livingstone put in charge? The answers are tightly linked.

Biographers and historians widely agree that we can trace the origin of the Expedition to the relationship between Sir Roderick Murchison and Livingstone. Their friendship began through correspondence while Livingstone was still in the field. Murchison, as Director-General of the Geological Survey, received Livingstone's information on the landforms and mineral resources of central Africa eagerly, incorporating it into his developing theories of Africa's landforms and hydrography.[2] In October 1856, after Livingstone wrote to him from the field stating that he was planning to leave the London Missionary Society, Murchison immediately wrote to the Foreign Secretary, Lord Clarendon (George Villiers), suggesting a future government expedition to the Zambezi Valley with Livingstone at its head in an official consular position.[3] Sixteen months later, this is what occurred, a result which attests to Murchison's high level of influence in the Foreign Office and Downing Street and his influence

upon the Expedition's planning. Nevertheless, Murchison could not just command the Treasury to fund an expedition, so we need to look more carefully at how the Zambesi Expedition was formed.

To answer questions concerning why Livingstone was accepted to head a government expedition it is enough to recall that in 1856–7 Livingstone was the acknowledged expert on southern tropical Africa and its most famous explorer. Burton and Speke had not yet dazzled the public with their report of Lakes Tanganyika and Victoria. Livingstone was drawing massive crowds wherever he went. John Henry Tremenheere reflected on the formation of the Expedition in the *Quarterly Review* in 1866 and wrote, 'The Government readily responded to the public feeling, and appointing [Livingstone] Consul for South-eastern Africa gave to his second expedition the prestige of a national enterprise.'[4] It seems that once the idea was put before the public it was a *fait accompli* and the Government had no option other than to form some sort of expedition to be led by the celebrity.

Though Livingstone's leadership of an expedition to the region was a growing certainty through 1857, the nature and character of the Expedition was not finalised until early in 1858. Many different interest groups contributed to its formation. It is these contributions that will be discussed here with the following two premises. First, in order to ensure support, the idea of an expedition was pitched to the widest possible array of public and private concerns. This, I suggest, applies especially to the earlier part of 1857 when government support was not yet certain. Second, once government sponsorship could be assumed, the scientific community sought to use the Expedition for its own purposes: to gain data and specimens. Representatives of various fields of research wanted someone on the Expedition trained to collect their specific desiderata. In what follows I will highlight how the practice of science in the late 1850s included maximising the opportunities offered by expeditions and will discuss this policy as it unfolds in the formation of the Zambesi Expedition. To this end, along with the more popular humanitarian interests connected to the Expedition, various epistemic interests and subject positions will be examined.

This chapter examines three facets of the scientific community's role in relation to the Zambesi Expedition: eager participant, expert

advisor and justifier of expense. I begin by examining an underlying ideology for the Expedition: the notion of the 'civilising mission'. Second, I consider the methods used to assess and train the appointees. Finally, I consider the letters of instruction written for the Expedition. In particular I am interested in who wrote them and what they can reveal about how the interests of different sciences were to be realised in 'the field'.

'THE THIN EDGE OF THE WEDGE': EXPLORATION, SCIENCE AND THE CIVILISING MISSION IDEOLOGY

Standing before the crowd in the Freemason's Tavern that gathered to bid him Godspeed, Livingstone provided a quick summary of his intentions: to put an end to slavery by introducing alternative, legitimate commerce to south-central Africa. He described his personal role in this plan as simply to initiate the process by 'opening up' uncharted regions to international commerce. Africa was believed to be benighted, backward and therefore isolated from the international community, the continent needed to be prised open and connected to the wider world—only the work of a pioneering explorer like himself could accomplish the necessary first steps. Livingstone told the meeting, 'What I want to do is to get in the thin edge of the wedge, and then leave it to be driven home by English energy and English spirit'.[5]

This was the summary of a vocation that Livingstone developed during his earlier travels. Central Africa, hidden behind an impenetrable coastline, must be 'split open' by the force of British civilisation. Livingstone's message for his countrymen indicated that his proposed starting point, the Zambezi River, was a crack in the malarious armour of the continent. Through this weak point, Europeans could steam quickly through the foetid delta to the salubrious highland locations he had identified. But what was this wedge? What was meant by this metaphor that was so readily accepted with 'loud cheers' from the audience? What images went through their minds when they visualised the African continent being violently split open by Livingstone's wedge? Only by analysing this metaphor can we understand the

rationale for the Zambesi Expedition and the mixed goals written into its expeditionary brief.

First we should consider the idea that all explorers of Africa were proto-imperialists. The first forays by Britons into the interior of Africa are understood by many to be the first steps towards British imperialism on that continent. This popular interpretation has received serious challenges. Robinson and Gallagher demonstrate forcefully that until the 1880s the 'official mind' of the British Government was strongly against formal annexation of territories in the interior of Africa.[6] When the partition of Africa did occur in the mid-1880s, they argue, the motivation had more to do with strategic relationships between European powers than any imperial fantasies. Acknowledging this Eurocentrism led to their conclusion that the explorers and missionaries of the mid-nineteenth century had no relevance to explanations of the imperial growth of the later 1880s. As we will see in more detail later, the instructions given to Livingstone by the Government do not call for any formal assumption of responsibility for any discovered territories. Rather, the goal is to develop the commercial links to allow Africans to build up their own sovereign states and join the world economy.

Similarly, Bridges has argued that any direct links between the British African Empire and the earlier exploration of East Africa are poorly understood, if they exist at all.[7] Nevertheless, he does argue that the explorers did contribute widely to popular opinions of the role of Britain in Africa and he calls this the 'unofficial mind'.[8] He argues that the large sales of explorers' narratives and the fact that they remained continually in print beyond the Victorian era suggests that they had significant influences upon the reading public's opinions. But public opinion and political necessity do not necessarily coincide and being enthralled by stories of faraway places may not lead to a desire for control of those same places.

If we cannot assume that explorers such as the members of the Zambesi Expedition were an advance guard of colonial administrators and white farmers we can at least acknowledge that the rhetoric deployed in support of the Expedition promotes a globalising agenda. Rather than signalling for us one purpose or policy, the 'wedge' represents in its widest interpretation the one vital assumption

underlying the entire complicated relationship the mid-Victorians had with the interior of Africa: those who thought about tropical Africa believed that the continent was backward and therefore required improvement. This belief was widespread and cut across ideological standpoints. The corollary to this was another belief of the Victorians, succinctly stated by Robinson and Gallagher, '[The Victorians] were sure that their ability to improve the human condition everywhere was as tremendous as their capacity to produce wealth.'[9] Thus, whether you were a racist polygenist who thought Africans were of a different species of *Homo* than Europeans, or a humanitarian monogenist who felt that all men were of one species, you believed the same thing: the historical cul-de-sac that had left Africa behind Britain at a level of development truncated somewhere in the early Iron Age was candidly escapable. In reference to Zambesia particularly, Livingstone commented 'it is certainly the iron age here'; but it could be improved, by Britons. [10] All that was required to bring about a therapeutic change was the application of Britain's new-found industrial powers and social liberalism to Africa's people and environment. The great differences between individuals promoting this plan lay in whether or not they thought Africans would be capable of adapting to such a change, or would simply 'wither away'. Such differing opinions did not form simple dichotomies. It was perfectly consistent to be fervently against the slave trade while simultaneously holding the belief that Africans were biologically inferior to Europeans.[11]

Livingstone represented a group of monogenist thinkers who believed that Africans were inherently capable of contributing to the industrial economy; and this ability would serve as their salvation.[12] They would also provide much-needed raw materials to Britain. Livingstone was optimistic and even after the Expedition ended wrote, 'It seemed likely that [the inhabitants'] strong propensity to trade might be easily turned to the advantage of our country as well as theirs.' He also argued that it had been centuries of barbarism that had degraded African civilisation, similar to the Irish, and that this was the only difference between them and the most civilised peoples. [13]

His critics opposed such ideas arguing that Africans were simply not naturally capable of joining the global industrial economy: 'People [Africans] in such a state of society are no more capable of furnishing,

by their own unaided efforts, the great staples of tropical and warm regions, than of manufacturing time-keepers, telescopes and steam engines'.[14] Other critics, such as John Crawfurd, member of and soon to be president of the Ethnological Society agreed strongly:

> The Hindoos were a highly civilised people in comparison with Dr. Livingstone's negroes; but, if we were to depend upon the people of Hindostan, nine-tenths of the greatest manufacture of this country would perish at once; and if we were to depend on African cotton, we should speedily be in a worse condition than we were two hundred years ago.[15]

Aside from such rampant pessimism tinged with racism, past experience had taught liberally-minded Victorians that only colonies of British settlers developed into valuable trading partners. Hobsbawm neatly summarises the commercial situation at mid-century in *The Age of Capital*:

> [Africa] had no very obvious economic assets for the West between the abolition of the Atlantic slave-trade and the discovery, on the one hand of precious stones and metals (in the south), on the other of the economic value of certain primary products which could only be grown or collected in tropical climates, and were still far from synthetic production. Neither was yet of great significance or even promise until the 1870s.[16]

Nevertheless, so little was known about the interior of the continent that it was fair to argue that wealth might be found there, if enough work was done to find it.[17] Livingstone and his supporters exploited this lack of knowledge to forward their own plans. Ignorance begets optimism.

In addition to the harsh reality that Africa did not offer valuable opportunities for trade expansion, there was a waning interest in anti-slavery movements at mid-century.[18] In 1857, the aftermaths of the Crimean War and the Indian Uprising were far more important issues to those Victorians who were interested in world affairs. Furthermore, public patience for the earlier, grandiose claims of the potential that lay up African rivers (with limited actual results) of Thomas Fowell Buxton and the other humanitarian leaders began to wear thin. This process of disenchantment accelerated after the tragedies of the 1841

Niger Expedition which resulted in many fatalities. Charles Dickens's invention in *Bleak House* (1852–3) of Mrs. Jellyby and her 'telescopic philanthropy' directed at Boorioboolliga is the classic negative portrayal of such civilising missions. We can thus conclude that in 1857, when Livingstone was speaking about Africa and his plans for it, the civilising mission ideology was nothing new and was not everywhere accepted, even if it still made for powerful rhetoric aimed widely to gather support. If Africa was not yet valuable, he would make the first steps to change the situation:

> As far as I am myself concerned, the opening of the new central country [of southern Africa] is a matter for congratulations only in so far as it opens up a prospect for the elevation of the inhabitants. As I have elsewhere remarked, I view the end of the geographical feat as the beginning of the missionary enterprise. I take the latter term in its most extended signification, and include every effort made for the amelioration of our race; the promotion of all those means by which God in His providence is working, and bringing all His dealings with man to a glorious consummation. Each man in his sphere, either knowingly or unwittingly, is performing the will of our Father in Heaven. Men of science, searching after hidden truths, which when discovered will, like the electric telegraph, bind men more closely together—soldiers battling for the right against tyranny—sailors rescuing the victims of oppression from the grasp of the heartless men-stealers—merchants teaching the nations lessons of mutual dependence—and many others, as well as missionaries, all work in the same direction, and all efforts are overruled for one glorious end.[19]

This general schema of Livingstone's plans to spread the light of Christianity, commerce and civilisation to central Africa, was at least twenty years old, harking back to the 1830s.[20] Yet, it is an incredibly powerful evocation of the assumptions of British power in the 1850s. New communication technologies, the rule of law, universal human rights and free-market capitalism will improve the lives of everyone on Earth. What is even more surprising is how easily this call to arms can be translated into the international development discourses of the twenty-first century. Livingstone's telegraphy is today's mobile phone or internet cafe. Mutual dependence is the globalised marketplace. We

have yet to extend and enforce a universal system of human rights to all the world's citizens, but doing so is still argued to be one of the most important global projects.

Back in 1857, if some held doubts for the success of the civilising mission, it would have been hard to tell from the large crowds and public support Livingstone commanded that year. Nevertheless, such short-lived periods of interest do not necessarily indicate that the greater portion of the British public was keenly interested in civilising missions. The research of Robinson and Gallagher into the 'Spirit of Victorian Expansion' indicates that the wider public sphere at mid-century was looking away, not toward Africa; they find that by the 1870s, 'All the powerful processes of social expansion, except that of philanthropy, were passing [Africa] by'.[21] The excitement surrounding the departure of the Zambesi Expedition brought south-eastern Africa temporarily into the limelight in late 1857 and early 1858, but in general the continent only held interest for a minority of individuals—mainly those able to support charitable works—who expressed a 'vague benevolence' which at any rate was almost extinct by the 1880s.[22]

Among all these opposing opinions about the prospects for 'civilising Africa' there was a shared belief that the fate of most tropical African societies was one of either change or extinction.[23] As Brantlinger has shown, European attitudes towards Africans changed dramatically during the nineteenth century. He argues that the early Romantics, 'were able to envisage Africans living without European interference', but by the late 1850s, representations had shifted to 'portray Africans as weak, pitiable, inferior mortals who need to be shown the light'.[24] The consequences for Africans who did not adapt were dire. It appeared to be inevitable that many non-European races—whether you believed they were all the same species or not—would fall extinct before the advance of European civilisation. Hoyt has referred to this mood as the 'sepulchral air [that] lingers about the corpus of Victorian Anthropology', though at the time of the Zambesi Expedition Livingstone's rhetoric retained some of the optimism of the early part of the century.[25] He mimicked the language of his ideological mentor, Buxton, and promoted the potential capabilities of African societies that could be tapped after paternalistic (British) tutelage pushed them

in the right direction.[26] The precarious position that Africans held, as the British philanthropists saw it in the late 1850s, demanded such intervention. Brantlinger sums up the position thus: 'The melodrama of Africa called for intervention by a higher moral authority, and the Victorians increasingly saw themselves—again, with Livingstone in the lead—as the highest moral power among nations'.[27] Nevertheless, however much this moral position may have contributed, in the long run, to the expansion of the British Empire in Africa, in the 1850s and 1860s the political or public will pushing in that direction was not at all powerful.

So, did many people really believe along with Livingstone that in just a few years a region of Africa that lay hundreds of uncharted miles from the coast would supplant the slavery-based cotton production of the southern United States? Did they see the Expedition as the first step towards this goal? Certainly some did, though I argue here that they were far from a majority. Margaret Oliphant expressed great support for civilising missions in her laudatory discussion of Livingstone's career to that point in the *Quarterly Review* of April 1858.[28] The great send-off parties also supported the wider goals of the mission. Lastly, the official government instructions for the Expedition provided to Livingstone indicated his exact plan for social change—but then he wrote them himself. On the other hand, there are indications of doubt in the official mind. Enigmatically, in the draft plans for the Expedition (signed by Lord Clarendon) sent from the Foreign Office to the Treasury and copied to the Admiralty a question mark appears in the margin next to this closing phrase:

> It may be hoped that by encouraging the natives to apply themselves to the development of the resources of their Country, a considerable advance may be made towards the extinction of the Slave Trade, as the natives would not be long in discovering that the former is a more certain source of profit than the latter.[29]

Somewhere in the bureaucracy, between the Foreign Office and the Admiralty—it is impossible to tell where—doubts were clearly expressed. Nevertheless this queried sentence proceeded to appear verbatim in the final version of the official instructions.

Brantlinger finds within the rhetoric of modern development theory echoes of the Victorian concern for the extinction of primitive races,

though he cautions that the hope today is that despite the inevitability of extinction only 'backward' cultures will die out, not actual people.[30] However, while he deconstructs the rhetoric of international development agencies, the discourse is not as modern as Brantlinger suggests. In the expressed motivation for the Zambesi Expedition the rhetoric of Buxton and other early abolitionists, as deployed by Livingstone, presents a very similar argument for the preservation of local populations through social change. The instructions given to the members of the Zambesi Expedition outlined a project to force the auto-extinction of backward cultures through social change, not human death.[31] The 'wedge' that would begin this upheaval was the Zambesi Expedition itself. Once the Makololo and other target societies were exposed to international commerce and the moral influence of the British people they would, slowly and inevitably, adopt new economic activities, new social mores and eventually a new religion—'backward' societal structures and beliefs along with the slave trade, would wither away naturally. This framework for social progress owed less, in 1857, to an overt imperialism than to the belief that, while all men were created equal, some cultures were better than others. Where great debates existed concerning the validity of the first part of this statement, a general acquiescence existed concerning the latter.

We are left to conclude this discussion of the civilising mission ideology with a paradox. The Zambesi Expedition was sent out by the Government, in no small part due to the positive support of the Foreign Secretary, Lord Clarendon and also the Prime Minister, Lord Palmerston. These leaders were lobbied by Murchison to provide Livingstone with the means to continue his work, which was presented as a humanitarian effort to eradicate the slave trade and ameliorate the living conditions of Africans. But as shown above, while the civilising mission ideology worked as powerful rhetoric for philanthropically-minded mid-Victorians, historians have found that towards the end of the 1850s, commercial and political support for such plans had lost much of its fervor. Since the tide of the 'official mind' was moving against the implementation of the civilising mission ideology in Africa, such humanitarian thinking becomes a weaker explanation for the Zambesi Expedition. Furthermore, Britain had no interest in formally controlling any new territory in Africa and therefore this is not an

explanation for why the Expedition was supported by the Government. The solution to our problem requires looking beyond the civilising mission ideology or imperialism for the motivations to explore south-eastern Africa. Murchison's great support for Livingstone and the Zambesi Expedition demands our consideration and the investigation of a less altruistic motivation—scientific discovery. The following two sections examine how Murchison and the wider scientific community influenced the formation of Zambesi Expedition and propose science as a key justification for government support. First, is a detailed look at the scientific staff who were appointed to assist Livingstone.

THE SELECTION AND TRAINING OF THE EXPEDITION'S SCIENTIFIC STAFF

In order to discuss the process of selecting and training the men who would accompany Livingstone in the field, it is first necessary to examine the 'culture of observation' dominant at the time and the attempts made to provide fieldworkers with a sound basis for their practice. The rhetoric of proper scientific method is indicative of more broadly held ideologies in Britain concerning proper practice, credibility and the position of individuals within the hierarchy of science.[32] Thus, an examination of this rhetoric and the means by which the knowledge of proper practice was transferred 'down' the hierarchy will inform this discussion of the position of the Expedition in relation to the scientific community. Following this discussion, the process by which the appointees were selected will be used to demonstrate both the qualities sought in those individuals and the role of the scientific community in assessing them.

Since its founding in 1830, there was a growing feeling in the Royal Geographical Society that untrained travellers and unsubstantiated accounts of foreign regions were causing more contention than solving problems. Bad observations led to poor conclusions. Leaders of the RGS therefore became desirous of sending skilled observers to unknown parts—true geographical explorers rather than simple travellers. Only accurate observations could be the basis for empirical knowledge. This mood was expressed, for example, in the presidential

addresses made at the RGS meetings. Murchison noted in 1844 that when the Society sent explorers on expeditions they were 'scientific travellers competent to explore those tracts'.[33] In 1846, Lord Colchester noted that the continuing uncertainly about the source of the Nile was due to a lack of consistent observations. He declared, 'There is therefore but one certain way of ascertaining the course and direction of a river, and that is by tracing it down its whole length from source to recipient'.[34]

It is clear from such statements that the preferred way to solve geographical questions was the direct, methodological observation of geographical phenomena by trained Europeans. But the problem was that no one had answered the questions of exactly who was suitably trained, and which skills they should be experts of. Moreover, the RGS did not spend much time at all explaining how to observe, collect and preserve natural history specimens—an important part of many explorers' activities. Despite the RGS's expressed wishes to improve potential explorers' skills, they did not initially set out to publish any sort of comprehensive guide for explorers. At first they only published articles on specific instruments useful for navigation and surveying in the field. Nevertheless, as time passed and calls for guidance grew, the RGS's Expeditionary Committee decided to append a section titled 'Hints to Travellers' at the end of the 1854 volume of the *Journal*.[35] This publication has been examined in depth by Driver. He portrays the text:

> …less as a confident assertion of a geographical way of seeing than as an unsettled attempt to resolve some fundamental dilemmas: how was field knowledge to be trusted? What were the limits of geographical knowledge? And, above all, what attitude should the scientific community have towards the untrained traveller?[36]

The Subcommittee put together the 'Hints' in a haphazard way, including opening remarks; three letters from Rear Admiral Smyth, Rear Admiral Beechey, and Francis Galton on celestial observations and outfitting an expedition; Sykes on boiling-point thermometers; and finally two lists titled, 'Hints for Collecting Geographical Information' and 'Descriptive Geography'.[37] In the opening remarks, written by Captain Fitzroy and Henry Raper, the policy of the RGS towards a

guidebook is succinctly given—the RGS will not publish a formal volume. But they add that the essays presented have been provided by 'scientific men' and are to be considered valuable suggestions.[38] The main reason offered for why a complete book would not be useful was that it would be of little use to the experienced traveller and not extensive enough for the inexperienced. This, in hindsight, seems fair. If a traveller writing to the Society had no knowledge of celestial navigation, and was asking about how to report on the latitude and longitude of a new location, the Society would be hard pressed to answer in brief through correspondence.

Publication of 'Hints to Travellers' did not preclude the RGS's preference for explorers speaking directly with the Expeditionary Committee for personal guidance—a policy it had long followed. Baron von Müller, who travelled in the Nile Valley of Sudan from 1847–49, noted that he had received 'scientific training' with the help of the RGS before his journey.[39] This training was mostly concerned with learning to determine his position by celestial navigation and taking meteorological measurements. After 'Hints' was published, Paul du Chaillu consulted the Society before his trip to West Africa in 1863. Murchison described the RGS's contribution:

> M. Paul du Chaillu has announced his immediate intention of again starting for the Gaboon, [*sic*] now adequately prepared to map his future journeys; and I confidently hope that by the study he has recently gone through, he will be enabled to make accurate astronomical observations, and add materially to the value of his published work which has so much interested the public of England, France, and America.[40]

Despite such instances of assistance and education for explorers, the lack of any sort of formal guide or training from the Society does seem surprising. Driver proposes that the RGS did not publish a guide because this would let out the secrets of the trade.[41] If anyone, he asks, with a bit of courage could pick up a guide and then head out to the unknown world, what was special about the RGS's explorers? In the first half of the nineteenth century, when scientific disciplines were being defined, Driver offers that to publish a 'guidebook' to an entire scientific speciality would have been a bit odd, at least for the RGS.

As the letters of instruction written for the explorers joining the Zambesi Expedition indicate, the RGS was not the only place where prospective explorers might go for guidance. Pre-empting the RGS by five years, the Admiralty produced a far more comprehensive guide to exploration, 'for the Use of Officers in Her Majesty's Navy; and travellers in general'.[42] Published first in 1849, the second edition of the *Manual of Scientific Enquiry* appeared in 1851 and the third in 1859. John Herschel was the editor. The Admiralty manuals are exceptionally comprehensive with chapters ranging from tidal observations to ethnography. Yet, despite being more than 500 pages long, the tomes are surprisingly compact, suited for cramped ships' libraries or the baggage of a land expedition. By coincidence, in the second and third editions the chapters on Zoology and Terrestrial Magnetism are by Richard Owen and Edward Sabine respectively. As we will see later, these men also wrote letters of instruction to members of the Zambesi Expedition on the same topics. Furthermore, the relevant chapters of the Admiralty *Manual* were appended to the Expedition's instructions and referred to specifically in them. In short, the *Manual* provided the most credible guidance on field techniques available at the time and its contributors were also called upon to provide specific guidance for prospective explorers.[43]

There were further books available for explorers such as Jackson's *What to Observe* (1841); Galton's famous *Art of Travel* (1855); and Adams's *et al*., *Manual of Natural History* (1854). The imperative in all these texts is similar: the traveller must be trained in order to return with observations of value. Implied in this value were epistemic interests along with a reification of the power of the scientific gaze to collect information and transfer it accurately. Jackson wrote that, properly trained, '[The traveller] can not only do much to enlarge the sphere of his own ideas, but acquire the means of communicating to others a great mass of valuable and interesting information.'[44] Skill in observation and the skill in communicating those observations successfully are tightly linked. Jackson reminded prospective travellers that they would be the source of information for many others and to this end provided a list of observational headings for explorers to follow when abroad, ranging from Meteorology, Agricultural Industry and Commerce to Literature, Engraving and Foreign Relations.[45]

The *Manual of Natural History* is more specific, giving its reader a survey of biological classification, the tools to identify interesting species of flora and fauna and, importantly, how to preserve them. Above all, Botany was shown to have great utility:

> Of late years, Natural History, no longer a chaotic mass of wild theories or vague assertions, but a truly inductive science, has proved of vast service to commercial pursuits, and now possesses a truly national interest.[46]

'Economic Botanist', the post given to John Kirk on the Expedition, reflects a wide interest in this potential within government circles.

The rhetoric of these instructive texts leads us to note, then, that proper observation is not only good practice, it is a national, nearly cultural, duty. This necessity to travel with skill, purpose and reason as a preoccupation was satirized by Margaret Oliphant in *Blackwood's Edinburgh Magazine*:

> The merest tourist, who goes where *Murray* [a popular guidebook series] bids him, is unhappy if he has not a motive to license his wandering—a 'pursuit' to raise him above the vulgar level of the travelling English. … But whatever he is, he is obliged to be something, from a mere necessity of self-respect.[47]

Her piece was written in part to celebrate the departure of the Zambesi Expedition and promote the 'missionary explorer' (i.e., Livingstone) as the best sort of traveller, deserving even more respect than the sportsman or scientific traveller because the missionary was the most 'disinterested'. The overall point is clear: frivolity is frowned upon while those who travel with a noble purpose are to be admired—one must 'be something'. Behind its necessity this command carries a hidden challenge. To have a purpose implied one possessed the skills to carry it out, and as seen above there was no straightforward method to gain those skills.

In the light of this wide discourse on method and the growing influence of empiricism, selecting the members of the Zambesi Expedition involved ensuring that the appointees were capable. As seen in the attitudes surrounding the 'Hints to Travellers', books were important sources of information for prospective explorers but books alone would not prepare one for fieldwork. For such an important

and ambitious expedition as this one, individuals with a suitable background of experience were required. Prospective members also had to be of 'the right sort'. They also had to be physically capable. In order to examine this process of evaluation as it happened, and establish the criteria, we must look directly at who was making the appointments and how the decisions were made.

Officially, the responsibility for selecting the scientific members of the Expedition rested with the Scientific Branch of the Admiralty, specifically the Chief Hydrographer, Captain John Washington. He was not totally independent in his choices, as his decisions were guided by and had to satisfy the opinions of three powerful scientific institutions: the Royal Society, the British Association for the Advancement of Science and the Royal Geographical Society. William Hooker, the Director of Kew Gardens, would be consulted concerning the role and choice of the botanist.[48] Early on Livingstone knew that the selection of his subordinates was partly out of his hands, writing to Joseph Hooker in October 1857, 'I don't suppose I shall have anything to do in the selection [of appointees] but I may have a power of veto'.[49] A main concern was that Livingstone's position as leader could not be threatened through the appointment of individuals with implied superiority to him, especially those of high military rank.[50]

Unofficially, the appointees to the scientific positions were selected by William Hooker and Murchison. They each used their personal networks of leading scientists to find candidates to bring forward and they corresponded informally concerning prospective appointees before making official moves.[51] William Hooker kept an active correspondence in particular with John Hutton Balfour about candidates for positions opening in Botany and Horticulture.[52] In short, if these two great leaders of science offered the candidates and Livingstone accepted—he was generally deferential and did not oppose any candidates directly—then the decision was accepted by Admiralty and the Foreign Office. By examining the selection process of the scientific members, we can trace the influence of Hooker and Murchison to the staffing of the Expedition in detail.

The selection of Richard Thornton appears straightforward: Murchison recommended him personally. Nevertheless, Thornton's short career prior to his appointment indicates the changing face of geology and the increasing importance of the Government School of

Mines (opened in 1851) in providing geologists to perform overseas research.[53] Thornton was a recent graduate of the School (1857) who won two prizes for academic excellence. These were the Government Prize for the best examination papers and the De la Beche Medal for excellence in geological studies. After graduation he toured coal mines with the Inspector of Crown Minerals, William Smyth, and afterwards spent the autumn of 1857 assisting in the chemistry laboratory of the School. He was ready to accept a position in Australia when Murchison, head of the School at this time, asked him to join the Zambesi Expedition as a mining geologist. His skills and reputation were impeccable, and he had the best referee possible for a geological post. At a meeting in Murchison's office at the school, Thornton was called in to meet Livingstone, whose only interest was in Thornton's health—aside from this query Murchison's candidate was automatically accepted.

Thomas Baines presents an interesting appointee as he was eventually relieved of duty by Livingstone and sent to the Cape in December 1859. Biographers and historians over the years have debated how Baines came to be fired and whether or not Livingstone was justified. What can be said without controversy is that Baines's exploration experience was second only to Livingstone's; this is why the committee of the RGS recommended him for the post. Baines's recent work as Artist and Storekeeper to the North Australia Expedition was lauded, and in Africa he had already travelled far north of the Cape and published an account of the Limpopo River.[54] On the merit of his geographical work he was elected a Fellow of the RGS on 23 November 1857. Both William Hooker and Murchison recommended him directly to John Washington at the Admiralty. William Hooker was so supportive he recommended that Baines would be more than capable of commanding the Expedition if Livingstone was required to separate from the group.[55] In short, Baines was an obvious choice, an experienced explorer and proven fieldworker. The circumstances of Baines's appointment further demonstrates the pivotal role that the RGS played in making explorers' careers happen.

John Kirk was less known to the unofficial group making appointments to the Expedition. William Hooker had decided to offer the position of Economic Botanist to a Dr Nichol after

Livingstone went to Kew Gardens on 14 December 1857 to ask for recommendations.[56] Nichol was also well known to John Hutton Balfour, Professor of Botany and Dean of the Medical Faculty at the University of Edinburgh. Balfour (1808–1884) was also Regius Keeper of the Royal Botanical Garden in Edinburgh and Queen's Botanist to Scotland along with being one of the founders of the Botanical Society of Edinburgh in 1836. He graduated in Medicine from Edinburgh in 1831 and was Dean of its Medical Faculty from 1849–1879. Nichol was interested but wanted to negotiate his appointment to the Expedition because he had chosen to accept an offer of employment from Sir John Liddell, then Director-General of the Royal Navy's Medical Department. Nichol would still be able to serve with Livingstone, but only with Liddell's permission. Upon learning about this requirement Livingstone was not willing to have '[his] expedition going a begging to Sir John Liddell'. Seeing the potential difficulties, Balfour offered another candidate, Dr John Kirk.[57] Kirk appears to have been very lucky because according to William Thistleton-Dyer, a later director of Kew Gardens, Kirk was not immediately considered:

> Kew wrote to [John Hutton]Balfour for a medical graduate competent to do botanical work. Balfour was at a loss for a man but met Kirk in Princes Street [Edinburgh] and offered him the job. Kirk replied that he would start the following day.[58]

Even though bumping into his old professor was a stroke of luck, he was not an unqualified candidate. Kirk's path to the Expedition and his later diplomatic career demonstrates two facts concerning the ongoing professionalisation of careers in science in the mid-nineteenth century. Firstly, we learn how botanists gained credentials without an institution comparable to the School of Mines. Born as the son of a minister in Forfarshire, Kirk became interested in natural history, especially botany, while studying medicine at the University of Edinburgh.[59] There he had been a student of Balfour and was elected a member of the Botanical Society of Edinburgh in January 1854, during his final year of University.[60] After finishing well, Kirk did his first year residency at Edinburgh's Royal Infirmary (1854–55). His fellow residents included Joseph Lister, John Beddoe (the ethnologist), and David Christison (the archaeologist). Beddoe, Christison and Kirk

subsequently volunteered together to serve as part of the Civil Hospital Staff during the Crimean War.

Due to administrative troubles while in Asia Minor, Kirk unexpectedly found himself with free time to botanise. He also travelled to Syria and Egypt and collected there. Upon returning to Britain in mid-1857 he consulted Sir William Hooker at Kew Gardens about his specimens.[61] Later that year, Kirk sent specimens from jute manufacturers in Dundee (near his family home in Arbroath) to the Economic Botany Museum at Kew. He also donated his specimens from the Middle East to the University of Edinburgh. Kirk was aware of the value of specimens and their exchange was an important feature of the botanical community's social networks. He wanted to be involved in botany and this strategy clearly worked because by the end of the year, Kirk had his post as economic botanist.

Kirk was considered a good student and had ingratiated himself with leading figures in botany. But this alone was not enough to secure the appointment. Kirk's referees made an important point that he had also travelled. Four weeks before Kirk was first named to accompany Livingstone, Sir William Hooker recommended Kirk as a suitable candidate for the Chair in Natural History at the University of Kingston, Ontario writing, 'He has, since he completed his education, improved himself by travel, especially in the East'.[62] Livingstone, in first mentioning Kirk, writes of the young doctor's successful travels in Egypt and Palestine as part of his credentials.[63] Another reason for his appointment lay, then, in his having 'proved' himself by collecting in a foreign field. His trip to Asia Minor fits in his life as a rite of passage, providing foreign experience necessary for his further career.[64] Thus certified, Kirk was predetermined to be trustworthy and a credible reporter of natural phenomena. Others could have done the task equally well, and his appointment is also partly to do with luck and having powerful patrons, but without the proper experience and skills he might never have been given the chance.

A further case study found in the selection process is how Charles Livingstone came to join his brother and be appointed.[65] At the outset of the planning period in 1857, Charles seems uniquely *unqualified* for service. He had left Scotland and trained as a minister at Oberlin College, Ohio. He then went on to work as a pastor in Massachusetts. Charles

Livingstone had neither scientific qualifications nor exploration experience; he had never been outside Great Britain and the United States. In late April 1857 he took leave from his ministry due to poor health and returned to Great Britain. Correspondence between the brothers during May 1857 indicates that David wanted Charles to join him on his next expedition to Africa. Charles was agreeable and wrote that instead of again suffering the summer heat of New England, he would go with him to Africa. Charles told his wife that 'The climate of the region we go to in Africa will not be near so trying to the health as that of the States with the great extreme of heat and cold'. Charles believed that the 'Kololo uplands' (the Batoka Plateau) would offer a climate where his health would improve and this belief demonstrates the power and conviction of his brother's portrayal of the 'salubrious highlands' waiting for Europeans in central Africa.

Even though the brothers agreed, it would be difficult to get the government to appoint Charles to the Expedition. They needed to show how Charles would contribute to the project. To this end the brothers Livingstone considered ways in which Charles could acquire the appropriate skills. This was a conscious effort to legitimise his appointment and avoid accusations of nepotism. Because they were deliberate, the choices they made say much about what general skills an explorer required and the important questions of the time in reference to African exploration.

Given David Livingstone's promotion of the Zambezi valley as a cotton-producing region, Charles was sent to Manchester to learn about cotton production. He purchased agricultural guidebooks on the advice of cotton merchants. In the event the Government would not appoint him, Charles sought out other opportunities for trading cotton in Angola.[66] Charles also learned about photography from Lord Kinnaird and Professor Lyon Playfair in the autumn of 1857. Playfair had been at the Anderson's College in Glasgow with David in the mid-1830s. At the College they were also friends with James 'Paraffin' Young who donated camera equipment to Charles for the Expedition. These plans proved effective because when Charles appeared on the list of recommended members of the Expedition in early January 1858, his knowledge of cotton production and manufacture is cited as a reason. Charles's main responsibility was to be the head of the permanent

station the Expedition would establish on the Batoka Plateau. There, as an ordained pastor, he would develop the benefits that the existence of a small but industrious European settlement would have upon 'the public mind of the country'.[67] They imagined that through a loosely defined moral osmosis the surrounding communities would benefit by the mere exposure to British lifestyle; Charles's title was therefore 'moral agent'.

Once officially appointed to the expedition Charles Livingstone's training regime matched that received by the others. He joined Baines and Bedingfeld at the Kew Observatory to receive instruction in measuring geomagnetism and the maintenance of navigational instruments such as chronometers, his two particular responsibilities. The observatory was at this time managed by the British Association for the Advancement of Science (BAAS) and was the leading centre for British geophysical research. There, during January 1858, they learned how to record the direction, inclination, and intensity of the Earth's magnetic field utilizing a variety of instruments. Their instruction was overseen by General Edward Sabine, who had contributed a chapter on 'Terrestrial Magnetism' to the *Admiralty Manual of Scientific Enquiry*, was director of the Kew Observatory and advised the Admiralty on scientific matters.[68] Training of explorers at the Kew Observatory was common practice, as noted in Richard Owen's address to the BAAS annual meeting in Leeds, September 1858:

> To prepare, to adjust, to test, to verify, and rectify those instruments for the use of voyagers and travellers are labours that have grown out of the important functions of the 'Kew Observatory.' These labours have been cheerfully performed whenever and by whomsoever required; as, recently, at the request of the Admiralty and Royal Society in aid of the Commission for determining the Oregon Boundary, and in the Second Expedition of Livingstone to the Zambezi. Not only have philosophical instruments been prepared and constants determined, but the voyagers have received, at Kew, practical instruction in their use.[69]

The preparation they received was also noted by Gassiot in his 'Report of the Kew Committee of the BAAS for 1858–59' and indicates that the instruments were provided and instruction given at the request of the Council of the Royal Society.

Learning these technical skills was critically important to the process of forming the Expedition. As will be seen in the chapter on fieldwork, the establishment of credibility relies in part upon the demonstration of competence. If there was any doubt concerning the explorers' abilities, the whole project was threatened. This danger was apparent during the final weeks before departure, as indicated by an incident which called into doubt Charles Livingstone's ability to operate and maintain a chronometer. David denied charges that his brother had been lax in his duties to keep a chronometer properly wound and wrote to Washington at the Admiralty that: 'I was very much annoyed by the idea that my brother was careless in his performance of duty…if there is not a sacred regard to truth in those to whom our observations may come, the zeal of the expedition for magnetism will undoubtedly sink to zero, perhaps below it'.[70] This small incident serves to establish a large conclusion. The establishment of trust between fieldworkers and metropolitan analysts motivated those in the field to perform their task well. If that trust was perceived to be lost, then fieldwork suffers not only socially, but *empirically*. We can therefore draw little distinction between the production and reception of scientific knowledge; they constitute one space for the construction of knowledge when we are establishing social explanations for the content of this knowledge. The standards for credible scientific practice that are developed in the social milieu of the metropolis are those that are applied in the field.

Further instruction in surveying and navigation was obtained *en route* on board the *Pearl*, the availability of a sea horizon making instruction in the use of a sextant easier than on land where the use of an artificial horizon is required. The members of the Expedition exchanged skills as well. Livingstone ran regular lessons in 'Sechuana' (Setswana).[71] Baines gave Kirk instruction in botanical illustration.[72] Kirk issued medical advice to all members, especially as concerned personal hygiene and use of daily quinine prophylaxis. When the *Pearl* stopped at Cape Town on 21 April, Baines, Kirk, and Charles Livingstone received further instruction in geomagnetism from Thomas Maclear, Astronomer Royal at the Cape.[73] Kirk and Baines also familiarized themselves with African flora, visiting private and public gardens whenever possible as they had also done when they stopped at Freetown, Sierra Leone.

What Charles and the others' experiences tell us is that, by and large, the prior skills and earned reputation of appointees was relied upon to certify their appointments. Their achievements, established through letters of recommendation, provided the critical demonstrations of ability and character. Prior experience in the field helped, but was not necessary and could be quickly acquired. Manuals and guide books existed to assist the fieldworkers, and they were instructed specifically to use them, but always some prior knowledge was assumed. Where by the late 1850s specialised skills were required, but rarely found, as in the case of terrestrial magnetism, informal systems for instruction were in place that could be called upon if needed. As Barton has also found, there was, as yet, 'no identifiable path of education and training' for those seeking scientific jobs.[74] The men chosen for this task knew that trust had been placed in them and their skills. They also knew that without powerful recommendations they never would have been given their appointments. This is especially true for Charles Livingstone who, in the end, was appointed by his own brother. For those who received the benefits of patronage the relationship went far beyond a simple letter of reference, as Thornton's thank you to Murchison demonstrates:

> I was disappointed in not seeing you in London before leaving. I wished personally to thank you for all your great and continued kindness to me, in obtaining me the appointment, in helping me—often undeservedly—out of all the difficulties I got into and on every opportunity giving me advice, instruction, and encouragement, not only concerning my public duty, but private life. It shall always be my endeavour, by carefully obeying your instruction, by working diligently and reporting faithfully to justify the confidence you have placed in me, and to deserve your future countenance and help. You may be sure that I shall always have the greatest pleasure in communicating to you on every opportunity the results of my labours and I shall be always glad to receive any hints or instructions from you.[75]

We have seen here how the subordinate scientific members of the Expedition were appointed. They possessed the appropriate skills and experience, knew the right people and received extra training where necessary. What is left is an examination of their instructions—what

were they supposed to do exactly? The next section takes a closer look at how the Expedition's brief, or letter of instruction, was developed over the months leading up to departure.

LETTERS OF INSTRUCTION: SCIENTIFIC DESIDERATA AND THE GOALS OF THE EXPEDITION

On 18 April 1858, on board the *Pearl,* Livingstone read out the official instructions for the Expedition provided by the Foreign Office. Each member was then, over time, provided with a copy of the instructions specifically tailored to their particular responsibilities. Along with these general directives, a further four letters of instructions separately described the duties of the botanist, zoologist, geologist, and the recorders of geomagnetic measurements. The origin of these four letters is found in a request made in mid-December 1857 by the Foreign Office and sent to the Royal Society, the Royal Geographical Society and Kew Gardens:

> Her Majesty's Government are desirous that advantage should be taken of Dr. Livingstone's proposed expedition in Africa, in which they take a deep interest to extend and promote scientific researches in the countries which are to be the scene of Dr. Livingstone's labours.[76]

This letter formally expressed a request that had already been made. As early as 24 October 1857 an ad hoc, 'Zambesi Committee', referred to as a 'deputation from the British Association', met at the Royal Society's rooms in London to discuss the possibility of an expedition to the region and how science could contribute to the project. Sadly, only minimal information about this committee's meetings is available in the Archives of the Royal Society and there is no record of what was said by whom. The members of the committee were leaders from across the scientific community: Humphrey Lloyd (Physicist and Chair of the Committee); Henry Rawlinson (Antiquarian, Philologist, and Geographer); Macgregor Laird (Shipbuilder and member of the 1832–4 Niger Expedition); Thomas Robinson (Astronomer); Edward Sabine (Astronomer and Geophysicist); and Murchison. At the first meeting, Livingstone presented his ideas to the committee which

then sent its opinions on the project to Lord Clarendon at the Foreign Office. Soon after this meeting, Livingstone wrote to Joseph Hooker at Kew Gardens indicating that, 'There is some probability of an expedition being sent up the Zambesi'. Livingstone also indicated in this letter that he wanted Joseph Hooker to join the Expedition as the economic botanist. [77] Hooker opted to stay home ostensibly due to family concerns and his increased responsibilities at Kew. Joseph Hooker's career had already gained his travel credentials by collecting in northern India; he could now work on herbarium-based research and the growing economic botany collections. His refusal to join the Expedition bothered Livingstone for some years.

In December, the Foreign Office again wrote to the 'Zambesi Committee' for its advice concerning whom to appoint and what tasks they should be set.[78] Initially, there was wide disagreement over the scale of the operation. When first contacted at the Admiralty, John Washington suggested a large expedition of nearly 200 Europeans; this was quickly turned down. In early January, Livingstone made a formal proposal which included six European specialists and ten men of the Kru tribe, know as 'Kroomen', who were sailors from Sierra Leone to crew the *Ma Robert*.[79] The response from the Royal Society came a week later, written by William Sharpey, Secretary, and highlighted the importance of directing scientific observations towards the development of the region's 'economic resources'.[80] While preparing its response, the committee coordinated the preparation of instructions for the various scientific specialities to be represented on the Expedition: botany, zoology, geology and geomagnetism.[81] Geographical exploration occupied part of the main brief of the Expedition and was discussed in the main portion of instructions. The specialised letters, as they very clearly describe what was expected of individual members of the Expedition, are examined here in order to discuss the role that various branches of the scientific community and their leaders played in structuring the Expedition. It is important to note that the chronology of correspondence above demonstrates that long before the final plan of the Expedition had been decided, leading members of the scientific community were preparing instructions pertaining to their particular speciality. Science was integral to the project from the outset.

Kirk received his letters of instruction at the same time as the others, on board the *Pearl*. Joseph Hooker wrote the letter under the heading 'The Principal Duties Expected of the Botanist' on 13 January 1858, passing them to the Royal Society who then forwarded them to the Foreign Office with Sharpey's letter of the 18th. Hooker's instructions reflected both the particular aims of Economic Botany and his ideas concerning the inherent public utility of all scientific research. Kirk was directed to 'ascertain exactly the species and varieties of plants in cultivation among the natives and colonists for all purposes'. The particular interests were any plants which yield 'food, clothing, medicinal products, timber, ornamental wood, gums, resins, oils, dye stuffs, etc'—in fact, anything of potential commercial value. Kirk was ordered to assess the utility of the plants exploited locally and record local processing techniques. Where possible he should conduct simple experiments to accurately determine their true value and should ensure he has the requisite kit for these analytical tasks.

Aside from determining what new plant resources may exist in the region, Kirk was also charged with investigating the possibility of introducing plants that were already important resources elsewhere. Indigo, cotton, coffee, rice, spices, and sugars were offered as possibilities. Hooker reflects here an enduring Victorian interest in 'acclimatisation' and the possibilities for transplanting cash crops around the globe. Kew Gardens, now at the head of an extensive network of colonial botanic gardens, coordinated acclimatisation research worldwide. Functioning as part of this network, Kirk took to the Zambezi Basin a collection of seeds to test in the region's climate. They also brought a selection of plants with them in 'Ward's Cases' (sealed crates with glass inserts to allow the transport of live plants). One case was prepared at Kew Gardens, while another was assembled at the Botanic Gardens in Cape Town and picked up *en route*. In the field, experiments were made into growing various types of cotton near Tete including the 'Sea Isle' variety from the United States. Thus we have a physical symbol of Livingstone's proposed attempts to transfer American cotton production to the Zambezi Valley.

In the instructions Joseph Hooker clearly stated that the botanist was not only collecting for himself, but for the entire scientific community. While highlighting commercially interesting plant products, Hooker implied that a full investigation of all the plants

in the region should be made, not only those which were of obvious economic importance. He argued that a strictly utilitarian outlook would not produce widespread benefits. By way of an explanation for casting the widest possible net, he ended the instructions with a justification for pure botany as opposed to the merely 'economic'. Kirk's gaze should include the observation of all aspects of the climate, soil and the 'exuberant' vegetation. This comprehensive gaze is not only important for scientific, empirical purposes; rather, the implementation of the civilising mission project depends upon reporting comprehensively and accurately. Hooker makes it very clear that not only fieldworkers are involved in the Expedition *and* that the use of the data should be kept in mind at all times:

> It is hence most important, both in this and other inquiries of the same nature, that the Botanist should make a full collection of the native plants of every kind with notes of their localities, general abundance and distribution, for an accurate investigation of these will afford to himself the surest foundation on which to base his conclusions and will enable many who cannot visit the country to suggest plans for its amelioration….Every effort should therefore be made by the expedition towards the formation of a complete herbarium for reasons quite independent of its scientific value. [82]

These ideas were repeated a few years later, when Joseph Hooker was again called upon to write instructions; this time for Charles Meller, who joined the Expedition in February 1861. Meller was sent out to complement the scientific staff of the Expedition, which, with Livingstone's expulsion of Baines and Thornton, had been effectively reduced to only Kirk, who was not allowed enough time to collect systematically. Hooker instructed Meller to pay special attention to timbers and woods useful for ship-building, though his gaze might also turn towards all areas of botany as well as geology, meteorology and zoology. Concerning other interests, Hooker imagines that the field will present many opportunities:

> There are a multitude of other matters that must suggest themselves to every intelligent traveller, and which require no specification; such as the climate, seasons, winds, currents, races [of men?] and of the inhabitants' diseases, superstitions, etc., etc., all worthy of attention, but far too numerous for one individual to grapple with;

> Mr. Meller must select such as he finds he is best fitted to enquire into by nature, taste and opportunity.[83]

Joseph Hooker thought the botanist's role was central to the project and therefore worthy of respect and Hooker wanted the botanist to be given the time to collect properly. This is clearly stated in his letter for the botanist, which Hooker knew Livingstone would read first. In the copy of this letter still held at the Royal Society in London Hooker writes, 'It is much to be desired that the Botanist should be able to devote all his time to the necessary investigations, which will certainly prove arduous, and will demand much skill and knowledge'.[84] Interestingly, this sentence was absent from the copy of Hooker's instructions which Kirk received from Livingstone, although the rest of the letter is reproduced verbatim. This is intriguing because Kirk's chief complaint (and Meller's) was that he did not have enough time for his botanical work. Since the copy of Hooker's letter was made on board the *Pearl* as the Expedition steamed towards the Zambezi it is tempting to speculate that Livingstone, who had different priorities, purposely elided this obvious threat to his managerial authority and control over his subordinates' work patterns.

Richard Owen wrote the 'Instructions for the Zoologist of the Zambesi Expedition', which were also given to Kirk. This letter focuses on three specific interests: the tsetse fly, ivory and lepidosirae (lung-fishes).[85] The tsetse fly was of especial interest because it was a barrier to the use of draft animals for transport and food. So important was this issue that an image of the fly appears on the title page of Livingstone's first book, *Missionary Travels*. Due to interest in the fly generated by earlier reports, Owen instructed Kirk to perform a thorough investigation into the tsetse lifecycle and indicated that experimental testing of 'native remedies' for the sickness allegedly caused by the fly's bite should be undertaken if at all possible. At this time the concept of insect-caused illness was not widely accepted.

Ivory, for its commercial value alone, held 'great practical importance' and Kirk was instructed to learn all he could about the elephants of the region.[86] He was also asked to retrieve a full set of elephant's teeth and if possible a foetus, with placenta attached, 'preserved in a keg of spirit'. Kirk excitedly attempted both requests and recorded in his journal on 26 March 1859, 'This will make a glorious specimen for

anatomists and Sharpey and Owen may fight over it'.[87] He succeeded in collecting the molars, but failed to preserve the foetal elephant due to the difficult conditions on board the *Ma Robert*. After he had spent a long day partially dissecting and preparing the foetus for preservation, rainwater leaked into the cabin, diluted the preserving spirit and destroyed the specimen. This was unfortunate because Owen had recently published on elephant placentas and he considered the study of 'placentary characters' invaluable to mammalian taxonomy. The teeth were desired specifically because the patterns on the molars would help determine if the elephants living in the Zambezi basin were of the same species as those found further south. Owen's instructions were guided by his wider research agenda, which sought the development of a 'natural system' of taxonomy built up from the comparative morphology of organs.[88]

Like the elephants' teeth and the foetus, the Lepidosireniformes, or lungfishes, were of considerable scientific interest. Owen's recent work on the divergence of animal forms and the increasing complexity of species through geological time, marked a recent and thrilling change in how the natural world was understood to have arrived at its present arrangement.[89] Lepidosirens appeared to fill a morphological niche between fishes and reptiles and therefore warranted special attention. Kirk considered the fish, locally called *dowe*, to be as much reptile as fish, and knew they would be great curiosities in London.[90] Owen referred to them as 'that anomalous genus' and the original Latin name for the first species to be described was *Lepidosiren paradoxa*. In the late 1830s Owen described specimens taken from rivers in West Africa and from the Nile (i.e., *Protopterus annectens,* Owen, 1839). Because these lungfish spend part of the year in a torpid state buried in the mud, there was the possibility of returning live specimens to London, an exceptional opportunity. Kirk's first attempt to do so failed when the specimens were lost in a shipwreck. However, he was able to provide a specimen in 1864, which is still preserved at the Natural History Museum, though it is unclear if it arrived alive.[91] We do know that living Lepidosirens were displayed as zoological curiosities in the Crystal Palace in 1860, and, according to news reports, occasionally escaped.[92] By the end of the Zambesi Expedition the new theories of evolution through natural selection first proposed by Darwin and Wallace in 1859 made such specimens of further interest as they

could be representatives of transition species and reveal the process of evolution.

Owen's instructions indicate that he was filling two roles as advisor to the Expedition. On one hand Owen wanted to see his own research interests in comparative vertebrate morphology aided by new specimens. The obvious potential for novel specimens—important to any taxonomic project—made expeditions to Africa particularly important, as so little of the continent's fauna had been catalogued at the time. On the other hand, he represented the interests of the British Museum's Natural History Department, an institution actively seeking specimens of high quality that would contribute to the comprehensiveness of the collection—in itself a benefit—and provide zoologists with new data in their particular specialities. We can also assume that Owen was using the steady acquisition of specimens to assist his lobbying for a separate, national museum of natural history; one of his career's defining missions.[93] Owen guided Kirk in both directions, instructing him in what to look out for and how to ensure its preservation while leaving Kirk the freedom to collect as he saw fit and was able.

The goals of the Expedition related to geology were inherent to the entire project from the moment of its conception in Murchison's mind.[94] By the later 1850s he did little fieldwork himself, relying upon others for such arduous tasks. In his invaluable studies of Murchison's career, Stafford concludes that 'The Dark Continent represented an immense challenge to explorers, and for Murchison it offered the ultimate test of the power of natural science to classify and develop alien environments'.[95] Murchison predicted in 1852 that, 'The interior of southern Africa comprised an elevated great central trough or basin' that was ringed with Palaeozoic uplands cut through 'by deep ravines, the chief of which serve as escapes for the periodical flood of rivers'.[96] This image of a 'lost geology' meshed well with more popular images of the continent as a land socially cut off from the cosmopolitan world—the geology was seen to reflect and even contribute to Africa's social isolation. As Stafford has eloquently shown, despite the obvious differences in time scales, Murchison rhetorically extended the ancient and unchanging nature of African geology to the inhabitants of the continent—they too were relics from the past.[97]

The Zambesi Expedition was only one among many that Murchison used to test his grand theories of continental structure. Murchison sought to advise numerous expeditions to Africa in part to test his personal theories of the geological structure of the continent and to find new commercial opportunities. Expeditions working north of the Cape, along the Niger, the Lake Regions, Abyssinia and the Limpopo were influenced by Murchison in varying degrees.[98] The instructions he wrote for Thornton reflect a dual interest in geology for geology's sake—testing his theories—and the possibility for commercially-important mineral deposits; coal, iron, copper and lead in particular. The Royal Society agreed that a trained mining geologist was indispensable to the Expedition's goals of developing economic resources.[99] Livingstone had already reported the existence of coal near Tete, and this potential resource required further investigation if steam transport along the river was to succeed.

Charles Livingstone had a more general role, working to support the Expedition. David Livingstone wrote his instructions personally. Given the training he sought prior to departure, Charles was directed to the care and maintenance of the chronometers along with the geomagnetic equipment. He was also the technician partly responsible for geomagnetic observations, and thus Sabine's directions in this regard were directed to him.[100] Charles was not considered a 'scientific' worker on par with the others; he had little education in natural history. He was expected however to operate the instruments properly and provide the data required by Sabine. Charles was also instructed to make use of his personal photographic equipment, though to be careful with his portraiture:

> You will endeavour to secure characteristic specimens of the different tribes residing in, or visiting Tete, for the purposes of Ethnology. Do not choose the ugliest but, (as among ourselves) the better class of natives who are believed to be characteristic of the race, companies of Banyai and other strangers who may be induced to sit for payment; and if possible, get men, women and children grouped together.[101]

Baines, as the artist, was similarly instructed by Livingstone to select the 'comelier countenances' of the Africans he selected for portraits. I reproduce a lengthy passage from his instructions to emphasize the

role of imagery in recording the reality of the field for the metropolitan audience:

> As Artist of the Expedition you are required to make faithful representations of the general features of the country through which we shall pass in sketches of those points to be characteristic of the scenery. You will also endeavour to make drawings of wild animals and birds, copying as closely as you can the natural attitude. …You are expected also to delineate for the general collection of the Expedition the specimens of useful and rare plants, fossils and reptiles that may be submitted to you as means of preserving pictorial records of things which through the influence of climate may be lost. …You are required to draw average specimens of the different tribes we may meet with, for the purposes of Ethnology and, should it be possible to give the dimensions of the heads of the individuals you may select, the measurements will be highly prized. The comelier countenances should be selected rather than the uglier, as the former are always taken as types of the European race. [102]

It is interesting to note that Livingstone wanted the portraits of Africans to be as acceptable to Europeans as possible, thereby generating confidence and support for his civilising mission ideology. He desired to control the representation of Africans produced by Baines and Charles, by ordering them to leave the 'ugly' ones out of the frame. The adjectives used to describe natural history images also reveal Livingstone's bias: the 'characteristic' representations are to be of 'useful' and 'rare' plants. Writing these instructions *en route* to the Zambezi, Livingstone planned strategies to control his subordinates and to control the output of the Expedition and hopefully guarantee success. The remainder of Baines's duties pertained to storekeeping and assisting with geomagnetic and meteorological observations. In both these latter cases, Baines was instructed to duplicate all of Charles' measurements in order to guard against human error. The failure of this system, when Baines was sick, prompted Charles to write letters of apology directly to Sabine indicating that the observations had not been replicated.[103]

Overall, the letters of instruction are telling in three ways. First, they note the potential economic benefits of the work to be carried out and

indicate especially those objects that will contribute best to utilitarian goals. This falls in line with all the most public pronouncements concerning the Expedition, that because commerce, industry and thus Britain would benefit from these researches it was good to spend public money supporting it. Richard Bellon recently summarised the ideals that Joseph Hooker and others promoted: 'In pursuing research, the [scientific] community would also serve the nation by promoting its health, education, defence, sustenance, and honour. The nation in turn owed the scientific community for this ministration'.[104]

Underlying the rhetoric of public utility we find a wholly different intention, one still linked to utility but further detached. The subtext of the scientific instructions implored the fieldworkers to collect as widely and comprehensively as they possibly could, no matter if the object was useful or not, and to do the collecting well. This is most evident in Joseph Hooker's letter, which begins with concerns over economic botany, but moves to a call for the creation of a comprehensive herbarium of the Zambezi basin. Hooker's letter of instructions can be directly connected to his and his father's petitions to the Government for the funding of a project to compile colonial floras. The proposed 'Flora of Tropical Africa' was granted government funding only after Kirk's botanical collection from the Zambezi was examined—indeed approval was formally delayed until the collection had been assessed.[105] As Drayton has shown, the floras were meant to fulfil several objectives: accumulation of knowledge for its own sake; provision of new sources of income for botanists; contribution to colonial economic progress and support of British manufacturing by identification of new raw materials—the same rationale scientific leaders provided for the Zambesi Expedition itself.[106]

Second, the letters promoted the ideals the leaders of the mid-Victorian scientific community sought in young, rising 'men of science'. Joseph Hooker believed firmly in the disinterested virtues of the scientific calling. Individuals who followed this career were meant to do so not for personal gain, but for the greater purpose of the advancement of science.[107] Richard Bellon has studied Joseph Hooker's career and shown that he sought men who possessed ability and character to join the hopefully growing ranks of scientific professionals.[108] To be interested in personal material gain degraded

research; it was a sign of poor character.[109] Given Hooker's strong convictions in this regard, we may better understand why he himself did not join Livingstone on the Zambesi Expedition. Livingstone only saw science from a utilitarian perspective and thus the two men did not understand each other at all: 'Be as angry as you like with me, I repeat you ought to make yourself more known. Could you not do something in the popular line with your Museum? There is nothing mean in it. See how [Lyon] Playfair and Sir Roderick [Murchison] get on, it is all fair and above board'.[110] Fame-seekers were exactly the kind of collectors that Hooker did not want on the Expedition, or in science, and here Livingstone was telling him to be one; from what we know of Joseph Hooker, he cannot have been impressed.

Third, the instructions are at first glance directed at the material practices of fieldwork. But a closer reading of them shows how the explorers were reminded in various ways to continually think about how their data would be received; keeping the reception of their data in mind was meant to shape their fieldwork practices. The instructions quite intentionally replicated an entire culture of knowledge-making for transport to the field. The explorers could refer to the instruction for technical information, but more importantly they could find in them, and all their training, the social standards that would allow them to remain a contiguous part of the metropolitan scientific community wherever they were.

CONCLUSION

Driver has argued that the 'cultures of exploration' that were dominant at mid-century extended well beyond the RGS and the scientific community.[111] This chapter supports this conclusion, although by seeking, in a sense, to look at the problem from the opposite direction. Instead of trying to see how the wider arena of Victorian attitudes in the second half of the 1850s influenced scientific exploration, it has been shown here that the interests of the scientific community were a constitutive part of an expedition touted as a 'civilising mission' to gain popular support. Without its scientific component, the Zambesi Expedition would have made little sense to the public at large or to the

members of Parliament who voted to support its funding. Furthermore, it would not have had any support from the scientific community. The Expedition was conceived in the mind of a leading scientist, Murchison, and the project relied heavily upon the expert advice of scientists for the selection of members, provisions of instructions and, as will be seen in subsequent chapters, the analysis of its results. The political and commercial climate in 1857 was not particularly enthusiastic nor even interested in south-eastern Africa; therefore it was only due to Livingstone's great fame and strong lobbying from scientific leaders that the Expedition came into existence.

The goals of science are often not particularly humanitarian or philanthropic. It is difficult to see how further data concerning the Earth's magnetic field would lift the 'veil of darkness' from the shores of Africa, although geomagnetic observations were an important task set for the explorers. This chapter, and indeed the entire book, highlights the underlying tensions between the utilitarian goals of commercial resource identification, the civilising mission and the empirical goals of science for science's sake. The letters of instruction contain elements of this tension in their structure. Moreover, Livingstone's general deference to leading men of science concerning these activities indicates he was more interested in the civilising mission aspects of the project. We will see later how Livingstone's lack of interest and patience for non-utilitarian science frequently thwarted the natural historians' fieldwork.

Despite these tensions, both Livingstone and the scientific leaders were fully prepared to pay lip service to one another's goals in order to gain official support. They presented a united front. Understanding their actions this way helps us to see why the Duke of Argyll could refer to scientific research as the 'higher ends' of Livingstone's work and joke about Owen's hopes to receive palaeontological specimens while, at the same time, the Royal Society informed the Foreign Office that 'the development of the economic resources of the country must obviously be the first object to which the labours of the scientific staff must be directed'.[112] The language in which the Expedition was framed reflected a continual negotiation between humanitarian and empirical interests, each side aware that the Expedition would not be possible without the other.

While some of the scientific goals of the Zambesi Expedition were certainly conceived of without a direct philanthropic agenda, it would have been more difficult for Livingstone and his supporters to promote a civilising mission without reference to contributions from the scientific community. By the middle of the nineteenth century the Victorian concept of 'civilisation' incorporated the contributions of science and technical achievement. Scientific knowledge—particularly that of economic botany and mining geology—would, once gathered, provide a sound foundation upon which to build the economic potential of south-eastern Africa. Such knowledge was a vital part of any 'civilising' project.

The next chapter will continue to examine the 'cultures of exploration' by looking at the role of technology. The material culture of Victorian exploration reflected the empirical drive towards objectivity through the use of instruments and structured observations.[113] Included in the letters of instruction discussed above were indications as to the use of appropriate instruments and methods. These technologies were as much a part of expeditionary fieldwork as the theories used to classify and make sense of foreign environments. I now turn to look at how this material culture contributed to scientific practice, the explorers' self-image, the practice of science in the field and the representation of African nature in Victorian Britain.

4 Technologies of Expedition

INTRODUCTION

> In the industrial era, scientific and technological measures of human worth and potential dominated European thinking on issues ranging from racism to colonial education. They also provided the key components of the civilising mission ideology that both justified Europe's global hegemony and vitally influenced the ways in which European power was exercised.[1]

The historian Michael Adas has provided an important interpretation of the changing foundations for European self-identification in the nineteenth century. Using his work as a heuristic, this chapter examines the use of technology by the members of the Zambesi Expedition. The explorers understood their expeditionary practices to be products of a scientific culture that promoted disinterested, rational thought, and that this style of reasoning represented progress away from superstition and bias. Of course, there were paradoxes; Livingstone heavily used the language of Christianity to justify the Expedition and his lifelong project, being as he was a deeply religious man. But the leading members of the Expedition were not equally religious. Kirk, Thornton and Baines rarely explore their own religious feelings in their journals, while both Livingstone brothers do this frequently. Nevertheless, religious affiliation was important to the mobilisation of public support for the Expedition and so any personal agnosticism was certainly muted in public. At this time in the nineteenth century Providential explanations for natural phenomena remained popular and, therefore, even those men of science who wished to avoid them in the name progress often said little against them.

The role of religion in the Expedition should not be overlooked, even in a chapter on technology. Therefore we should consider where religion contributed to the justification for the civilising mission ideology and how technology fitted into this religious framework. Despite the increasing recognition of industrial technology as the defining characteristic of Victorian culture, some argued that religious beliefs could be the foundation for a worldview that embraced scientific and technological advancements. This latter cultural formulation was most apparent among Scottish missionaries who blended an industrial work ethic with their evangelism. This formula became a justification for missionary work in itself, and one which Livingstone expressed overtly. He argued that Britain's place as an industrial and moral power was only achieved through a divine plan to link Christianity with technology. This argument was based upon his absolute belief in the providential origin of technology that was akin to Man's own creation. He wrote: 'Mankind could not, in the first instance, have *civilised* themselves, and therefore must have had a superhuman *Instructor*'.[2] But the promethean technology was not evenly distributed, indicating further that the superiority of British industry was the result of this same divine plan. Livingstone's superhuman Instructor seeded technology where it would support the divine plan. Through his own words we see the apotheosis of Livingstone's justification for the civilising mission ideology:

> The stagnation of the mind in certain nations which have preceded us in the line of discovery [e.g., Arabia or China] may also have been intended, in order that the greatest power derivable from science and art might be associated with the religion which proclaims peace and good will to man. Had the power given by inventions to the nations of Christendom been awarded in the natural course of things to the men who were first in the race, we see no earthly reason why the Buddhists and Mohammedans should not now have lorded it over us poor islanders with steamers, and all the improvements in artillery, or that the Lancashire witches and Edinburgh "bonny lasses" should not now have been exported regularly to the harems of the East.[3]

Within this framework, steam power and the Gospels were tightly linked and Livingstone saw the necessity for British intervention in

central Africa justified because it was possible. Africa will be civilised, according to Livingstone, 'because we can go there'. The most powerful new tool for the civilising missionary was therefore the steamship.

BRINGING STEAM POWER TO THE ZAMBEZI

Three steamships were used by the Zambesi Expedition, the *Ma Robert*, HMS *Pioneer* and *Lady Nyassa*. The *Ma Robert* went out initially in sections and was assembled in the Zambezi delta in May, 1858. She sank in the river on 21 December, 1860 as a result of a badly corroded hull. The *Pioneer* was towed to the Zambezi from Scotland and arrived 4 February 1861. She served until the end of the Expedition and was returned to the Navy in February 1864. The *Lady Nyassa* was Livingstone's private purchase and arrived in sections on 3 February 1862 in order to be transported by hand around the cataracts of the Shire River and launched on Lake Nyassa. Livingstone was relying on the *Lady Nyassa* to provide him with the mobility and security on the lake to begin his civilising mission. Despite spending nearly a year on this project, they were recalled before the plan could be realised.

4. The *Lady Nyassa* under construction on the banks of the Zambesi, with HMS *Pioneer* on the right.

At the end of the Expedition he steamed and sailed *Lady Nyassa* to Bombay, a seven-week voyage, and put her up for sale.

Using steam power on the river does not appear to have been Livingstone's own idea, but that of Edward Sabine, who spoke to him about the issue after the Dublin meeting of the BAAS in September 1857.[4] Members of the Manchester Chamber of Commerce also supported the idea. The plan recalled previous expeditions in 1841–42 and 1854–5 when steamers travelled up the Niger.[5] The hopes for successful steam navigation on the Zambezi relied upon Livingstone's assessment of the river's navigability. Where privately he held doubts about this, his public representation of the river portrayed it as an African Mississippi or 'God's Highway' offering easy access to the African interior.[6] This was one of the images he used to gain public and political support.

Even though the use of steam power was not Livingstone's idea, he warmed to it quickly and became enamoured with its symbolic power. Pioneering the use of steam in south-eastern Africa would impress local communities and (as he saw it) increase his influence. Livingstone did worry that the Portuguese authorities would view the arrival of British steam to the Zambezi as a political threat; and by September 1857 Livingstone felt that diplomatic efforts would be necessary to allay Portuguese fears that he thought would specifically arise due to the use of steam power.[7] But this was not a serious reason to abandon the idea. The extensive correspondence, preserved in the Royal Naval Museum Archive, between the Admiralty, Livingstone and shipbuilders concerning the boats to be used and their design indicate that the explorer was not the only one to see the iconic power of steam and decide that its use was the vital feature of a modern British expedition. Once the use of steam technology on the Expedition was agreed, it was clear that they needed a steam boat that would be suitable for use on a possibly shallow African river.

Initially, the task of providing a river steamer fell to Macgregor Laird of Birkenhead (Liverpool). Laird (1808–1861) had been a member of the African Inland Commercial Company's Niger Expedition of 1832–4 and therefore claimed some expertise in navigating African rivers.[8] Laird proposed two options for providing the Expedition with a boat. Laird's shipyard owned an iron screw steamer named *Sunbeam* and offered it for sale or charter to the Government for the purpose of

exploring the Zambezi. *Sunbeam* drew 8 feet when loaded and was 132 feet long. The second option was a smaller side paddle 'steam launch' that Laird was building; this would draw 3' 30" and was about 80 feet long. The launch would also be exceptionally lightweight because it would use revolutionary steel plates for the hull.[9]

Laird wrote to Washington in early December about the requirements for the vessel he would provide, and it is clear he was relying on Livingstone's reports to determine these:

> From a careful perusal of Dr. Livingstone's journal I am of the opinion that the Zambesi will be found navigable above the Chicora [Cahora Bassa] rapids by a vessel the size of the *Sunbeam* but certainly that the Steam Launch proposed would pass them when the river is in flood.[10]

Early December 1857 was clearly an important time for planning the Expedition's transport. The day before Laird wrote to Washington, Washington had written to Livingstone asking him about the river and its navigability with a series of questions:

1 How far you consider the unhealthy region extends from the coast towards the interior by the course of the river? 100 miles?

2 As what rate do you consider the current can draw in the rainy season?

3 Do you contemplate that the larger vessel should be sufficiently small to be transported above the first rapid at Tett or Niyungweh? Or that only the launch need be so transported?

4 Have you any means of making a guess at the height and extent of the rapid?

5 Do you happen to know if Mr. Hoskins or any of the officers who were in the [*Frolic*?] in 1852–3 are in England?

6 Would any good be passed by the large vessel only going to Tett? It is, I conclude, beyond that point or the Portuguese territory that your work is to be done?

7 Mr. Laird's vessel is of 400 tons, + 132 ft long and will draw 8 ft of water when loaded. Do you think there would be a chance of getting such a vessel on to Tett?

It is interesting that the fifth question has the hydrographer specifically enquiring as to the whereabouts of naval officers who could corroborate Livingstone's observations. In Livingstone's reply, we learn that Mr. Hoskins had moved to China and that no one else was available. Therefore, aside from Livingstone's testimony, Washington had only a few sketchy reports about the lower reaches of the river from vessels that had investigated the delta and the notes left behind by the crewmen of HMS *Leven* who died of fever on the river in 1823. No doubt the experienced hydrographer was concerned about the accuracy of Livingstone's untrained observations of the river, which were made without instruments. Washington sought Livingstone's opinion on the boat proposed by Laird, fully aware that the Scottish explorer had little experience of boats. Livingstone's responses to Washington are honest but careful in their optimism. He was of the opinion that the *Sunbeam* would make it upriver to Tete during the flood but also warned, 'For prudence sake the less she draws the better'; this remark is an ominous foreshadowing of the difficulties to come.[11] Livingstone confirmed that he was completely willing to take a large streamer that required at least 8 feet of water into the Zambezi, although he had extreme problems with a vessel that drew half that much.

Along with obtaining a boat for the river, the Expedition also needed get to the Zambezi. Whichever vessel they took, it would not be capable of making the voyage from Britain unaided. On 18 December 1865, a list of options for getting the Expedition with its boat to the river was drawn up at the Hydrographer's Office. The plans include options using the *Sunbeam* to carry the whole party with the disassembled launch on board from Liverpool to Tete, and then 300 miles up the Zambezi. Other options proposed using a ship already sailing to the Cape or India to reduce costs. Livingstone preferred the first, feeling that proceeding rapidly through the unhealthy lowlands of the Zambezi delta was critical and he fully believed that the *Sunbeam* would make it upriver.

In January 1858 a decision was finally made. The Expedition would travel from Britain to Tete, two hundred miles up the Zambezi River, in a large steamer which would carry the pieces of a prefabricated boat built by Laird. In an advisory capacity, the council of the Royal

Geographical Society supported this plan by a unanimous resolution.[12] By February, transport plans were finalised. A screw steamer named *Pearl* would transport the Expedition and all its cargo (including the launch) to the Zambezi and as far upstream as possible, most likely all the way to Tete. This steamer would also assist HMS *Hermes,* based at Simon's Bay at the Cape, in a hydrographic survey of the Zambezi delta. Once finished the *Pearl* would continue on to Ceylon for service under the Colonial Office. The Ceylon Government would receive £300 from the Foreign Office for the delay of their ship. This plan was economical in that it made use of an available government boat passing that way.[13] Macgregor Laird received a commission to construct the river launch, which was christened *Ma Robert* to honour Livingstone's mother, whose oldest son was named Robert; a Makololo custom. The *Sunbeam* dropped out of the plan completely.

The *bon voyage* parties were in London, but the Expedition sailed from Birkenhead, in Merseyside. They left the Mersey and sailed into Liverpool Bay early in the afternoon of 10 March 1858. Richard Thornton reports that all were on board furiously writing final last letters for friends and family. The voyage south was generally calm with long stops at Freetown in Sierra Leone and Cape Town. The *Pearl* arrived on 14 May 1858 at the Zambezi delta with HMS *Hermes* escorting. Within three days the *Ma Robert* was bolted together and they began to seek the main channel of the river. The *Ma Robert* was supposed to be offloaded at Tete but preliminary observations of the navigability of the river were pessimistic and it was decided that it would be safest to proceed upriver with the launch acting as a pilot vessel for the *Pearl*. During this time, a hydrographic survey of the delta commenced. This would improve British charts of the East African coastline and enable future ships to support the Expedition more safely. This work was performed under the direction of Lieutenant Francis Skead, a Naval Hydrographer temporarily seconded to the Expedition for this purpose.[14] Approaching any delta was a risky operation for larger ships and always held the potential of a serious grounding.[15] Extensive surveying would minimise this risk in the future, and the charts they produced would be used by the ships that would later re-supply the Expedition.

The delta was a challenging area to navigate and they did not find the main body of the river until 11 June. Soon after this it was clear to

the naval officers that the *Pearl* was unable to risk the journey to Tete due to shallow water. The decision was taken to unload the Expedition's gear to a small island as far upstream from the delta as the *Pearl* dared to go. This they dubbed 'Expedition Island'. The Expedition was also given two smaller rowing boats to tow behind the *Ma Robert* and a pinnace to help survey the river. Being forced to unload the *Pearl* at Expedition Island was the first of a series of enormous setbacks. Instead of reaching Tete within a week or two of entering the delta, they now faced months of ferrying gear up the river. The *Pearl* left them on their small island on 26 June.

The members of the Expedition began to realise that the river was not the open waterway they had been led to believe. Shifting the gear in stages up river groundings became frequent and they learned from Senhor Vienna, who owned the *prazo* at Shupanga, that no clear channel to Tete existed during the dry season.[16] Moving the gear was arduous, boring and extremely time consuming; the explorers, with most of their equipment, did not reunite in Tete until 3 November, seven months later. It was a frustrating period. After six months on the river Baines referred to the Zambezi as 'the broad labyrinth of shoals called by courtesy a river'.[17] Too shallow in the dry season, the river's channel meandered wildly and thwarted all attempts at mapping. Many days were spent winching and warping their boats over shoals. Kirk wryly referred to this procedure in his journal as 'land transport'. Instead of icons of British technical superiority, the ships became symbols of failure, failed expectations and misapplied technology. Livingstone began to blame the *Ma Robert* and with a lack of tact, did so publicly. Arguments between Livingstone and Macgregor Laird, the firm that built the *Ma Robert*, lit up the pages of the British press, and almost led to formal accusations of libel. At the time, John Washington apportioned blame equally to Macgregor Laird, Livingstone, and the engineer on board, George Rae.[18]

The symbolism of steam power had its pitfalls. In a note written before they left England, Livingstone had pressured Washington to ensure that the steam engines would be capable of the task at hand:

> It has occurred to me that the horsepower of Mr. Laird's vessel is too small. It would be a sorry thing for us to be unable to stem the current in the only steamer the natives ever saw.[19]

This is a telling note. If the ship were to fail, the embarrassment would be Livingstone's and, by extension, Britain's. To fail in extending the range of steam power could potentially misrepresent the technological abilities of an entire culture, threatening the entire 'civilising mission' project.[20] In the first months of the Expedition this was exactly what was happening.

But the dissatisfaction with the *Ma Robert* did not extend to steam power and its accoutrements in general. The explorers' self-identification was strongly linked to the use of steam on the Zambezi and, when it worked, they delighted in their command of technology when this was subjected to the 'native' gaze. Deploying such technology also provided the foundation for their judgement and representation of the locals.[21] Such feelings can be seen in detail upon the launch of the Expedition's third steamer, *Lady Nyassa,* in June of 1862. In the *Narrative*, the impact of iron ship construction upon the locals is highlighted in writing that simultaneously emphasises British industrial superiority and 'native' naiveté:

> Natives from all parts of the country came to see the launch, most of them quite certain that, being made of iron she must go to the bottom as soon as she entered the water. Earnest discussions had taken place among them with regard to the propriety of using iron for ship-building. The majority affirmed that it would never answer. They said, "If we put a hoe into the water, or the smallest bit of iron, it sinks immediately. How then can such a mass of iron float? It must go to the bottom." The minority answered that this must be true with them, but white men had medicine for everything. The unbelievers were astonished, and could hardly believe their eyes, when they saw the ship float lightly and gracefully on the river, instead of going to the bottom, as they so confidently predicted. "Truly," they said, "these men have powerful medicine."[22]

This scene is given to readers of the *Narrative* so that they may see both how the location of the scene and the area's inhabitants differ from home, while conforming that those commanding the ship (and writing the narrative) were properly British. The explorer watching the natives is the readers' gaze by proxy. In this sense, Livingstone capitalises on the feelings of sameness and remoteness to one's home society, a narrative device common in travel literature of the period.[23]

Despite such successful impressions, the repeated failures of the steamboats led to widespread depression among the members of the Expedition and to questioning the skills of their leader. During a particularly bad grounding of the *Pioneer* on 15 November 1861, the Expedition remained nearly motionless for over a month in the Shire River. Journal entries among all on board almost cease during this period—there was so little new to tell. Each day was spent trying to free the ship from the sands and dragging her a few more yards. Near the end of this struggle, nerves were frayed and Kirk wrote in his journal of 'The want of nautical knowledge of our commander'.[24] On the same day the commander in question (Livingstone) recorded that 'The ship is quite too deep and too long for exploration'.[25] They had little agreement over who or what was causing their problems.

Thomas Baines, as the artist, recorded many views of the *Ma Robert* steaming gloriously up the Zambezi, fully in control and drawing the attention of the locals. These are in marked contrast to his other images of her floundering in swamps. In the cover image to this volume the *Ma Robert* appears with steam up but stuck on a sand bar. A clearly flummoxed Livingstone, recently out of his deckchair behind, is shown barking orders from the roof of the cabin, barely escaping entanglement in the sails and rigging. The Africans in the water push the Europeans and their boat to safety.[26] It is not a majestic scene and implies the inadequacy of the river and possibly those who touted its virtues.

The boats were an integral part of the Expedition and symbols of its success or failure. The explorers pinned their hopes on the ability to use steam power to proceed quickly through unhealthy swamps in order to unravel the mysteries beyond. They hoped to blaze a trail for merchant ships, developing a new area for trade, and to uplift the local population from their benighted condition. In fact, the use of steam was not successful and the boats struggled. The ships threatened the image of the British as commanders of modern technology, threatened the relations between the members of the Expedition. They also threatened the performance of natural history and the careers of the natural historians, as will be seen in the next section.

NATURAL HISTORY AND STEAM: WORKING ON THE ZAMBEZI

When the *Pearl* stopped in Freetown, Sierra Leone, before steaming on to the Cape, Kirk collected many specimens. He also tried to work when the *Pearl* had steam up and was under way, but despaired of not being able to do much collecting or preserving at sea. The speed of the *Pearl* prohibited the use of sampling nets and the unsteady and damp conditions on board limited his ability to catalogue his botanical collections and preserve them sufficiently. In his journal he wrote, 'In a steamer, there is little chance for the study of Natural History'.[27] Barely one month into service, Kirk foreshadowed a problem that plagued him throughout his time on the Expedition—rapid modes of transport are incompatible with scientific investigation.

On first arriving in the Zambezi delta, the *Pearl* initially followed the course of the West Luabo to its eventual disappearance in marshes. The *Ma Robert* had pushed ahead, seeking a channel and found none. Everyone was then forced back to the ocean. For Kirk this was the farthest inland he had ever been in Africa and it offered a tantalizing glimpse of the interior and its flora. While understanding the need to keep the ships unstuck and pressing forward, the conflict between pilot and naturalist began to be noted in his journal. On May 26th, the day of turning back, he wrote:

> I often wish I could get onshore to different things but unless under great temptation, could not think of wasting time, which was precious; and Bedingfeld, who was in command, being no lover of science in any of its branches, it was not easy to go persuade him that there was much good to get by it.[28]

Later, when the *Ma Robert* ran out of coal, the situation changed and Kirk was immediately called upon to identify trees suitable for burning in the boiler. At such moments, natural history was secondary to the business of simply moving forward and scientific knowledge a tool rather than an end. Certainly, much of the urgency was related to a distinct fear of the delta as an unhealthy locale, rife with malarious exhalations from the mud. Livingstone's plan and his acceptance of steam technology was influenced by the potential for moving through the lowlands as quickly as possible to avoid disease. Earlier, when nearing the coast of Natal, the captain of the *Pearl* permitted a

ten-minute stop to allow Baines to sketch an exceptionally beautiful landscape scene at the mouth of the St. John's River.[29] When on the Zambezi, however, haste mitigated against such opportunities.

Things might have been different had a smaller boat been available for exclusive botanical work. Fourteen months into the Expedition (26 May 1859), while at the coast waiting for a supply ship, Kirk pondered in his journal about the necessities for proper botanical exploration:

> I wish I had a boat to go work up the Mangroves, *Pandanus* etc. When under steam it is impossible to stop and gather. It could only be managed by a botanical skipper. Other people don't think a mud plant worth much.[30]

Movement, though often thwarted by a shallow river, continued to take precedence over observation throughout the Expedition. Upon seeing the *Pandanus* palm in fruit and flower on 16 September 1858, Kirk eagerly wanted to stop, but their schedule prevented it. For a botanist the fruit and flower are crucial for taxonomic purposes: passing these by was a great personal and professional loss. A few months later, the onset of the first rainy season found Kirk and Livingstone exploring the Shire River. Kirk records on 22 December 1858 that previously dry river banks were now lush with vegetation but other duties precluded a stop: 'I wish I had the chance to botanise, but this is regular transport work.'[31] These and many other potential specimens were no more than the fruits of Tantalus.

Charles Meller, who had arrived in February 1861 with high hopes of assisting Kirk in collecting specimens representative of the region, also recognised the botanical opportunities afforded by the great onrush of vegetation with the start of the rainy season. Unfortunately his collecting activities were likewise thwarted. He later wrote to Joseph Hooker at Kew Gardens that 'it was cruel to have to pass by such unlimited botany as teemed in Manganja land after being so long unable to move from the ship'.[32]

The pace of moving the tons of cargo up and down the shallow Zambezi and Shire rivers prevented systematic botanical work. Steam could not be wasted idling by the riverside. Adapting to this pattern of movement, Kirk 'botanised' when the steamer had to stop for wood. His journals note many 'walks' taken while wood was collected and these became short collecting excursions. 'Wooding', as they called it,

could take up to two days as the Kru sailors cut down trees and sawed them into boiler-sized pieces. Thus, the pace and location of botany was linked directly to the pace of the boat and indeed the efficiency of its engine. Whether or not these sites were the most suitable for botanical work was not a consideration—fuel was the paramount concern. On more than one occasion the natural scientists were stranded on shore when steam was got up and Livingstone ordered departure. At these times, Kirk or Meller were left to run along the bank to eventually rejoin the group. After *four years* of these types of experiences, Kirk confided in William Hooker that:

> As far as I am concerned I may say that the expedition having turned out one offering very few opportunities for Botany and being simply heavy work transporting the gear from place to place I feel it rather a waste of time and shall probably soon find my way home.[33]

Kirk remained fourteen months longer out of a sense of duty.

Finding time to collect specimens was a significant problem; preserving them effectively proved to be another. In late May 1858 Kirk realised that the cabin of the *Ma Robert* was too damp for his collections and the crew less than interested in his whole project. His dried plants were going mouldy and as mentioned earlier, the leaky cabin destroyed a valuable elephant foetus. The collectors believed there was a distinct lack of understanding of purpose between themselves and the non-scientific members of the Expedition. The clash between natural history and the civilising mission did not only arise from the necessity of using leaky, impatient steamboats; transmitting the importance of specimen preservation across to the rest of the Expedition was nearly impossible, as the following incident demonstrates.

On 13 June 1858, Kirk and Baines were both excited about the acquisition of an interesting fish purchased from a fisherman who had pulled along side the *Ma Robert*. Locally named *shynyessi*—most likely to be the electric catfish *Malapterurus zambezensis*—they revived the fish in a tub of water on deck and discovered it to be capable of delivering powerful electric shocks. Baines sketched the fish and produced a watercolour. Kirk attempted to preserve it. Unfortunately, the reality of life on the little steamer hampered Kirk's success at

bringing this specimen home. While Kirk remains silent on the event, Baines records the fate of the fish:

> Dr. Kirk attempted to preserve the fish, but it soon went the way of all specimens, which are generally called trash, stinking things, lumber, &c. and thrown overboard at the first chance so that we are almost getting tired of collecting.[34]

Entries like this raise important questions about power and hierarchy within the Expedition. Why were the specimens treated so roughly? Collecting them was one of their primary goals. It may help to consider the space they worked in. The *Ma Robert* was seventy-five feet long and eight feet in the beam, displacing thirty tons. On board in 1858 were seven Europeans and the twelve Kru sailors who had been hired at Freetown. At any point in time there were a number of locals on board acting as guides and informants. The conditions never improved, even with a change of ship. In early 1862 Meller complained in a letter to Joseph Hooker that the *Pioneer*, a larger ship, was, 'overcrowded with men and cockroaches' and they spent two thirds of their time in piloting and navigation.[35]

As a site for natural history, the steamships proved to be a miserable space where specimens rotted or were eaten by pests. Rain leaked into the preserving jars and diluted the spirit—resulting in rotted specimens. Extra boats were not made available for collecting activities. And while we know that unwatched specimens were cast overboard by the crew, nowhere do we have evidence that crewmen were punished for disposing of specimens without permission, or that Livingstone made much effort to support collecting activities. The rhetoric which emphasised scientific discovery and had been deployed to gather support for the Expedition in Britain, was not transformed into support in the field in terms of appropriate technology or time allocation.

It appears that the civilising mission ideology so powerfully motivated Livingstone that activities not directly related to this purpose lacked support. He needed to find a place for a permanent station from which civilising activities would spread. Once the barrier of the Cahora Bassa rapids was realised the main task became to find a new region for their plans to introduce the cotton trade. This involved

exploring the upper Shire, Lake Nyassa and the Rovuma River. The problem was that all of the equipment and stores they had could not be transported in one trip by the steamers they used. Therefore, immense amounts of time were spent moving equipment up and down the rivers in stages while checking on caches left at Portuguese settlements, often with a senior member of the Expedition left to watch over them. When the members of the Universities' Mission arrived more time was lost in transport work, and then the attempt to move the *Lady Nyassa* to the lake was given priority from early February 1862.

For the men of science trying to achieve other goals and answer to experts back home, the lack of support for their collecting activities brought on professional crises. The patterns of movement that centred on fuel depots in combination with limited space on board, altered the ways in which natural history was performed. As the natural historians began to realise their jobs could not be performed properly, their letters and journal entries reflect the personal stress and feelings of inadequacy this situation generated. Despite all these hindrances, the naturalists did produce impressive collections, as will be seen in Chapter 6, and these are physical examples of their skill at overcoming obstacles from within the Expedition as well as the environment.

IMAGING ZAMBESIA I: PHOTOGRAPHY

Few of the artefacts brought back by the explorers held more widespread appeal than images. Pictures of the environment conveyed an immediate sense to viewers of the reality, as perceived by the explorers, of the Zambezi basin. Florid descriptions, preserved flora and fauna, mineralogical specimens and sheaves of data held much more potential for study by natural historians, but images made on site held explanatory *and* decorative value—applicable for science and useful for popularizing science.[36] In this section I will consider photography first, and then other images.

The Zambesi Expedition was the first with government funding to take photographs in Africa—although this is an informal 'first' as there was neither an official position of photographer on the Expedition nor did the government provide any of the equipment. Nevertheless,

this was a novel experiment in deploying new technology in a distant, foreign field. Kirk and Charles Livingstone took photographs using their personal equipment and photography was a private pursuit within a public project.

Most of the photos taken by Charles Livingstone were made using the wet collodion process, which involved glass plates. Wet collodion was a cumbersome process but allowed for fast exposure times. Sadly, most of his images have been lost and only two are now known to exist.[37] Included in these were at least 40 stereoscopic photographs of the 'natives in their various occupations and amusements'.[38] Of one, for instance, Charles wrote to his wife: 'One [photograph] shows how they carry their babies and their mode of hoeing'.[39] Charles's letters to his wife reveal that he had produced images intended to demonstrate local industry (e.g., goldsmiths, corn grinding, house construction, agriculture) and a special interest in musical instruments. He also took landscape scenes.

Kirk's photographic interests began during his years at Edinburgh University (1848–54) and he maintained this hobby throughout his life.[40] In the field, Kirk used a variation of the calotype process called the wax-paper process in preference to collodion photography. His negatives were on paper, not glass, but the paper process had the disadvantage of requiring long exposure times and therefore much more control over the subject. It is possible that Kirk learned some of his photography, especially the wax-paper variant of calotype, from Thomas Keith (1827–1895), who was resident at the Old Edinburgh Infirmary until 1853, when Kirk began working there.[41] In 1858, Kirk had had nearly a decade of experience in photography and was confident with his skills. He thought the 'wet process', by which he meant the wet collodion process preferred by Charles Livingstone, too complicated for field applications. Recording Charles Livingstone's first failed attempt at wet collodion photography in the field, Kirk wrote 'I certainly believe, as I said in London, that the paper process is the only one which at present is worth taking on an expedition such as this.'[42] Kirk's generally low opinion of Charles and his cumbersome equipment was reinforced when on their first journey to Lake Nyassa it was realised that Charles had left behind some of the necessary chemicals, requiring them to transport the rest of the 'useless apparatus' for weeks over rough terrain to no purpose.[43] Baines had remained at

Tete to oversee the stores, and intending to travel light they brought only the camera for collecting images, no drawing materials. After the incident, Kirk wrote to his brother, 'A photographer without his nitrate (in the present state of the art) might as well have remained—so we have neither photographs nor sketches'.

Though Kirk held strong opinions on the subject of which processes were appropriate for tropical fieldwork, he experimented in the field with a newly available and more convenient process: dry collodion glass plates pre-sensitised in Britain and sealed in a lightproof sleeve. Whilst they provided excellent definition, dry collodion plates also had the disadvantage of requiring a longer exposure than wet plates—again favouring inanimate subjects. Kirk favoured photographic processes for fieldwork that required exposures of many minutes, whereas wet collodion, used by Charles Livingstone, required a few seconds but was more complicated.[44]

Kirk continually experimented with the wax-paper calotype process while in the field. He substituted the clear water of the Zambezi for distilled water with perfect success.[45] Kirk had strong disdain for acetic acid, a chemical he found to be 'a nuisance and unhealthy', and thus he endeavoured to find a substitute acid that would 'facilitate the paper process'.[46] Citric acid was found to be a good replacement, 'especially for travellers'.[47] These experiments were partly necessitated by dwindling supplies but were also partly an attempt to make field photography easier—hence his experiments with dry collodion plates and general avoidance of the wet collodion process in the field.

In 1864 the Royal Geographical Society revised and republished its 'Hints to Travellers'.[48] Notably, a section on field photography was added and Kirk's experience on the Zambezi was published in the form of a letter.[49] His thoughts on photography from his personal journals were summarised succinctly for the public: 'Photography is little suited for distant and wild countries, yet where it can be employed is of the greatest service.'[50] In these suggestions he reconfirmed his use of the wax-paper calotype process in the field for reasons of simplicity, easy storage of paper negatives and the all-important absence of noxious chemicals. His experiments with dry collodion plates led him to predict that they will eventually 'supersede' all other processes with further progress.

5. Mary Livingstone's Grave near Sena

The content of Kirk's images are intriguing and have generated a great deal of discussion among historians. They are the first we have from that part of the world. Researchers have noted that the extant photos contain no humans. Instead, they record landscapes or botanical scenes such as a baobab tree (*Kigelia Africana*). Local industry is depicted in the momentarily abandoned site of a canoe-builder's workshop. The image of the *Ma Robert* at the Lupata gorge is also eerily devoid of humans, as is an image of Mary Livingstone's lonely grave at Sena. James Ryan recently concluded that Kirk 'does not seem to have been interested in making photographs of the indigenous inhabitants'.[51] It is tempting to conclude that this focus was intentional and that it reveals much about the photographer, his perception of this new medium and of his surrounding environment.

Here we need to be cautious. As discussed above, photographs *were* successfully taken with human subjects by Charles Livingstone and this was his specific responsibility. Kirk's job was to study plants and animals. It must also be remembered, as shown here, that Kirk preferred processes that required long exposures. Animate subjects would have been blurred and avoiding this result necessitated removing people from his camera's gaze. Furthermore, if his exposures were long enough, any people in the frame who were not trying to

stand still and moved about would not appear on the photographic image. The lack of people does not indicate that Kirk's personal idea of Africa did not include Africans or that he was not interested in ethnography. Because of his stated technical preferences, Kirk tried to control nature as much as possible in order to capture its likeness. He knew that this control could not extend to human subjects. This link between process, exposure times and subject is reiterated in the 'Hints for Travellers' in an article that immediately follows Kirk's:

> [The wet process] is always employed for portraits…requiring only a few seconds' exposure in the camera', while with dry collodion 'The only price we pay for this advantage is the necessity for a little longer exposure in the camera; which, for landscapes, is of no moment at all.[52]

Had Kirk been willing to undertake the wet collodion process he might have found exposure times conducive to portraiture, but he did not. Kirk's Africa is empty by the limits of his preferred process and because the portraiture of locals was left to Charles Livingstone.

Kirk's purposes in making photographs must also be kept in mind when interpreting his work. Where Ryan finds Kirk's photograph of vegetation near Lupata gorge a depiction of 'the visual iconography

6. Creepers in the Bush, near Lupata Gorge

of darkest Africa' dominating Victorian thought about the continent, I suggest a more mundane analysis.[53] Kirk intended the image for botanical representation. His journal records the exact event: '[I] took photographs of vegetation with the curiously fleshy twinners which their stems like huge serpents twist up the trees and form circles on the grounds'.[54] Kirk saw that botanical photography could provide an accurate depiction of plants *in situ* and thereby complement preserved specimens and field notes. Other images of large trees perform the same task; they are intended as botanical illustration. Kirk used photography as another preservation technique, like drying paper and jars of spirit, and in the process was developing a new form of economic botany.

IMAGING ZAMBESIA II: THOMAS BAINES

Thomas Baines's work has been the subject of some attention by art historians, particularly in South Africa.[55] His enduring fame there has, however, not been matched in Britain until recently. Some historians attribute this to the fact that Baines's reputation was tarnished in the UK by Livingstone's accusations of theft and the consequent dismissal of Baines in late 1859. Despite numerous protestations, Baines never

7. The *Ma Robert* on the Zambesi, near Lupata Gorge

received a formal hearing of the charges against him. The Cape Town public tended not to agree with the dismissal, made clear by a series of editorials in the *South African Advertiser and Mail*.[56]

Baines produced a vast number of oils, watercolours, and sketches depicting an eclectic mix of landscapes, natural history illustrations, portraiture, and action scenes. As a professional artist, Baines knew his job well and began recording images immediately. In the delta he captured the assembly of the *Ma Robert*, as it happened, in pencil sketches. Considering these images in conjunction with the accounts in Livingstone's journal one gets a sense of group self-satisfaction as British discipline and ingenuity come together successfully in the most remote of places. Many images of the *Ma Robert* steaming majestically up the Zambezi were produced. Such images are more than action photos; they are iconic. For an expedition that was many places at once these images falsely provided a symbol that could be identified as 'the Expedition'. The *Ma Robert* was a small outpost of the British Isles that had steamed into the Zambezi. Baines's images and Kirk's photographs reinforce this view. The launch appears small but sturdy in a vast foreign landscape.

Baines's method was to capture a scene quickly in sketch or watercolour and take detailed notes about activities. Later, these 'studies' could become larger oils. Because Baines was interested in recording local culture in all its complexity, his notes offer more ethnographic detail than the other explorers. He also sought to record the activities of the Expedition itself. We can triangulate with the images and his journal and gain some insight into his understanding of how the Expedition performed in the field. The explorers, when portrayed, are almost always at work. There are only a few images of them engaged in leisure activities, when they are resting after a hard day's walk along the banks of the Cahora Bassa rapids. Even in these, not everyone is resting, as some hunch over their instruments. When at work, the explorers deploy technology, normally appearing as the *Ma Robert*, sextants, sketch pads, a camera or simply boxes of equipment. Baines's 'portraits' of the Expedition's members depict what they do to show who they are.

In a watercolour from the delta, Baines places himself, with sketchpad, in the frame, walking past and examining the aerial roots of an overpowering mangrove at low tide. This is exploration and botanical

assessment in action. His caption notes 'the long drops are the seeds of the mangrove, which pierce the soft mud when they fall'. It may be significant that Baines is alone in this image, dated 22 November 1859. At this point Livingstone had already accused him of theft and relieved him of duty. He was waiting to be sent home. This image may partly be Baines showing us his skills and achievements as an explorer.

In an oil he produced of a *Pandanus* palm, Baines placed himself in the frame sketching while Kirk cuts at a tree for specimens and a local guide stands in for scale. On the day the image was first recorded, Baines recalls that they were struck with the beauty of the species:

> Dr. Kirk and I forced our way through reeds, grass, matted jungle, mud and the intertwining stems and roots of the mangrove and hibiscus to find our way to the most picturesque we could pick out.[57]

The image reflects his impressions, the humans appearing small in a tropical scene of abundant vegetation; they are crawling over and under the vegetation. Their control of their immediate surroundings rests upon their technologies: Baines's sketchbook and Kirk's hatchet. The implication is that by learning about the wilderness it is controlled. The cut tree will be a specimen soon and eventually identified, catalogued, transported and stored at Kew Gardens. The image reflects in one event the explorers' continual efforts to establish small loci of control in a wider wilderness. The series of paintings of the Expedition's disappointing visit to the Cahora Bassa rapids in November and December of 1858 lend a similar feeling—tiny human figures deploying the instruments of survey as they move through a vast landscape.

Baines's paintings of the people of the region reflect the panoptic gaze stipulated by his instructions. From 11 July to 6 September 1859 he was the only member of the Expedition at Tete and during this time he directed his brushes and pencils at daily life in the region. Having heard from Thornton about a local sugar mill he went to investigate sugar production methods. He later published an article about the mill in *The Cape Monthly Magazine*.[58] Ironically this type of 'economic ethnography' was exactly what the Expedition was charged to do. While Livingstone was exploring the Shire Highlands looking for a

suitable site for their permanent station, Baines was making detailed observations of local industry; in other words Baines was doing the work of the Expedition while Livingstone was still trying to figure out where they would, and could, go.

Baines intervened into the image when he represented local practices. He does not provide snapshots. A watercolour of the mill and those who work around it is instructive, but is also a studied fabrication. The image displays all the processes of sugar manufacture at once: harvesting, stripping and grinding the cane, boiling the sap down to crystals and making *panellas* (storage pots). Another oil of the same village displays the sugar production in greater detail though again showing the stages of the process. They are at once works of ethnography and economic botany where Baines has presented the process occurring in discrete stages.

In his economic ethnography Baines offers himself as a compound eye, bringing together separate but linked processes so that the viewer might understand the whole process while also seeing how the village appeared. This is his power as an explorer, reflecting in imagery the same conflations of African life that we find in travel narratives, bringing years of experiences together into a small space for the metropolitan reader and viewer. As part of the travel narrative such images reinforce a text that many owners of such books may not have bothered to read. George Thornton wrote to his brother in the field, 'Dr [Livingstone's] books [*Missionary Travels*] have a wonderful sale—the pictures did it—but I have never met with anyone who had read the book through'.[59] Baines reflects the desires of the intended viewer and is in concert with Victorian perceptions of Africans. He depicts the closeness of the locals to nature and reveals the 'simple' technology which facilitates this.[60]

Baines also did portraits of many Portuguese settlers, though none appear to have survived since they were given to the subjects in gratitude for their assistance. His scenes of Roman Catholic Easter services in Tete or a gala wedding parade somewhat undermine the 'wilderness' status of the region. It appears incongruous to find altar boys in cassocks and men sporting top hats in Livingstone's 'darkest Africa'. The impression of juxtaposition may have more to do with stereotypes of Africa that have increased in power since the 1860s and would not have struck the Victorian viewer as strange.[61] Baines's work

cuts across Zambesian society and shows the variety of lifestyles that existed in a cosmopolitan region.

REACHING ACROSS TECHNOLOGICAL DIVIDES

Early in the Expedition, while they were still trying to find their way out of the Zambezi Delta and get upstream, the explorers had a fascinating encounter with locals. Baines, Kirk and Livingstone record this event—they were desirous to obtain assistance in finding their way and wanted a guide, but the locals were afraid to approach the ship in their canoes. Baines records in his journal:

> We sent Tom Jumbo (in his canoe, which being only slightly different from their own was less calculated to alarm them) to open a friendly communication… Tom among other signs stripped his arms to show them he was black like themselves.[62]

Jumbo was the head of the Kru sailors. In a watercolour, Baines shows him in front of an unfinished landscape gesturing to his skin; an act reciprocated by the local. Jumbo's uniform sets him apart from the locals who appear to be assessing him. The impression made by the *Ma Robert*, just out of the frame here but certainly under steam, was obvious to the explorers. The fact that they were a floating spectacle hindered their ability to operate. Baines shows us their attempt to reach out across a technological gap and emphasise the unity of all Africans to each other, equating like with like, even if they cannot communicate with each other. The Europeans are trying to say, through an African proxy, 'Our tools make us different, but we are the same'. Jumbo uses both his canoe and his body for this purpose and is successful. If he, a black man also, can be a part of the European group safely then so can they.

Eventually the canoe men did come alongside the steamer, try some soup, and then led the Expedition through the circuitous channels of the delta albeit to an eventual dead end. This mitigated victory in race relations was a noted first success in their 'civilising mission'. Later, locals were convinced to board the *Ma Robert* and learn more of the British lifestyle:

> The natives whom we have had on board as sort of guides, have become wonderfully civilised. They make themselves generally useful in the boat and give us the names of places.[63]

On 19 June, Baines also records that locals began to come on board regularly and they provided assistance and information while receiving food and medical treatment.[64]

The technological divide between the Europeans, the Kru and the locals was further bridged through an odd event, recorded in Kirk's journal on 30 June 1858, while they were setting up the temporary depot on Expedition Island. Many of the boxes of equipment had been opened for the first time only a few days previously. Since entering the Zambezi, they had encountered a few electric eels for sale by fisherman. The novelty of these eels and indeed electricity itself underscores these events:

> The Doctor gets out his galvanic magnetic machine and gives a shock to the natives… On feeling it one of them at once said, "*Oh shynyessi*" (the name of the electric fish). They all recognized it as the same thing and gave the machine that name. They mentioned that it was found up at Senna and was very disagreeable when one touched them among the mud.[65]

Kirk was impressed with the local's instantaneous recognition and naming of the machine. On one level, he emphasised African simplicity in naming the machine after a fish; demonstrating their closer relationship to the natural world in contrast to British familiarity with the technical world. At another level, Kirk was deeply interested that human-made electricity was novel for the locals, but the similarity to the fish was instantly apprehended. The locals realized they recognized 'electricity' (albeit on their own terms) and offered what they knew about this sensation in the way they were familiar with it. The galvanic machine is, in this sense, not producing a novel experience at all.

No one else records this event and the galvanic battery appears just this once in the Expedition's existing papers. The device appears to be Livingstone's personal property; he was interested in galvanic batteries. While a student at Anderson's College near Glasgow, studying under Thomas Graham and James Young, Livingstone and

Lyon Playfair built a battery on their own.[66] What exactly the battery on the Expedition was used for is not clear. It is not recognizable in the equipment lists and is not mentioned later. Like Livingstone's magic lantern, the battery may have been intended solely for display, an example of technological mastery deployed as a spectacle, as he was doing on the boat the first time he unpacked the device.

The steamships also provided a novel space for cross-cultural encounter. In early 1859 the *Ma Robert* was twice taken up the Shire River in January and again in March. Livingstone recorded that crowds gazed upon the steamer, 'with evident wonder' from the banks.[67] As they proceeded up river, frequent stops were made for wood and to exchange gifts with the local leaders. As part of these negotiations, chiefs would be invited to board the steamer and be shown around. This was clearly a bold move that evoked much discussion among advisors to the chiefs. The purpose of inviting leaders on board was twofold. First, the explorers wanted to impress them with their skills. Second, the explorers wanted to normalise the experience of seeings the steamer. If the steamer continued to invoke fear, their purpose of opening trade would be thwarted.

The first encounter with the Manganja of the Shire valley was not a total success in this second aim. Kirk feared that the steamer was being blamed for a drought and consequent crop failure.[68] The explorers attempted to allay such concerns by emphasising their interest in cotton and other trade goods, distributing presents and exhibiting their steamer. On the second journey upstream the attempts to placate the locals appear to have paid off, although Kirk recorded a curious reaction from the locals:

> [We] showed [the headmen] the steamer but if there is trade going on or anyone getting a present, in fact as long as the idea of Manchester [cotton trade] is in any way before their minds, any other idea vanishes and they have neither astonishment nor curiosity. They receive a piece of cloth as a child would a toy, holding out their hands long before it is ready to give them.[69]

The steamer lost the impact Kirk thought it should have when lucrative trade was at hand and he finds the loss of astonishment to be a sign of childishness rather than the normalisation of the steam launch

in local perception. Livingstone insisted on trading at every stop in the belief that this would teach the local population about the value of their commodities and that the 'English' were interested in these things. This crucial first step in the civilising mission ideology was taken very seriously, though here Kirk's expectation of local awe went unfulfilled when trade was the important part of an encounter.

CONCLUSION

Technology has been highlighted in this chapter in order to emphasise its contributions to scientific practice and 'the ideology of western dominance'.[70] As a group, the Expedition rallied around cultural icons like the steamships, basing the success of their project partly upon their mastery of this technology. When the ships failed to perform, for whatever reason, it was a technical *and* psychological crisis. Their self-identity was also connected to their abilities to observe, record, measure, and analyse aspects of the Zambesian environment and its inhabitants. Baines's abilities to paint and Thornton's knowledge of geological stratigraphy, for example, were taken together as proof that the British explorers better understood the environment than its inhabitants.

Using particular forms of technology placed restrictions upon the explorers as well. In Britain they committed themselves to transporting large pieces of equipment far into the interior: an iron house, a sugar mill, cotton gins, photographic equipment and reagents, scientific instruments, guns and ammunition.[71] These were the physical manifestations of the civilising mission ideology and were supposed to serve as the seeds of a new economy. Moving them around was troublesome and frustrating. Many of these larger items were in time either sold to the Portuguese settlers or were lost to the river in accidents.[72] Attempting to move the *Lady Nyassa* to the lake was such a large project that this eventually overshadowed all other activities in the final years of the Expedition.

This chapter has highlighted those situations where the interests of the explorers were revealed through their use of technology or their thoughts about technology. They approached their observation of the

region with ideas and methods that were, in part, based upon the technology they employed to do their work. The use of instruments, steamships and imaging technology influenced the scientific practices they employed. In Kirk's photography we see that his ideas about what kinds of technology were appropriate for fieldwork influenced the images he returned. Baines compressed time and space into single images that were both decorative and instructive.

It has also been shown that by bringing the steamships into the rivers a new space was introduced to the region. 'On board' the *Ma Robert* or *Pioneer* was clearly a British space and the explorers were at home when on board. Moving along the river they invited members of Zambesian communities to enter this new space and marvel at the differences. Chiefs and others were rightly hesitant, trying to foresee what new forms of power were implied in this new space and what this would mean to relationships within their own society. If they were chiefs on shore, would they still be chiefs on board?

The next chapter continues in this consideration of fieldwork. This necessarily continues the discussion of technology not only because it was always being employed in the form of tools and methods, but also because we could conceive of the entire Expedition as a technology. With the risk of being overly reductive, it is possible to step back and perceive that the Expedition was a kind of tool, constructed and used by the Victorian community to observe a region and effect change. As seen in the previous chapter this construction incorporated a range of interests and the tools they used in the field reflect these. As we continue to look at fieldwork it will be important to recall that the explorers identified themselves through the work they did and the tools they used. The struggles over representation and credibility detailed in the next chapter reflect this embodiment of the materials and methods of scientific practice.

5 Fieldwork as Practice: Informants, Collection and Moving Knowledge

INTRODUCTION

In discussing the geography of knowledge during the early modern period, Steven Harris observed: 'How science travels has as much to do with the problem of travel in the making of science as it does with the problem of making science travel'.[1] Prompted by his heuristic, this chapter examines the collecting activities of the members of the Zambesi Expedition. This theme was partially developed in the previous chapter, where some of the technical aspects of field collection were considered; here the focus will be upon the social institutions that shaped expeditionary science and the role of local informants and assistants.

The site of an expedition is the arena where fieldwork takes place and where fieldworkers interact. Jane Camerini, in her study of early Victorian scientific fieldworkers concluded that 'relationships pervade the practice of fieldwork,' arguing that these relationships served to provide the logistical and epistemic foundations for collecting activities.[2] To collect successfully, local knowledge in the form of specimens or information had to be transferred to sites where they were authoritatively analysed in order to become more widely accessible. This work of transference, mobilising teams of collectors and porters, successfully preserving specimens, locating packing materials and finding secure transportation out of the field, was, and remains, a complicated affair involving many people.

Focusing on specimens or information and investigating how they move between groups provides insight, I suggest, into how we may place expeditions within the Victorian scientific endeavour. In Harris's paper, the long-distance corporations he examined became the site of knowledge generation, with the 'acquisition, transport, and concentration' of knowledge as the modes through which this composite site is to be understood. 'Situating knowledge and its means of acquisition in the context of corporations allows knowledge production to be viewed both as "local" and "distributed" without privileging the former over the latter or, more generally, the micro over the macro.'[3] This is an important point and one that will be revisited in order to query traditional geographies of Victorian science.

The networks of naturalists analysed here were not part of one institution that could be equated with Harris's corporations. Rather, the Zambesi Expedition in conjunction with other institutions forms the 'site' of knowledge generation to be considered. My concern to follow information across scientific communities entails the description of numerous spaces where knowledge was acquired, produced, received and published. David N. Livingstone's ideas of 'spaces of expedition' and 'spaces of circulation' are particularly relevant here and lead us to consider, as he writes, the 'diverse places where science is made'.[4] In this chapter, the emphasis is on how these diverse spaces are linked through the movement of specimens and people across the globe. In one sense, then, this entire chapter is about travel; but in another, more important sense, this chapter is about how travel, specifically that form of travel called an expedition, shapes scientific practices.

Sites where scientific analysis is performed, sometimes termed 'centres of calculation' after the work of Bruno Latour, are those social and epistemic spaces where field knowledge is assembled, recorded and unified into universal knowledge through the use of theories and methods recognized as valid by the wider scientific community.[5] The institutions are themselves locations where the heterogeneous nature of science was played out on a day-to-day basis in the varied work of preserving, identifying, cataloguing, displaying and viewing specimens. Natural history museums are an obvious example of such institutions and numerous scholars have teased out the significance of these sites to knowledge construction.[6] In such spaces specimens

act as boundary objects, remaining identifiable to all the groups (i.e. collectors, analysts, viewing public, etc.) but employed to fulfil different requirements by each.[7]

It is obvious from the numerous scientific bodies that leapt at the chance to influence the Zambesi Expedition that the Victorian scientific community was very interested in producing universal knowledge about Africa through expeditions. But we should analyse how this production could take place and see if the Latourian network model is useful. Harris's heuristic provides some initial direction. In order to query how Europeans learned about Africa in the Victorian period we need to focus on the phenomena of travel between scientific sites—the travel of facts, standards, techniques, people and materials. Studying one scientific site cannot answer questions about the construction of scientific knowledge that occurs between continents and therefore cannot inform a study of expeditions. A result of focusing on the travel between sites is that it then becomes clear that expeditionary science necessarily has a geography that we can map and interrogate.

In discussing this 'spatial turn' in the history of science, Livingstone has noted that where scientific practices are spatially distributed the issues of credibility and expertise, and the institutions that maintain them, become critically important to our understanding of how such practices are sustained.[8] For example, unlike the seventeenth century natural philosophers invited to observe Robert Boyle's air-pump demonstrations, few natural historians in the nineteenth century had the opportunity to directly observe tropical specimens *in situ*.[9] Verifying the credibility of the collector as a reporter remained for Victorian naturalists a critical, if continually problematic, aspect of scientific analyses of the far flung regions of the world.

Charles Withers has described a set of general issues concerning travel and trust in the reporting of distant nature to metropolitan communities. In particular he is concerned with identifying the criteria in use at any particular place and time to establish trust in others' knowledge claims. He suggests that making knowledge public, making it acceptable, and making it reliable has to do with the nature of social relationships between like people in different places and different people in the same place. Additionally, he proposes that the degree to which knowledge is considered credible may be influenced

by what one is prepared to know and to accept as a fact at the time.[10] This last point is a limited restatement of a major conclusion of the Strong Programme: that there is a normative dimension to concept usage that must be taken into account, and that the proper explanation of this normativity is sociological.

This is a crucial point for how we approach the knowledge produced by members of the Expedition and how it was accepted in the metropolitan scientific communities. The various methods they employed in consciously or unconsciously dealing with issues of credibility will be discussed here. With these ideas of travel and credibility in mind, this chapter approaches the scientific work of the Zambesi Expedition by examining the practices that connect the field and museum, the informant, the collector and the analyst. In this way, our general understanding of Victorian science may be tested against the specific case of this expedition and the unfolding practices of scientific collection.

This chapter will first examine the general role of local informants and assistants in collecting activities. Often written out or underplayed in the historical narrative, assistants and informants were ubiquitous in the field, either carrying out the actual act of collection or providing useful information. I would like to highlight their efforts here and explore their contributions to the scientific work of the Expedition. In doing so, I will challenge some aspects of postcolonial literary critiques of travel narratives and the position of local knowledge in British science. Second, I will use a series of case studies of particular collections to further examine these practices. The chapter will conclude with a detailed mapping of the trajectory of a collection of molluscs to demonstrate how information or specimens were transferred home and eventually published. The molluscs serve as a model case for the large variety of collection types made on the Expedition.

INFORMANTS AND ASSISTANTS: LOCAL CONTRIBUTORS TO A FOREIGN PROJECT

Imperial historiography largely wrote out the role of local assistants and informants in the hagiographies of the great 'African' explorers. In these texts, anonymous African locals appear as faithful followers,

difficult employees, threatening enemies or 'benighted' souls in need of European assistance. Such representations served to justify the colonial manifestation of the civilising mission ideology. More recently an attempt to discern the identity of these obscured figures in the history of the European exploration of Africa was made by Donald Simpson in a study titled *Dark Companions*.[11] In Simpson's book, these 'companions' are named, their contributions detailed and their later careers investigated. He used explorer's texts as mines for data, but did not take an extra step and critically analyse these representations and how their African knowledge became European. In the specific case of the Zambesi Expedition, Clendennen has provided lists of the lower ranking Europeans and Africans who worked with the Expedition.[12] Unfortunately, lists of names do little to inform us about the intricate relationships between the people concerned as they worked together and contributed to the Expedition's success.

In order to draw a clearer picture of these assistants' contributions to fieldwork, I want to look at the position of local informants and assistants from a more general perspective before moving, in the next section, to some more specific examples. In this discussion I will echo the issues raised by Steven Shapin in his study of technicians in Robert Boyle's seventeenth-century laboratory, where he (Shapin) set a twofold task for his history: to make technicians' work visible and to understand why they were nearly invisible in the first place.[13] Informants and assistants to Victorian explorers are here assumed to occupy a social position similar to those Early Modern laboratory technicians in terms of their obscurity in the scientific records. Shapin found three problems in the historiography of technicians: their traditional exclusion from histories and sociologies of science; their invisibility in the formal documentary records produced by scientific practitioners; and the perception by persons in control of scientific workspaces that technicians' work was irrelevant to the final knowledge 'product'.

An attempt at such a history of technicians is recent work by Kapil Raj, who has looked at the close collaboration between local assistants and the British officials in the great land surveys of the Indian subcontinent in the late eighteenth and nineteenth centuries. Raj found that properly-trained human travellers became instruments,

measuring the landscape with their own bodies where British bodies could not tread.[14] As we will see below, the metaphor of instrument is important here: explorers, when they could not do the work themselves, used locals as instruments of observation similarly to the way that the metropolitan geographical community used explorers to view Africa from a distance. There are not exact analogues to Raj's examples on the Zambesi Expedition, but there are similarities in the ways local assistants contributed to the Expedition's labours.

Leading members of the Zambesi Expedition utilised assistants and informants of two general types: those brought with the Expedition and those employed in the field. The former category includes men of British origin and a dozen Kru sailors hired from Freetown, Sierra Leone. We know little beyond the names and wages of most of these assistants. The 'blue jackets', a synecdoche for common sailors, were seconded from the Admiralty to crew the steamers. The Kru sailors, following a long tradition of Krus serving in the British Navy, formed part of steamers' complement and were often set ashore to the endless task of cutting firewood for the steamers' hungry boilers.[15] They also unwittingly provided data for epidemiological studies of innate and acquired immunity to the 'Zambezi Fever' as Africans, but not 'local' Zambesian Africans. In fact the Kru were employed in part because there was a presumption that they would catch fever less frequently than Europeans because they were naturally more acclimatised to tropical conditions.

There were also many local assistants, who require some introduction. I use the word 'local' to describe all the people that members of the Expedition encountered, and possibly employed, in the field because it is far more precise than the much more subjective 'indigenous'. The latter excludes far too many individuals who lived in, and were possibly born in, Zambesia and possessed considerable stores of knowledge about the region. The category of 'local' incorporates all the various characters living in the Zambezi basin. On the river, many flavours of 'local' can be identified and a person's origin contributed to the explorers' recognition of them. One's status as Arabian, Portuguese, Goanese, Landeen (Ngoni-Zulu), Makololo, Manganja, Chewa, Ajawa (Yao), *colono*, slave, multi-racial, born along the river or in the highlands above, figured distinctly and critically into how

one was recognised by the British explorers. Portuguese settlers were further divided into two types: immigrant or locally born. The former held the highest status as authoritative reporters in the eyes of the Britons, although there was a strict class distinction between the officers and independent merchants and those conscripted as soldiers. The Mozambican-born Portuguese were, with exceptions, less credible in the explorers' eyes and were often described as possessing decreased physical, mental, and moral strength.[16] Nevertheless, a locally born Portuguese, especially if literate, was regarded as a more credible informant than any African. Similarly, the more 'Portuguese' a local appeared to the explorers the more potential credibility they possessed; in other words, phenotype mattered. The knowledge of Portuguese language was also an important characteristic. Withers, in his study of geographical knowledge in the late 1600s, developed themes concerning the language and social position of local informants in the Scottish Highlands that apply equally here: 'Acceptance of the reliability of others' experience depended also upon whose experience it was'.[17]

With these issues of identity and recognition in mind, examinations of published and unpublished explorers' materials can, within limits, contribute to our knowledge of obscured assistants and informants. Explorers' journals are occasionally the only source for the ethnography of regions at particular times, which makes them sources that must be dealt with, if they are imperfect.[18] Unfortunately, we rarely know local informants through their own words, as they left few written traces of their lives that have survived. We must read the explorers' travel narratives, private journals, letters, and articles available today with an eye to 'rescuing' hidden activities and understanding the role of assistants in the collecting activities of the Expedition.

There was little space in mid-Victorian travel writing and subsequent imperialist historiography for eighteenth-century conceptions of 'noble savages' living an idyllic existence unadulterated by the evils of urban life.[19] For instance, it has recently been discovered that the journals of John Hanning Speke, published in 1863, were edited by his publisher Blackwood to the extent of hiring a ghost writer to ensure that Speke's portrayal of the kingdom of Uganda fitted a 'preconceived social model'.[20] This was done without irony to an account of a vast region

almost totally unknown to European audiences. This has also been shown to happen with images produced to illustrate travel narratives. This could also be done with images when they were prepared for publication. Engravers could alter images made in the field to 'suit' the popular imagination and thus alter the representation.[21] Why were publishers unwilling to let explorers' descriptions stand on their own? Why alter the representation of a place the reader should have no preconceptions about? One answer may be that despite the declining momentum of the abolitionist movement, many Britons in the late 1850s continued to perceive Africans as needing help, and lots of it.[22] Livingstone and other 'progressive' monogenist thinkers argued that Africans were besieged by an indigenous social ineptitude, although inherently capable of being the equals of their white brethren in the future. Images that challenged the social inferiority of Africans to Europeans, and thus challenged the civilising mission ideology, were unwelcome. Among those who thought along more polygenist and racialised grounds, the necessity to shape the image of Africans as one befitting a 'lesser species' is more obvious. Publishers, often profit-seeking entities, preferred to give audiences what they wanted. Such popular, common sense perceptions of the chronic weaknesses in African society provided a firm foundation for the coherence of the civilising mission ideology and partly explain the inability of European authors of the later nineteenth century to depict Africans as independent, dominant and capable individuals.[23] Such effects also serve to explain why we know so little about African views on nature through travel narratives.

In the case of cartography, which may serve as an example for other sciences, research on indigenous African map making is noted by its absence. Bassett explains this marginalisation as due to a number of factors. European map making traditions quickly replaced African traditions during the colonial period. In addition, there has been a pejorative viewpoint that Africans did not have the cognitive ability to make such maps themselves. Finally, restricted definitions of what is a 'map' may have excluded a range of African map making processes and artefacts from serious study.[24]

Scholarship from India has provided some assistance in characterising local assistants and informants. The work of Kapil

Raj has been mentioned, but in the wider discourse of 'Subaltern Studies', the position of disempowered peoples in their oppressors' texts has become the focus of close research. Subaltern Studies is often considered a branch of literary criticism originating in India but it was originally based upon advances in Western historiography of the social.[25] Subalterns, it is argued, are obscured because 'Fragmented records of subalternity register both the necessary failure of subalterns to come into their own and the pressure they exerted on discursive systems that, in turn, provoked their suppression and fragmentation'.[26] Forever defined by the interlopers, the role of locals as informants or assistants was created by the European presence and impossible without that presence and the subsequent European writing of it. No matter what the reaction of locals to such encounters, Gyan Prakash argues that in every case, 'Reacting to power is to be constituted by it'.[27] This same power obscured subalterns and left their contributions irretrievable, presenting a difficult historiographical problem. Likewise in our case, without the Zambesi Expedition there is no local reaction to it and therefore no possibility for the history of this expedition written in denial of its central, structural role as the instigator and definer of all the events under consideration here. This may seem an obvious point, but if we try to obtain a history of the Expedition that extends beyond its central role the problem become acute.

The methods of Subaltern Studies can provide important clues to the mindset of authors who neglected to mention the contributions of those considered to be members of subjugated, or more appropriately in this case, 'observed' groups. The outlook is most strongly explained by Barnett for whom 'This routine practical dependence on local knowledges and information is not accorded any epistemological value.'[28] While such postcolonial critiques can be useful, the original task of subaltern studies, that of 'history from below', has shifted and become overly focused on the text.[29] Moving away from more empirical historical studies to literary theory can provoke misreadings of the exploration narrative. When just reading a published narrative, it is too easy to assume that there was something nefarious in the occluding of local contributions to British science. Maintaining these assumptions leads to conclusions that explorers were committing a form of empirical violence analogous to formal conquest. Such

assumptions can also lead to the assumption that early explorers in Africa were the first wave of imperialists as exploration and annexation are compressed into one act. We need to be more distinguishing, both in thinking about the historical legacy of African exploration and in our analyses of why locals were written out of the scientific record. To do this we must first consider the requirements of scientific rhetoric.

Here is where comparisons with seventeenth-century European laboratory spaces can help us understand nineteenth–century expeditions in Africa. Shapin's analysis of why Boyle's technicians were obscured demonstrates that other meanings, besides imperialistic power relationships, are implied by the absence of detailed information concerning informants and assistants in records of scientific work.[30] These layers of meaning remain unmentioned or unnoticed in literary analyses trapped within a postcolonial mindset that remains dazzled by the institutions of the 'oppressor'. Of particular note here is the work of Mary Louise Pratt in her text *Imperial Eyes* or that of Barnett in which travel narratives and scientific papers are classified as 'singular expressions of western interests and desires'. [31] This is a just characterisation in one analysis and must be kept in mind, but when texts were written for a scientific audience they were also the expressions of a scientific culture that was consciously striving to transcend local interests and desires of any type, *including their own*, in order to produce universally accurate representations of the natural world.

The specific requirements of the scientific goal of objectivity, well-established in mid-Victorian scientific culture, demanded first and foremost that observations were made *directly* by a trained, trusted investigator. In his research on Victorian geography Driver finds that, 'In the world of nineteenth-century science, the credibility of claims to empirical knowledge was said to depend on accurate observations, above all else'.[32] The fact that such observations were almost always produced by a European has led to presentist assumptions of a racialist epistemology in some postcolonial critique. This has been an error. Science cannot be reduced to a passive tool of imperialist oppressors. The exceptionally rich history of the rise of empiricism and the growing reliance on instruments and numerical data all indicate that at mid-century the explorers themselves were under increasing pressure to

be more thorough, more methodological, more *scientific*. Only in this way could their observations be useful, believable and transferable. The concern for firsthand observations and the suppression of the local voice was not about race *per se*; it was about trust, credibility and authority; and how these were earned, maintained *and* represented in the types of documents we have available to us today. Therefore, Barnett is correct to highlight the subordination of non-European meanings and knowledge to the European, but he has failed to appreciate how European meanings and knowledge were moulded, and themselves subordinated, to the discourse of universality.

Although at first appearing distant to the topic in hand, Shapin's study of early modern laboratories therefore provides an important analogy for the written representations of the Zambesi Expedition's collecting activities and the roles of assistants. When Kirk declares that he made collections of plants on the Zambezi, we may recall Shapin's analysis of Boyle's claims to experimental authority:

> A plausible interpretation of what was intended by and understood by the seventeenth-century claim that one had 'done experiments oneself' is that the experimental work had been instigated by oneself, that the historical events reported in the resulting experimental narrative did actually occur and occurred when and as described, that they occurred in a place over which one exercised authority, that one had indeed taken responsibility for what happened, and that one now vouched for the truthfulness of what was textually related.[33]

Similarly, if members of the Expedition employed local assistants to collect plants or animals it need not have been overtly stated because they were vouching for subordinates' work and ultimately responsible for it. This is clear when we contrast private or unpublished evidence of their daily activities with the published works. When Kirk, Meller or Thornton stated that they made collections along the Zambezi this statement affirmed that they had power over particular 'spaces of collection', saw to it that collections were what they were supposed to be, and that if instruments were used, they were used properly. This caretaker role was enabled by their credible reputations and assumed by scientific readers. It is clear that the rhetorical necessities elided the contributions of locals to the Expedition, but we should not then

jump to the conclusion that this contribution was not understood to have occurred. In other words, saying that the contribution of local informants and assistants was irrelevant to the representation of expeditionary practice does not mean that these locals were irrelevant to the practice itself.

Reading deeply into explorers' texts and related sources to uncover the daily practices of field science also protects us from *mis*reading the significance of how specimens obtained locally were later represented in metropolitan scientific literature. Equally important to the generation of scientific knowledge was the analysis of the collected specimens and data by metropolitan analysts. Fortunately many of the specimens collected by Kirk and the others remain preserved in Natural History collections around Britain and may be examined today. Using these resources we can see the labels and hastily scrawled notes on scraps of paper for ourselves—daily practice revealed in the material culture of collection. In order to demonstrate how such investigations extend our appreciation of the relationship between explorers and locals, this discussion is intended to engage with further claims made by Pratt. She has suggested that, 'Natural History as a way of thinking interrupted existing networks of historical and material relations among people, plants, and animals wherever it applied itself'.[34] Pratt finds that this interruption occurred as a consequence of removing objects of natural history physically and conceptually from the 'tangled threads of their life surroundings,' and their 'places in other people's economies, histories, social and symbolic systems'.[35] While it is true that the contribution of local knowledge to scientific analyses was severely *under*written, I want to suggest that the examination of debates concerning data collected in the field can reveal how local knowledge was important to both the explorer's view of the environment and to metropolitan scientific discourse. While normally (and acceptably) obscured as part of field practice, in certain contexts local knowledge of the natural world was not only collected, it was important scientific evidence.

It will be argued in the next section, and indeed through the rest of the book, that specimens were best understood when 'their places in other people's economies, histories, social and symbolic systems', were preserved, recorded and remembered—contrary to Pratt's assumption

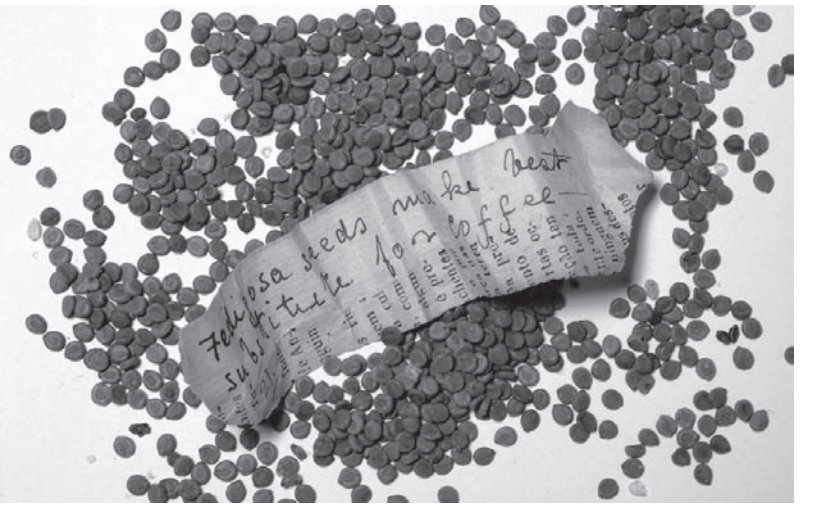
that these attributes of specimens were always interrupted. The case studies that follow will provide examples of how the 'local' was preserved in universal scientific knowledge, merging the field and metropolis into one space of scientific practice where science was constructed: the space of an expedition.

FIELD COLLECTION IN PRACTICE

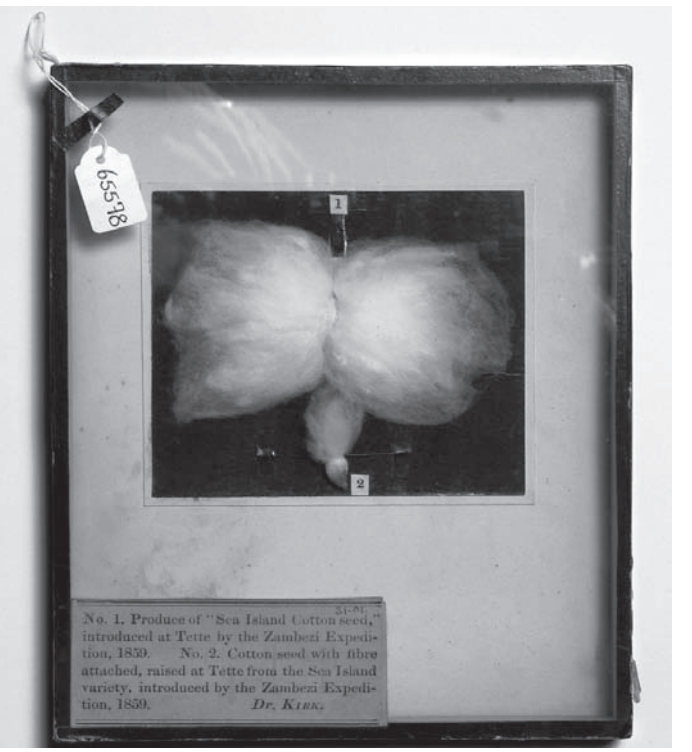
No level of training or preparation could totally prepare a scientific fieldworker for a new environment. Climate, politics and the potential specimens themselves offered unforeseen challenges for collection, preservation and description. The guides to exploration discussed previously acknowledged this uncertainty, while making extensive prescriptions for how to be prepared. Expeditions proceeded with immense quantities of gear in order to be prepared for any contingency. What is clear in such guides is that local knowledge was accorded some degree of respect, if only in that it was worth recording. In a letter written just before the Expedition's departure, Murchison advised the Foreign Office and the Admiralty that Livingstone should be instructed to record 'native systems of weights, measures and values' along with astronomic positions by sextant, the morphology of the river, etc.[36] How successfully (in metropolitan estimation) an individual dealt with such varied tasks and the contingencies of the field contributed largely to their reputation as an explorer.

During the first few weeks the Expedition was in the Zambezi delta, in May and June of 1858, Kirk began to collect as often as he could given his multiple responsibilities and the constraints of time. As the Expedition wound its way through the sinuous effluent channels of the delta, a village came into view. This was Kirk's first encounter of agriculture in the region and he was keen to see which plants were cultivated. Direct questioning of the farmers proved difficult when they all fled:

> We had seen several native canoes and now we came in sight of natives near their huts. We landed but the fellows made off. I took specimens of most of the things grown in their gardens. Among these were millet, rice, cassava, sweet potatoes, castor oil, Indian



8. *Cassia occidentalis*. 'Fedigosa seeds make best substitute for coffee'



9. *Gossypium sp*. 'Sea Isle' cotton sample from the Expedition's experimental plots

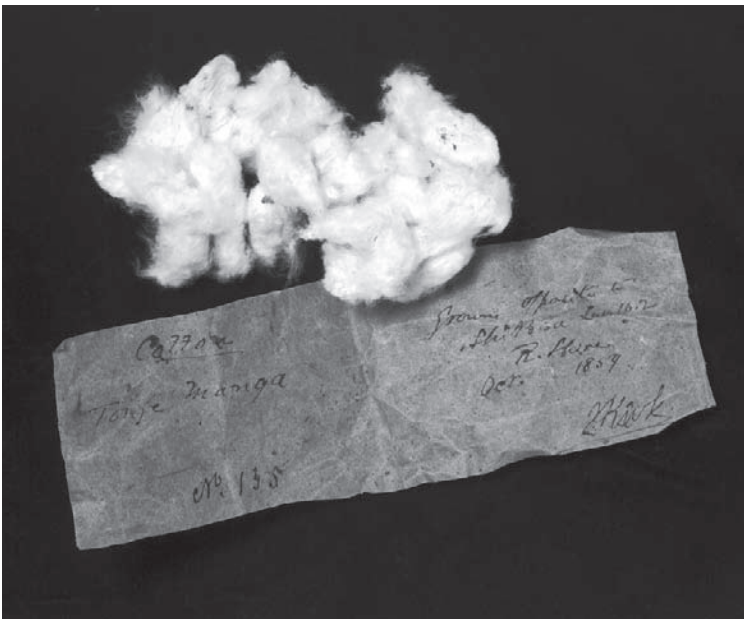
> hemp, pumpkins and cotton. The occupation of the people seemed to be that of fishermen. We left several things in return.[37]

In Baines's journal there is further detail:

> About eleven we saw a few huts and Bedingfeld and Kirk went ashore, but returned presently calling to me for biscuit and pork.... We left the pork and bread in exchange for the few specimens we brought away and proceeded on our voyage.[38]

We have no idea of local opinion concerning this event. What did they make of the steamer and the strange appearance of saltpork and biscuits? The sight of the steam launch, *Ma Robert*, and uncertainty over the intentions of this boatload of Europeans was clearly enough to make avoidance the only prudent reaction. We can plausibly infer from the above that Kirk was impressed by the variety of plants under cultivation and strongly desired specimens. Without any permission, but ethically concerned about 'stealing' the specimens, Kirk quickly organised an exchange of foodstuffs and the specimens were accumulated with a clear conscience. In this early indirect encounter with local knowledge, Kirk may have been thinking of Livingstone's instructions concerning proper behaviour: the explorers must always set 'an example of consistent moral conduct'.[39] The act of leaving payment for the specimens contrasts with ideas of explorers running roughshod over local property, even though he has taken some liberties. Kirk eventually earned the trust of farmers, and acquired a large amount of information concerning agriculture, both African and Portuguese. Thus he filled his role as the 'economic botanist' which necessarily relied heavily upon local knowledge and practices. His reports rely heavily on this information.

We can see the traces of local information elsewhere in Kirk's work. The 'Entry Book' for the Museum of Economic Botany at Kew Gardens, which contains a daily record of all the objects coming into the museum, includes entries of specimens from the Zambesi Expedition. In the entries, local names and uses for plants were carefully recorded, for example: 'Bark of *Mukundukundu* (Cinchonaceae) used in fevers by the natives'; 'Cotton as obtained from the natives' or 'Follicles of a Apocyneaus plant called *Kombe* and used as an arrow poison'.[40]



10. *Gossypium sp*. 'Cotton, Tonje Manga, no. 135, grown opposite to Shibisa's Lat 16.2, River Shire, October 1859, J. Kirk'

11. *Strychnos sp*. 'Drinking Vessel, made of fruit of Mohulu-hulu. Dr. Livingstone's Exped. 1860. Sir J. Kirk'

Elsewhere Kirk utilised local classifications of cotton to aid his discussion of the possibilities for cotton exports from the region:

> Cotton—There are two species of the cotton plant cultivated in countries explored: one of these, known as the *Tonje Kaja*, has been in existence for a very long time, and may be indigenous; no trace of its introduction can be found; it is found everywhere, but is being replaced by a better sort named *Tonje Manga*, which signifies foreign cotton, and is of modern introduction, having come from the various towns on the east coast.[41]

Kirk (and Meller) collected raw specimens along with finished products of local refining processes. Balls of tobacco, fishing nets, cloth, blocks of caoutchouc (rubber), hair combs, flour, glues, oils and prepared fish poisons were among the materials returned for analysis. These arrived along with dried plants and fruits preserved in spirit which were sorted and sent to the Herbarium. On the labels, produced in the field where paper was apparently at a premium, the blending of local and European knowledge can be seen. When Kirk returned to Kew, he assisted in the more formal identification of his specimens with Latin nomenclature. At the British Museum, animals received similar treatment with local names and uses included on labels attached to the specimens. These were gathered through informants, such as the fishermen who would approach the members of the Expedition with fish for sale.

Other forms of data were collected through local assistance, often in response to contingencies that threatened standard field methods. For instance, the constant mobility of the Expedition, which was not part of the original plan, prevented daily, long term meteorological observations at any particular station but this kind of data was important and expected by metropolitan analysts. Therefore, Kirk trained Major Tito Augusto Araujo Sicard, Commandant of Tete and later (1863) Governor of Quelimane, in the recording of barometric readings and other measurements at Tete.[42] Sicard's register was the longest consistent meteorological record that the Expedition produced, though it was not performed by an actual member of it.

In another example, we can plausibly suppose that Kirk felt in control of his collecting activities during an event recorded by Richard Thornton: 'One of the Zulus came in. He spoke a little Portuguese and

seemed a pretty sensible fellow. Kirk promised him some cloth if he would bring him the leaves and flower of columba root.'[43] This method of offering money for specimens is not widely recorded by members of the Expedition. More frequent were instances of collection by purchase of animals and plants sold as food (and often eaten as such). In these situations specimens were not sought out at all, but fortuitously appeared before the collectors' eyes and their skill lay in identifying an opportunity when it arose. Portuguese settlers also provided their local knowledge, though this was not always acknowledged. Kirk fails to record in his journal what appears, according to Thornton, to have been an informative tour of Sena:

> [Senhor Belchior] and Kirk had a long talk about the productions of the country. He showed [Kirk] an enormous lump of India Rubber and gave Capt. B[edingfeld] a good lump, then he showed us the boazy [buaze shrub] and he was very bitter against the Portuguese Government here. Showed us some brown sugar manufactured at Tete. It was very sweet and good. Then went out to see the canoes. They bring him a good deal of money. A good large canoe costs 30 [to] 50£, some of the largest more.[44]

In this way, locals of all sorts unknowingly acted as collectors for Kirk and the others. In other cases local collectors knew their positions and sought to be a part of the project. Some of the Portuguese settlers who were aware of the skills the explorers possessed brought specimens of minerals and plant resins for analysis—no doubt thinking of commercial potentials. Once again we have the most detail about such an incident from Thornton. He records on 6 September 1858 that Major Tito Augusto Araujo Sicard had sent some of his men to look for gum-bearing trees, gum copal and other plants for Kirk.[45] It is less clear in the record of the Expedition if locals were ever formally trained to collect particular specimens under direction. Later in his life Kirk, as HM Consul to Zanzibar, did use teams of local collectors whom he personally trained, but whether he did during this earlier period is unclear. It is safe to assume that paid local collectors were utilized on an *ad hoc* basis, like the unnamed Zulu or Senhor Belchior above, but there is no evidence that any were given regular pay.

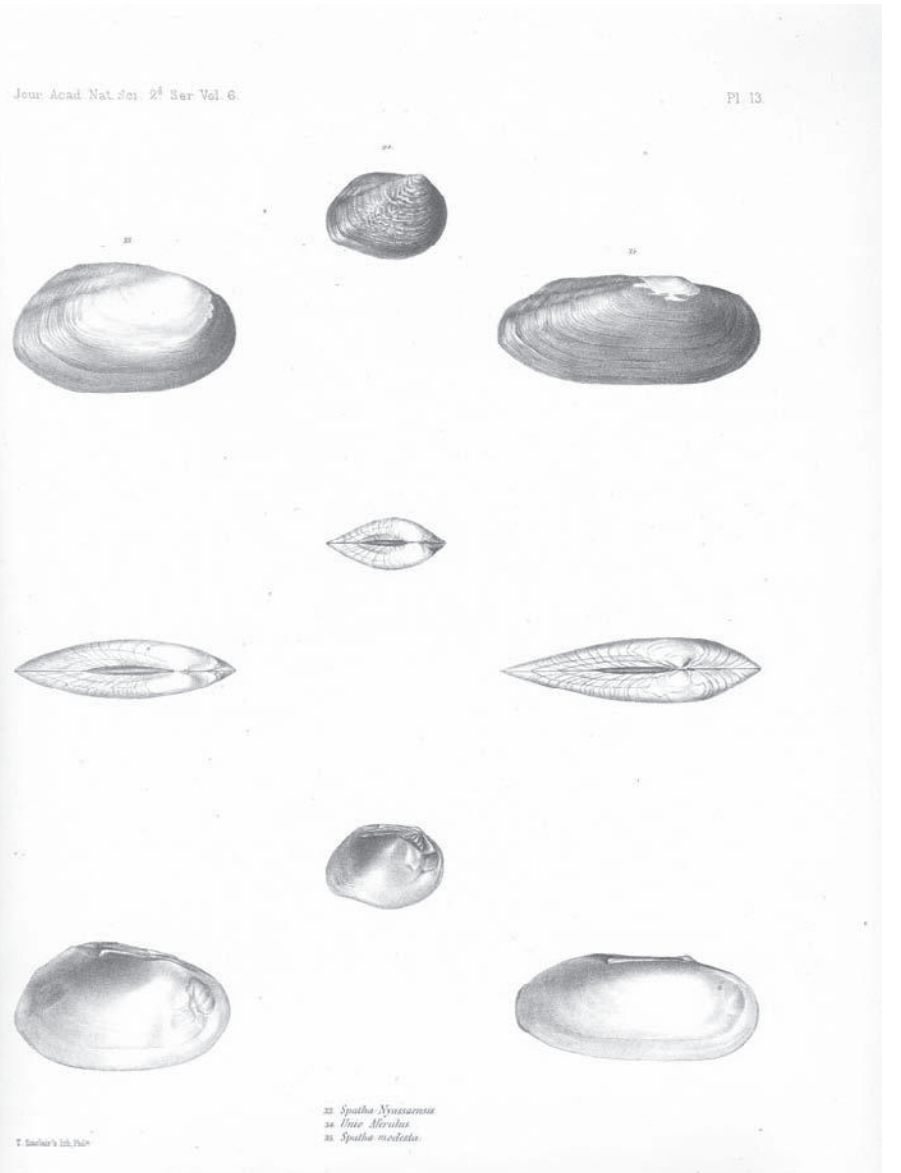
Acknowledging a direct role for local informants in collecting information and making observations was not often an appropriate

method for the explorers, and hence they were written out of the final analyses. There are important methodological reasons why acknowledgment was difficult. First, in order for Kirk to use local information he had first to indicate that he had, in very real sense, failed to make the observation himself. The failure needed to be explained or at least recognised. Second, the problem of establishing the credibility of these informants was very important and also very difficult; they were not part of the same community as Kirk and those who would examine Kirk's data. Specimens could be validated to some degree, but second-hand information presented a larger problem. Applying concepts to the natural world is a social process and in using locals Kirk was bringing in persons from outside the community into this process; this could not be done without explanation. He therefore had to provide clear reasons for why we should believe his assistants. In a letter to A. Günther at the British Museum Kirk demonstrates his struggle with these concerns:

> Above the Victoria Falls of the Zambesi and the Murchison Rapids of the Shire a marked difference in the fish fauna is met with. During the short time I spent in the former region, many fishes with which I was not familiar in the lower part were observed, and the natives who accompanied us remarked of others met with near Tete, and still more met with in the Nyassa Lake, that to them were unknown. Without claiming for the negro any exalted place, still it cannot be denied that in such points as come under his daily observation, particularly as concerns his food, he is very accurate and discriminating.…The knowledge possessed of wild game by hunters of the desert is well-known; and the different tribes depending on the produce of the waters are equally well acquainted with their inhabitants.[46]

The tone of the excerpt shifts at the point where Kirk admitted he relied on local informants to confirm his suspicions that the distribution of species in the river system changes above the major cataracts. Having shifted from personal observation to local hearsay mid-sentence, he selfconsciously enters into an explanation of why we should believe these informants.

The plea for credibility he gives is curious because it does not rely upon describing individual integrity, but rather upon two other



12. Unionid Mussels collected by Kirk

arguments. The first is that people who eat fish will know what they look like. Secondly, and perhaps more interestingly, he calls up a universal ethnographical type—the knowledgeable fisherman who knows his prey is just like the desert hunter we all (apparently) know so well. Having related his companions to other ethnographic 'type-specimens' who possess credible knowledge, Kirk is bridging the gap between Humboldtian biogeographical thinking about mapping species distribution and indigenous knowledge. He used arguments he clearly expects any armchair naturalist would be prepared to understand and accept. By repackaging the local African fisherman's knowledge into universal statements about human nature he has made the local informant a credible authority on fish distribution. It is a remarkable transformation. The letter also indicates further that local African fishermen could not be allowed into British scientific discourse on their own merits; they lacked the appropriate credentials to speak in that forum and their expert information was only allowed after this careful explanation. Despite the necessity for this transformation, it does not follow that the local knowledge of nature was 'not accorded any epistemological value' or ignored. Kirk's explanation indicates that local knowledge was permissible *after* systematic modulation and, despite this modulation it retained value throughout analysis in the metropolis *as local knowledge*.

A failed attempt to use local information occurred in wider attempts to determine the hydrology of the region. In relation to the simultaneous journeys of Burton, Speke and Grant to the north along Lakes Tanganyika and Victoria, the existence of a river at the north end of Lake Nyassa was a very important piece of information. Burton insisted that Lake Tanganyika was the source of the Nile, Speke insisted it was Lake Victoria. If a large river flowed into the northern end of Lake Nyassa then Speke's argument was that this river must flow from Lake Tanganyika and thus the latter lake could not have enough water to give rise to two rivers. Therefore, it was very important for British geographers in Africa to have the most accurate and complete information about the situation of all the rivers running into or flowing out of Lake Nyassa.

Connected to the Tanganyika question was whether or not the Rovuma River flowed from Lake Nyassa to the Indian Ocean. This

question spawned two trips up this river by the Zambesi Expedition and the death of at least one local in a skirmish. Livingstone had pushed hard up the Rovuma because he knew that for geographical, diplomatic and navigational reasons the Zambezi was turning out to be a personal embarrassment. Long after his colleagues had realised the Rovuma was not a viable alternative, Livingstone dragged them and their boats up the shallow stream praying that it would lead into Lake Nyassa.

In both cases, the north end of Lake Nyassa and the source of the Rovuma, the members of the Expedition failed to produce direct observations—they did not reach the north end of the lake and they did not reach the source of the Rovuma, wherever it was. They interviewed many locals concerning the two points of geography, but could draw no firm conclusions. Concerning their attempts to interview locals, Livingstone found that, 'It is difficult to get at facts, or draw out of the natives any reliable information respecting the country in front'.[47] Realising he could not provide a direct observation and certainly aware of the criticisms endured by Burton and Speke for their similar inabilities to observe the northern end of Lake Tanganyika or to circumscribe Lake Victoria, Livingstone resisted the temptation to draw any firm conclusions about the geography of the northern end of the lake. In the end, the best claim they could make concerning the lake was based upon their most reliable informant in that area, whose knowledge was weakly argued to agree with what they were already thinking:

> [Chief] Mankambira had never heard of any large river in the north, and even denied its existence altogether; giving us at the same time the names of the different halting-places round the head of the lake, and the number of days required to reach the coast opposite his village; which corresponded, as nearly as we could judge, with the distance at which we have placed the end.[48]

This was, of course, insufficient evidence when presented in London and this was made clear to them. On the day after Kirk returned to London he wrote to Livingstone that: 'Murchison looks broken up… he says if it [the Expedition] had only gone on to the north end of Nyasa which people say (why I don't know) receives a large river from the Tanganyika we would have done something'.[49] This is a clear sign

to us that the results of the Expedition, its knowledge product, had wider consequences and also that the status of local informants—their credibility—influenced how this knowledge was received. The reception of the Expedition's reports in Britain will be examined further in the next chapter.

The examples given above support and challenge some postcolonial literary criticisms of Victorian exploration accounts. They support Barnett's conclusion that, 'A labour of transformation is undertaken upon local information before it is allowed to appear as knowledge open to scientific verification and refutation.'[50] However, the transformation was not total, and it was not in the interests of scientific authority to completely sever or silence the local voice. At times debates were only solved by reference to the words of local informants and in the case of Economic Botany local knowledge was often exactly what was desired. The agency of non-Europeans in these encounters was challenged, but a closer look at the internal discourses of science and the material cultures of collections indicates that there are cases where local knowledge's power extended to the metropolis. The place of the explorer in this process will be examined more closely in the following example.

FROM FIELD TO PUBLICATION: MOLLUSCS AND THE GEOGRAPHY OF THE ZAMBESI EXPEDITION

Malacology, the study of molluscs, attracted scientists as well as those enthralled with shells as decorative objects. The mussels considered here are all part of the Unionidae, a large Family of freshwater molluscs containing around 1000 species. Although most widely distributed in North America, hence the name, Unionids are found all over the world. In this section I examine how specimens of Unionids travelled from Lake Nyassa, where Kirk collected them, to Philadelphia. This case study will provide an example of how specimens from the Expedition moved around the globe.[51]

The path of the mussels is best followed by beginning at the end, with their description in academic journals. In 1865 some of the mussel specimens Kirk collected were described by Heinrich Dohrn in

the *Proceedings of the Zoological Society of London*. Heinrich (1838–1913) was a noted zoologist who had taken his PhD from Berlin in 1861.[52] He was the brother of the more famous pioneer of marine biology, Anton Dohrn (1840–1909). Their father, Carl Augustus Dohrn (1806–1892), was a successful entomologist. Although most of Heinrich's papers and collections were destroyed in the bombings of Stettin (now Szczecin, Poland) during World War II, it is likely that Dohrn had seen shells from the Zambezi while studying in Berlin, where Wilhelm Peters, who had collected along that river in the 1840s, was Professor of Zoology. Peters published his Zambezi specimens as a series of volumes titled *Naturwissenschaftliche Reise Nach Mossambique*. These volumes, and his role as a critic of the Expedition will be discussed at length in the next chapter. In his description of Kirk's specimens, Heinrich Dohrn lamented the absence of certain shells that he knew were originally part of the collection sent to him for description:

> I regret very much that there are no Unionidae in the collection which I got for examination. All I can state from the above list [of species] is, that the conchological fauna of Lake Nyassa seems to belong to the same region with Natal; but most of the freshwater species from the lake having turned out to be hitherto unknown, and some of the other species having been found by Captain Speke and others far more northwards, it is rather difficult to come to any conclusion from the present collection.[53]

Elsewhere in the article Dohrn quoted a letter from Kirk, which explains the absence:

> The Unionidae of the lake having previously been described and figured by Isaac Lea, in a paper read before the Academy of Natural Sciences of Philadelphia, April 12th, 1864, are not here included. They number six species, and one still remains undescribed.[54]

Why would six shells out of the Lake Nyassa collection have been removed in this way, especially since their removal hindered Dohrn's task of drawing conclusions about their geographic distribution in respect to other African collections? The unique Unionid specimens, most likely new species, were identified and specifically separated from the main collection to be sent to Philadelphia for description by Isaac Lea. Dohrn received only the remainder. Sending the specimens to

Lea was clearly justified. Lea was a leading member of Philadelphia's scientific community, and an expert malacologist. He was the world expert on the Unionidae. Lea was also personally known by European men of science. He twice toured the important scientific centres of Europe, developing especially strong relations with staff at the British Museum (Natural History).[55]

Kirk collected the mussels on Lake Nyassa in September or October 1861, though he does not record the exact date. During this period Kirk, David and Charles Livingstone, John Neil, an able seaman, and 'a score of attendants' travelled nearly the whole length of the lake in a small sailboat with a following shore party.[56] It was a difficult trip and offered limited opportunities for collecting due to the speed of their travel and a lack of porters to carry specimens. Their main intention was to record the dimensions of the lake and determine its place in the region's hydrography. It may be that Kirk did not collect the specimens himself but utilized local assistants, was presented the shells or even that he purchased them at a market: these are all methods of acquiring specimens he describes elsewhere in his journals.[57]

The Nyassa team returned to the main body of the Expedition, who were waiting for them at the first cataracts of the Shire River, on 8 November 1861. Their boat, HMS *Pioneer*, was readied and everyone started downstream in the hopes of meeting an Admiralty ship at the delta of the Zambezi. Unfortunately, *Pioneer* ran aground in the shallow river and remained stuck for over a month waiting for the river to come into flood. While idle, Kirk wrote letters to Joseph Hooker and William Hooker describing the flora and fauna along the western shore of Lake Nyassa. The first letter was written on 6 December 1861 to William Hooker and mentions the Lake Nyassa shells specifically.[58] Kirk had packaged up a number of crates and he requested that a small tin box of shells, packed inside a larger case, be forwarded to 'Professor Owen' at the British Museum. The next letter to William Hooker, written nearly two weeks later indicates that Kirk removed the tin of shells from the larger box along with some cotton samples and oil nuts.[59] It appears that there was a chance to send a small amount of packages ahead to the coast by canoe, and Kirk thought to send the small tin box of shells ahead instead of keeping them with the bulk of his collection, stuck on the sandbank.[60] In the

letter he again indicated that the shells should be forwarded to Owen and requested, 'if he sends me the names of them I should be much obliged'.[61] By mid-January, the chance to send some correspondence ahead had not materialised and the tin box of shells was back in its original crate marked, 'for Prof. Owen'.[62] The river rose and the *Pioneer* finally reached the coast on 20 January. HMS *Gorgon* met them there on 31 January to transfer correspondence and supply provisions.

Confident the shells were finally on their way, Kirk wrote to Richard Owen on 15 March 1862 to alert him of the new specimens. The Expedition was busy transporting pieces of their third steamer, *Lady Nyassa*, upriver from the mouth of the Zambezi as they unloaded them from HMS *Gorgon*. The letter opens with Kirk writing:

> I send through Sir W. J. Hooker a collection of shells from the borders of Lake Nyassa. Among them I doubt not you will find several new ones. They will at least be interesting as I think it contains more species than any other collection from the Lake Regions.[63]

In the last part of the quote here, Kirk is alluding to the mussel shells collected by Burton and Speke on their East African Expedition.[64] Although Kirk was located somewhat remotely in the field, developments occurring in the exploration of the continent elsewhere reached him through correspondence and influenced the way he saw his own specimens and their relative importance. If the mussels he collected were of the same species as those found by Burton and Speke, then a strong argument could be made that Lakes Nyassa and Tanganyika were connected by a river. This revelation would have provided further evidence for the ongoing efforts to determine the sources of the Nile. At the same time Kirk was sending the shells to England, Speke was crossing into the Kingdom of Uganda, trying to prove that Lake Victoria was the source of the Nile.[65] Knowing this must have highlighted for Kirk the importance of the Lake Nyassa specimens and helps explain why he was keen to get them home and described as quickly as possible.

The shells, with other mails and specimens, went with HMS *Gorgon* when it left the Mozambique Channel for Cape Town on 4 April 1862. The cases were taken to Simon's Bay and then transported to Sheerness, at the mouth of the Medway on the Thames estuary, by HMS *Cossack* and were addressed 'through the Secretary of State for Foreign

Affairs to Kew Gardens'. The Admiralty notified William Hooker on 9 September of their arrival and a few days later the specimens were sent by train to Kew.[66]

The case holding the shells was opened along with ten others at the Kew Museum for Economic Botany on 16 September 1862.[67] According to the Entry Book, the shells were forwarded to, 'Prof. Owen, Brit. Museum'.[68] The rest of the material remained at Kew because Kirk specifically requested this of William Hooker in the letter of 6 December, 1861.[69] Here we learn that, where the specimens were of great interest, such as a foetal elephant, a lepidosiren, or the mussels, the specimens would be opened and forwarded for expert description quickly, rather than storing them safely and waiting for the collector to return. It was understood that the context necessary to fully understand and classify many of the specimens would be lost if they were dispersed before his return home. In a letter to John Washington, Livingstone also instructs that botanical and zoological specimens must remain with Joseph Hooker at Kew, 'till the arrival of the collector, whose knowledge…will be most advantageous in classification'.[70]

Aside from the mussel shells and a few other specimens, the bulk of the zoological materials remained packed in crates at the herbarium for two years waiting for Kirk. It would appear that moving from local to universal knowledge here required the *physical* presence of the collector, who stood as proxy for the Zambezi basin, confirming the natural habitat of specimens. Without his presence, the specimens could lose their local meanings and were in danger of becoming dislocated curios. Though Kirk would not be the author of the descriptions of most of his collection, zoological and botanical, he still held control over their fate. This indicates his credibility as a collector and the importance of his field knowledge to the final description.

Where he felt capable, Kirk did author articles describing his specimens, bowing to others' authority where he did not. He was commonly mentioned and cited in papers where his specimens were described. Neither his credibility as a fieldworker nor his authority as a man of science was ever called into doubt—he smoothly operated in both capacities and approached the Victorian ideal of a fieldworker: reserved, daring and scientific.[71] Keeping most of the Zambezi collections sealed until Kirk returned and opened them himself allowed

the chain of credibility from the field to the published description to remain tightly linked. The mussels, however, were particularly interesting. Their description could not wait and thus they were sent ahead.

At the British Museum the specific entry in the Accessions Register for the mussels reads, '1862 October 8th, a collection of shells, collected during Dr. Livingstone's Expedition and presented by Dr. Kirk. Post Office, Cape of Good Hope'.[72] Although this entry would appear to indicate the shells in question, it is not clear why they are listed as coming through the Cape Post Office and this form of registration does not match the information found at Kew Gardens. This can be interpreted as a clerical mistake, for the other evidence presented above suggests conclusively that the shells went to the Museum via Kew; their dates of arrival at Kew and the British Museum correspond to the parcel's description.

In tracing the movement of specimens from Kirk's hands via Admiralty ships to Kew and then the British Museum, we are tracing lines of authority that linked field collectors to metropolitan research centres. Trust was placed in those who transported the specimens and those who took responsibility for them. Kirk does not indicate in his letters that he had an analyst for his specimens in mind. Instead, Richard Owen, as superintendent of the natural history departments of the British Museum, was expected to deal with the collection appropriately. In this role, Owen acts as an integral part of a network upon which the Expedition's scientific credibility and significance would depend.

The shells next appear in the *Proceedings of the Academy of Natural Sciences of Philadelphia* on 12 April 1864. In his, 'Descriptions of Six New Species of UNIONIDAE from Lake Nyassa, Central Africa, &c.' Lea writes:

> The specimens herein described are of unusual interest. They are the first which I have seen from Central Africa, and I am greatly indebted for them to the liberality of John Kirk, M.D., of Edinburgh, who accompanied the Zambezi Expedition, under the British Government, as Medical Officer and Botanist. There are six in number, all of which I believe to be undescribed. … The three Uniones differ from any type I have heretofore seen from Africa. …

> It is greatly to be regretted that none of the soft parts were preserved, that we might compare their anatomy with those from America. Lake Nyassa is one of the three great central lakes of Africa, and has a southern drainage in the Zambezi River. It is, in extent, as Dr. Kirk informs me by letter, 'exceeding two hundred miles north and south, and from fifteen to sixty miles wide, and is fifteen hundred feet above the sea. It lies between the parallels of 14° and 18° south latitude.[73]

Lea described the specimens and, with acknowledgment to their home environment and collector, named them: *Unio kirkii, Unio nyassaensis, Unio aferula, Spatha alata, Spatha modesta,* Spatha *nyassaensis*. This article was collected together with others and republished with plates in the Academy's *Journal* a few years later. Tracing in detail the shells' movement from Kirk to Lea via Owen as intermediary is not easy. Letters from Kirk to Lea appear not to have survived and it is unclear if the letter to which Lea refers above was personally written to Lea by Kirk or if it was a general letter accompanying the specimens. Kirk never had an opportunity to meet Lea and they do not appear to have known each other. Lea was, however, a close personal acquaintance of Owen and others working at the British Museum.

Given what we know from Dohrn's article, it is clear that the Unionid shells were selectively removed from the main collection and specifically sent to Lea for analysis.[74] Others were qualified to do this work. Dohrn certainly implies that he could have done the job and did not approve of splitting the collection in the first place. According to Dohrn, splitting up the collection between analysts diminished its value as evidence for the biogeography of mussels in southern Africa. Despite these issues, instead of keeping the shells together and using a more local specialist, the *Unio* specimens were separated out and sent to Lea. Possibly to avoid any priority dispute or confusion in naming, when the remainder of the shells were sent to Dohrn for description, no Unionids were included, so if there were duplicates retained at the British Museum, Dohrn was clearly not allowed to see them, hence his 'regret'.[75] Dohrn was very much acknowledged as an expert in malacology, but Lea was the established expert on Unionids. In 1863, Lea had been sent Unionid molluscs recently collected in South America by Patricia María Paz y Membiela, former director of

the Spanish Comisión Científica del Pacífico, demonstrating that Lea's expertise was widely acknowledged in the early 1860s and he was receiving specimens of this family from government-sponsored expeditions worldwide.[76]

Described, named and published in Lea's articles, the mussels were then fully incorporated into western scientific knowledge. They have been moved from the farthest empirical and geographical peripheries into the metropolitan knowledge system epitomised by London's scientific institutions. In following the mussels to their final destination we find, however, that the metropolis relocated itself along lines of credibility and authority leading to Lea in Philadelphia, where the journey ends.

It may seem obvious to some that we should think of the British Museum as a 'centre of calculation' and apply actor network theory in this case. But if we did so, then this centre must occupy a space stretching from Philadelphia, across London, to Berlin—an unwieldy image that is overly reductive.[77] By following the mussels through society, the centre of calculation proves to be a fictitious place if we assume it to be the end of the line where all the further analytical work was performed. Here, the metropolitan centres of science acted to propel the specimens further along their epistemic journeys as material collected on the Expedition was dealt with, literally, on a case-by-case basis. The work at the museum involved receiving specimens, evaluating them briefly and then sending them on to an appropriate expert for proper analysis, wherever they may be. This taxonomic triage may be reviewed today in the rough identifications given to specimens in museum accessions registers and donation books. The point of the primary analysis was to get a quick idea of what was arriving so that a specialist could be assigned to identify them. Differences in the quality of initial classifications can be attributed to the skills of whichever individual was responsible for opening the box.[78] In this role, the British Museum functioned less as a 'centre of calculation' and more as an entrepôt for natural history. Furthermore, given the continual rhetorical links made to fieldwork and its function within analyses, notions of an analytic 'centre' are misleading when we are trying to construct a historical geography of scientific knowledge.

CONCLUSION

This chapter examined the activities of collection and in particular the epistemic and physical spaces where practices that resulted in the attachment of new meanings to objects and information were performed. Geographers of science have classified these spaces as those where collection, production, and consumption of scientific information take place.[79]

In this chapter, the role of local assistants and their contribution to the field-based practices of the Expedition were examined in detail. Their obscurity in narratives of expeditions and scientific literature is found to have a twofold origin: Western egotism and the stylistic norms of scientific argument. In contrast to some findings of postcolonial literary critics, the latter is argued to have the larger influence upon the obscuring of local assistants and informants in the various texts produced by scientific expeditions. Indeed, as we will see more clearly in the next chapter, the role of the explorers themselves was obscured, ignored or deliberately marginalised in some arenas of scientific discourse; in these situations the further-removed epistemic contribution of local assistants had very little chance of being acknowledged. Thus, while explorers downgraded the role of local informants and assistants in fieldwork, the contributions of explorers could also be downgraded in metropolitan accounts of knowledge gathered in the field. This gives us reason to revisit our assumptions concerning the power relations between locals, explorers and metropolitan analysts of expeditionary data.

Although racialist and nationalist preconceptions certainly had a role to play in these empirically-driven relationships, it must be kept in mind that the Europeans involved were overtly concerned with upholding rigid standards of scientific logic and practices of professional scrutiny. For example, it was for these latter reasons that in the years around 1860 the three great African lakes—Tanganyika, Nyassa, and Victoria—were considered inadequately understood and the stage was set for a further decade of geographical theorising now known as ‘the Nile Controversy’. During this debate, many explorers’ conclusions about the hydrology of each lake were determined by metropolitan analysts to be based solely upon local testimony rather than direct observation and hence, incomplete. This was despite

the fact that Burton, Speke, Livingstone and Kirk all wanted their local informants to be authoritative and did everything they could to corroborate their evidence. In practice it appears that the veracity of 'native testimony' was an unsolved epistemological problem in geography and natural history. This problem was continually revisited with each new conclusion arising from an explorer's fieldwork.[80]

In other cases the role of the explorer as interlocutor and the voice of the local were purposefully mobilised to support or attack scientific conclusions. In these situations it became necessary to open the 'black box' of scientific practice and demonstrate the methods of knowledge acquisition and appropriation. Moreover, in the case of a famous figure such as David Livingstone, intervening historiography, initially imperial or hagiographic followed by psychoanalytic biography, has been either unwilling, theoretically unable, or simply uninterested in analysing the social construction of scientific knowledge. This has resulted in the continued invisibility of the local contributions. The examples above show that where the explorer was found to be a competent fieldworker and offered careful conclusions, then the local voice as modulated through the explorer was in fact perfectly admissible, credible and, above all, necessary. This corroborates Bassett's conclusion that African knowledge significantly influenced European maps of Africa.[81]

In the case of the Zambesi Expedition, we find the incorporation of African knowledge into European knowledge systems via the recording of local names for animals and plants along with geographic information. These names later became potential pieces of evidence for further scientific identification and analysis in laboratory or herbarium settings. Wilhelm Peters wrote in the introduction to his study of Zambesian fishes that he strictly collected local names in order 'thereby to have rendered the recovery of the species considerably easier for my successors'.[82] Along with names, local knowledge of plant and animal distribution, habits, and uses were also incorporated into scientific descriptions of the region. In the case of Economic Botany, finding sources for key Victorian raw materials such as coal, gutta percha, gum copal, cotton and other fibres was almost entirely reliant upon determining local knowledge and practices. In the case of gum copal, the investigation of local collecting practices contributed to the determination of its origin as fossilised tree resins. A further example

involves commercial information, where systems of weights, measures and currency were critical information that had to be accurate if future trade were to succeed. Connected to this was information on local fashion trends in cloth and beads; the wrong trade items were worthless and would purchase little in local markets. Explorers had to be prepared.

Specimens, properly catalogued, served as boundary objects between knowledge systems and spaces. As objects or facts moved between communities they filled different purposes and new meanings were attached to them. The dramatic modulation of a plant from agricultural produce to herbarium specimen to potential item of trade is the canonical example of how expeditions alter the natural worlds they visit. Explorers who were found to erroneously record local names or insufficiently catalogue specimens were challenged and could lose credibility as a fieldworker. Thus, local classifications of the natural world, made real by their attachment to physical objects, provided part of the foundation for imperial descriptions of the Zambezi basin.

A wealth of manuscript and published evidence has allowed for this analysis of the Zambesi Expedition. The links between local African knowledge and European science has been examined here and contributes further evidence for Turnbull's recent conclusions concerning the comparative sociology of scientific and indigenous knowledge:

> Recognising that all knowledge systems create their own space in which knowledge, trust and place are made, allows for just such an interrogation and working together [between alternative systems] by making visible the spatial and moral components of knowledge production.[83]

The following chapter continues the examination of collecting activities, but from a metropolitan perspective. Here we will be looking closer at the ways in which Britain's scientific community talked about and influenced the Expedition through the analysis of its results. Many of the themes developed here will remain important as we look at the ultimate destinations for the knowledge produced within the spaces of collection: the metropolitan institutions which received, analysed and published the results.

6 The Expedition at Home: African Nature in the Scientific Metropolis

INTRODUCTION

Representing Africa to the metropolitan scientific community required the physical movement of people and equipment to the field and the reciprocal movement of people, data and specimens to the metropolis. Collections constituted a major portion of this latter movement and their appearance brought African nature before the metropolitan gaze. They also served to lend credibility to an explorer's verbal report. The link between well-preserved specimens and personal credibility was clear to the explorers of the Zambesi Expedition. Joseph Hooker instructed Charles Meller, 'Dried specimens afford the means of knowing the products of a country, they alone can authenticate the information the traveller produces; they are the warrants of his industry and intelligence'.[1] This movement and replacing was very much part of the Expedition and of its post-fieldwork validation. The expeditionary project did not end with the return of the explorers; rather it continued, and continues, through an open ended period of analysis and dissemination as researchers call upon the data produced by the Expedition for a variety of research purposes including ethnography, botany and, of course, history. This chapter examines the story of the Expedition in the metropolis and how the explorers and their specimens navigated the wider scientific community. The trajectories of the specimens are mapped and the statements of

the Expedition's harshest critics are used to identify the epistemic standards which challenged fieldworkers in metropolitan locations.

The years 1863 and 1864 saw the slow return of the Expedition's members. Kirk first reached London on 9 October 1863 with Charles Livingstone; Meller a few months later. Livingstone, remaining briefly to examine the areas west of Lake Nyassa returned on 23 July 1864 via Bombay. During these years the 'unpacking' took place and the explorers presented the bulk of their findings to the metropolitan scientific community. But what else was going on in that community at the time? The early 1860s saw great debates in science and examining this context in which data from the Zambezi were presented may help us to understand the experience the explorers underwent.

First and foremost, the controversy surrounding Darwin's *On the Origin of Species* (1859) was a significant part of the wider context. There remained at this time a variety of opinions on the subject.[2] 1864 also saw the exciting high point of the Nile Controversy, with its acrimonious disagreement between Richard Burton and John Hanning Speke. A formal debate was planned to take place at the September 1864 meeting of the British Association for the Advancement of Science in Bath. Had Kirk and Livingstone made it to the northern tip of Lake Nyassa and determined if a river connected it to Lake Tanganyika they would have contributed critical facts to this debate. But they did not complete their survey and were thus pushed to the background of the discussion. Instead, we find that Livingstone, as an expert on things 'African' and a still popular figure, was called in to chair the Geography session of that annual meeting where Burton and Speke would debate their conflicting theories. Tragically, Speke's death the evening before the debate forestalled the encounter forever. [3] Even though there was no revelation of the Zambesi Expedition's discoveries at the meeting and the Expedition was only mentioned in passing during Murchison's address to the Geography & Ethnography Section of the meeting, Livingstone's fame was such that he did lecture before a general 'Evening Meeting', and, as recorded in *The Times*, he gave a general account of Zambesia and proposed more plans for the future abolition of the slave trade through the introduction of lawful commerce.[4] It was a standard speech for Livingstone and very similar to those he gave previous to the Zambesi Expedition; it was not printed in that year's BAAS *Report*.

The year 1864 also saw the foundation of the X-Club, an exclusive dining club within the Royal Society founded to promote the position of science in British society and secure steady public funding for scientific workers. Members of the club such as Joseph Hooker believed that science deserved to be publicly funded and he and others lobbied to this end for most of the latter half of the nineteenth century.[5] No doubt he would have been sympathetic to Kirk's failure to find funding for writing up his collections in the winter of 1863–64 despite multiple applications to the Foreign Office. Kirk, who never overtly sought to make easy profit from science, was exactly the kind of botanist that the younger Hooker wished to see supported. We can have little doubt that Kirk's situation would have contributed to Joseph's sense of crisis in the scientific profession. In the end, Kirk never found a financial reward or paying career in science, although he remained an important botanist and was elected a Fellow of the Royal Society.

Members of the X-Club were also involved in the debates over natural selection, which were vibrant in 1864. The rhetoric began to take shape as a war of Science versus Scripture.[6] Fearing a resurgence of orthodoxy and the possible loss of nature to theology, the X-Club formed partly to counter any such movement and to act as advocates for scientific naturalism and liberal reform.[7] Promoting an independent (read as 'agnostic') scientific profession working for the public good with public support was their strategy for realising a complex set of goals. By being independent the members of the X-Club also desired the creation of a scientific community that was supported by the public but not working directly for the public's desires. They did not want men of science to become low-level civil servants, rather they wanted their expertise acknowledged and trusted.

While the members of the Expedition navigated the exciting events in science, they also sought to address what we might think of as the Expedition's audience, but this concept needs to be examined more closely. What kinds of people were interested in the Expedition's activities? Was there an organised interest in Africa? To answer this, the notion of an 'Africanist' community needs to be investigated in terms of whether it could be said to exist in Great Britain around 1860. Was there an acknowledged group of experts on 'Africa', possibly representing various fields of research, waiting to be informed and

provide comment? A distinct metropolitan terrain of African discourse, was not yet formally arranged in the 1850s and 1860s. The Royal Colonial Institute was not formed until 1868. The Society of Arts, a commercial development organisation, did not designate a section for African topics until 1874. The Royal African Society was not founded until 1901. Before these specialist spaces opened, 'Africanists', such as there were, met and debated within the varied discursive spaces of geographical, scientific, ethnological or anthropological, commercial, philanthropic or missionary societies.[8] Few societies around 1864 made any special provision for discussions of African topics in general: they mixed them freely with discussions of other areas of the globe. Yet, we can map out something of the social arena in which Africa would be discussed.

In specific circumstances ideological divides would keep Africanist discourse fragmented. The Anthropological Society, founded in 1863, was instituted on strict polygenetic ideas about the races of humans that were at odds with the monogenists of the Ethnological Society.[9] Abolitionist and anti-slavery groups had long been arenas for discussing Africa's problems and promoting solutions, although by 1864, the heyday of these groups had passed along with wide acceptance of their optimistic Rousseau-esque representations of African society as a romantic idyll untainted by civilisation. From the early 1830s these groups tended to use Exeter Hall in London for their meetings, bringing together those interested in humanitarian and missionary work in Africa under one roof. It was in front of many such groups that Livingstone spoke during 1857, seeking support for his return to the Zambezi in order to assuage the evils of the East African slave trade.[10] These spaces were not the place for specialist scientific discussion of botany, zoology, or the like.

In geographical circles, specialist interest in Africa had long centred on the Royal Geographical Society (RGS), founded in 1830, and its precursor, the African Association, both of which promoted exploration of the continent. The RGS regularly scheduled papers to be read at its Monday night meetings with a geographical theme—the famous 'African Nights'—but there was no further specialisation in its regular publications. Nevertheless, the RGS provided a central space for discussing the findings of the Expedition, and its role in critiquing

the Expedition's work is examined later. Looking to botany, neither Kirk nor Meller were acting as specialist 'African botanists', but, rather, were botanists applying themselves to African plants. Even if they were such focused experts, none of the British natural history societies specialised on particular overseas areas at this time.

The real connection between botany and the exploration of Africa was made through the discipline of economic botany. Riding on the possibility of commercial, and hence wider benefits, interest in the useful plants of specific overseas areas grew during the 1850s and 1860s.[11] The Museum of Economic Botany at Kew Gardens opened in 1847 and steadily became an important resource for industrialists seeking new raw materials: indeed, 'all botanical collections made at government expense went after 1854 first to Kew'.[12] The early 1860s were also the years when the great colonial florae would be proposed and begun. Magisterial catalogues of a region's plant life, they were written slowly over the next few decades through projects covering the British West Indies, Tropical Africa and the Cape.[13] Much later, in 1960, the *Flora Zambesiaca* began compiling a taxonomy of plants found throughout the basin. Kirk is acknowledged as the empirical progenitor of that work and an itinerary of his movements on the Zambesi Expedition is included in the first volume.

Related to this discussion of useful plants was another popular topic for the early 1860s, acclimatisation.[14] The establishment of societies devoted to the promotion of acclimatisation in the 1850s and early 1860s gave renewed impetus to the idea of generating wealth and industry through the skilful transfer of species to new locales.[15] Acclimatisation discourse was also interested in the introduction of foreign species for zoological and botanical gardens as well as for horticultural curiosity, fishing and hunting. France led the way in this area with the founding in 1854 of *Société Zoologique d'Acclimatation* in Paris. While many schemes failed, the overt symbolism of European hegemony through metropolitan displays of colonial nature reinforced imperial ideologies of dominance through science.

Zoology and the earth sciences were similar in their lack of formal overseas regional specialisation and the main British journals included articles looking at material from around the globe. Indeed, Murchison was himself interested in Africa because so little was known about its

past and present geological structure but this did not make Africa a unique place. Rather, Africa was for him considered to be yet another wilderness beyond the edges of the empire, soon to be known and dominated.[16] Medicine similarly knew little of Africa, but did not think of it as an essentially different kind of place. Conceptions held at the time concerning the causal factors of disease, especially fever, were not specific to Africa or anywhere else in the tropics, they were universal. Furthermore, Tropical diseases, as we conceptualise them today, were not so understood until the 1890s, and as such were not a topic for a regionalised discourse.[17] Where hygiene and sanitation were being promoted for improving the health of expeditions in Africa, the same techniques could equally apply to the denizens of London. Livingstone promoted the highlands adjacent to the River Shire as healthier than the banks of the Thames, examining the rivers and the climate of their adjacent lands according to the same criteria.[18]

Indeed, at this time men of science were increasingly seeing their discourse as universal. The accelerating rise of the metropolitan, professional scientist possessing a global view during the 1860s entailed a devaluing of the local outlook of parochial, and now amateur, investigators.[19] Scientific discourse was selfconsciously universal. So at a basic level, interest in the findings of the Zambesi Expedition would be formulated through an expectation that the general rules of natural history would apply. Therefore, discussion of the findings of the Expedition would take place in the context of a global discourse, not an African one.

Given the lack of a dedicated professional specialisation, if there was anything like a community of 'Africanists' before the partition of Africa by the colonial powers in 1885, it was extremely small in nature and scattered in its geography. In an important study, Dorothy Helly found only 150 men in England 'consistently concerned' with African topics appearing at the meetings of professional and philanthropic societies between 1860–1890. She finds no indication that these people imagined themselves as members of a specialist group concerned with Africa.[20] Thus, when Kirk, Meller and the other members of the Expedition returned home to report on the natural resources of the Zambezi valley, their audiences within the scientific community would have been diverse, but, with the exception of the geographers

and a few commercial speculators, probably not interested in south-eastern Africa in particular. This final point can help us to understand the reception of the Expedition overall. The more popular press focused its reporting on the incomplete discovery of Lake Nyassa, that is, they judged the Expedition solely from the standpoint of the most popular aspect of exploration at the time: geographical discovery. The remainder of the Expedition's findings, and the more successful, were distributed and contained within specialist literature and went largely unnoticed beyond those spheres.[21] This reception will be examined in further detail below.

The scientists of the Zambesi Expedition were returning to a community that was keenly interested in learning about new and unusual areas of the globe. They presented their data and specimens to experts that would analyse and critique them according to universal scientific standards of truth and evidence. Methodologically speaking, there was nothing special about Africa; its nature would be examined in exactly the same way as the Pentlands—the whole world needed to be understood according to one set of rules and standards of evidence. As William Hopkins succinctly put it in 1860, 'It is impossible to admit laxity of reasoning to the naturalist while we insist on rigorous proof in the physicist. He who appeals to Caesar must be judged by Caesar's laws'.[22] It was into those critical arenas that the Expedition would deliver its results and be judged by them. This chapter will further detail the discourse of these arenas by reviewing the publications which resulted from the Expedition. The reaction to the results in public and private spaces will also be examined where the evidence allows. In general, the spaces of presentation, dissemination and circulation will be queried in order to reveal the interests that both direct scientific practices and shape the construction of scientific knowledge in these spaces.

PUBLICATION PATTERNS

The Zambesi Expedition produced considerable data and specimens that were used by metropolitan specialists in a number of fields. The rhetoric used to muster support for the Expedition appealed to the great

benefits that would flow from the resulting scientific knowledge of the region. The situation was different at the close of the Expedition when harsh criticism of its failure to open new trade routes or make any conclusive geographical discoveries, combined with a general lack of interest in the press, obscured the numerous empirical results. As one commentator to *The Examiner* wrote in 1863, the whole Expedition was a 'hopeless enterprise' and a waste of public funds.[23] Similarly this opinion persists until today and then as now, the scientific aspects of the Expedition have been neglected in published historiography. With these issues in mind this section outlines a preliminary analysis of the written scientific product of the Zambesi Expedition as it was published in Victorian scientific periodicals and stored in natural history collections.

Connections between the members of mid-Victorian scientific society were maintained through its publications. The great proliferation of periodicals, specialist and popular, itself the result of falling printing costs in the second quarter of the nineteenth century, provided a key arena for the dissemination of findings; not everyone could attend regular meetings.[24] Beyond the societies, and their more exclusive reading publics, popular science journals were also present in the third quarter of the nineteenth century and were present alongside the incorporation of scientific material into non-scientific publications.[25] Science was also discussed increasingly in local societies which promoted science as a civic interest.[26] Popular science journals, often inspired by self-improvement ideologies, linked the arenas of scientific production to those of scientific consumption through the simultaneous revelation of the knowledge-making process and the dissemination of findings; they sought to take science to the people.[27]

How far all this popularisation actually reached members of the working classes is subject to debate, as organisations such as the Royal Institution—dedicated to the popularisation of science—failed to reach the 'depths' of the working classes through lectures and demonstrations.[28] In terms of scientific descriptions of the Empire it is possible that the majority of the population of Great Britain received very little beyond the most sensational stories.[29] Moreover, Riffenburgh, in his study of the representation of explorers in the Victorian press,

Journal Title	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1871	1877	Journal Total
Annals and Magazine of Natural History			2			1	1	2					6
British Medical Journal					1								1
Journal of the Linnean Society: Botany							2	1		6			9
Journal of the Linnean Society: Zoology								1					1
Journal of the Royal Geographical Society				1		1	6	4		1			13
Journal of the Society of Arts			1										1
Medical Times and Gazette				2	4								6
Philosophical Transactions of the Royal Society												1	1
Proceedings of the Academy of Natural Sciences							1						1
Proceedings of the Royal Geographical Society	1	2	1	5	1		2	1		1			14
Proceedings of the Royal Society of Edinburgh		1											1
Proceedings of the Zoological Society			1				11	3					15
Report of the BAAS Annual Meeting		2	2		1		1						6
The Ibis							3						3
*The Lancet**				1		1	1						3
The Technologist				1	2		1						4
Transactions of the Botanical Society		2			1		2		1				6
Transactions of the Epidemiological Society				1							1		2
Transactions of the Linnean Society			1		2		1	1					5
Total articles or notices appearing	1	7	8	11	12	3	32	13	1	8	1	1	**98**

13. Table of Scientific Publications

finds that, 'Most people did not really want to know about scientific data or results'.[30] Those neglected data and results remained confined to specialist literature; that literature is examined here.

The Table on p151 is a tally of scientific publications related to the Zambesi Expedition's work. It includes any articles, reprinted letters or papers read aloud at meetings that utilised or discussed data and specimens produced by the Expedition. Shorter notices or mentions in annual addresses that merely inform the reader of the Expedition's progress have been excluded from the count. With the exception of *The Technologist*, all of the journals listed here are associated with scientific societies or institutions.[31] Though not catalogued here, newspapers such as the *Times*, *Illustrated London News*, *The Scotsman* and *The Examiner*, along with periodicals such as the *Quarterly Review*, *Blackwood's Edinburgh Journal*, *Home and Foreign Review*, *North British Review*, and *Edinburgh Review* provided their readers with updates of the Expedition's progress or reviews of its publications. The quarterlies usually discussed the Expedition in relation to the exploration of Africa at large or in connection with issues such as slavery, cotton supply, emigration or missionary work; those issues of interest to the reading elites.

The greatest number of articles appeared in 1864. The two 'outliers', published in 1871 and 1877, are an article on cholera epidemics in East Africa and one on geomagnetism. For the former, James Christie was preparing an epidemiological study of cholera and sought Kirk's knowledge concerning the extent to which it spread southwards during an 1858 outbreak on Zanzibar. The latter was a product of Sabine's 'magnetic crusade', which took decades to complete.

The rush of publications in 1864 occurred because Kirk was responsible for most of the specimens the Expedition produced, and he returned in 1863 to open the crates that had been sent ahead. Charles Meller, the other naturalist, returned to London a few months after Kirk and would have helped to catalogue them, but recurrent fevers caused him to be immediately convalesced to the south of France. Because of this Meller asked Kirk to take control of his specimens for him. It is for this reason that Kirk is credited in Accessions Registers at Kew Gardens and the British Museum with many of Meller's specimens. The presence of the collector was important as it allowed the bulk of

the natural history collections, those sent ahead and those that had just arrived with Kirk, to be identified by experts at Kew, the British Museum and other locations. Many boxes had remained unopened for years waiting for Kirk to arrive.

Evidence for the official nature of the Expedition is made apparent by the publication patterns. Kirk had close ties to the Botanical Society of Edinburgh and he published with them before joining the Expedition. From the Zambezi, Kirk regularly corresponded with the Botanical Society's head and his botanical mentor, John Hutton Balfour. Balfour published these letters in the society's *Transactions* after removing any personal or sensitive comments.[32] When Kirk returned to Scotland, he made a presentation to the society about the Zambezi, and this was published in 1864.

Despite these close ties to the Edinburgh-based Botanical Society and with the singular exception of Lindsay's 1866 article on dye-yielding lichens from the Zambezi, no analyses or identifications of Kirk's specimens were published in the Botanical Society's *Transactions*.[33] The sole vehicles for publishing the botanical specimens were the products of the Linnean Society of London, which was closely connected with Kew's botanists. The official instructions for the Expedition indicated that Kew was the institution responsible for analysing the specimens. This plan was followed as was the normal route of publication out of Kew at the time—the Linnean Society. This pattern of papers also indicates the availability at Kew of sufficient expertise to identify the specimens. Likewise the desire, and ability, of Kirk to work on his own collections is apparent in the botanical articles: he wrote five of the fourteen.

Where we can definitely point to Kew as the site where the botanical specimens were analysed, the analysis of the zoological collections followed a somewhat more dispersed pattern. The zoological specimens were discussed across six separate publications written by ten different analysts. As noted in Chapter 5, some of the zoological specimens were shipped abroad to specialists for identification. This dispersal pattern reflects the breakup of the Linnean Society's control over zoology in the 1820s, and the continuing preoccupation of the Linnean Society with botany.[34] It is clear that the British Museum (Natural History) was the destination for almost all the zoological specimens, but it

was not the site where they were all examined; because of this the publication of those specimens was across more periodicals than the botanical specimens. This may indicate that zoology was less of an 'imperial' science than botany and its findings were not 'national trade secrets' that required protection; although such a claim requires further research. Certainly, with limited exceptions, animal products held less potential for industrial exploitation than vegetable products. It was simply not as important to protect zoological findings, whereas sources of quinine, gum copal, plant fibres, gutta percha (suddenly of immense importance for insulating telegraph wires) and dyestuffs were critical to the British economy.[35] While the importance of economic botany to the nation was clearly promoted by the Hookers and others, the idea of economic zoology appears to have been far less coherent outside of animal husbandry and game keeping, neither of which were of great concern to the members of the Expedition.

In geological research, the identification of coal deposits was self-evidently important to national interests, though an inconvenient location could render any discovery worthless. It was because of the importance of coal that Thornton was specifically identified as holding expertise in mining geology and sent with the Expedition.[36] Despite Thornton's considerable efforts at the coalface, physical and diplomatic barriers rendered the deposits unavailable to British industry for some decades. The rest of Thornton's work focused on finding evidence to support Murchison's predictions concerning the large-scale structure of continents. During his period of separation from the Expedition he assisted the exploration of Mount Kilimanjaro with Baron von der Decken.[37] The young geologist's premature death in the field left behind a mass of indecipherable field notes and a few published letters. Thornton's geological observations remain scattered and imprecise, lacking any conclusion and failing to provide the basis for a geological map of the region.[38] Nevertheless, his more general observations, and those of the other members proved important. For instance, the position of large mountains to the west of Lake Nyassa seen by Livingstone proved Murchison's prediction (which he had made in 1852), that the southern portion of the continent consisted of a large watery plateau subtended or enclosed by higher mountain ranges themselves punctuated by fissures through which Africa's great

rivers emerged.[39] Because of Thornton's untimely death we see no strictly 'geological' publications, and those that tend in that direction are published by the RGS, under Murchison's strict control.

The measurements of terrestrial magnetism taken in 1858–9 were not published as part of Sabine's global geomagnetic survey for twenty-one years. Three points are indicated: Tete, Dakanamoio Island and Expedition Island. It is interesting to notice that the 'Observer' column lists only 'Livingstone', obscuring the fact that Charles Livingstone was largely responsible for the measurements with the help of Baines, Thornton and Kirk. David Livingstone, in fact, was not trained to use the instruments. The investigators of terrestrial magnetism appear to have had little interest in the contextual details of collection. Of importance here are the accuracy of the particular instruments and the capabilities of the instrument operators. The maps Sabine produced demonstrated the uniqueness of the Expedition's contribution to the global project; they remained the sole data points in the region for many decades.

The Table on p151 further demonstrates that the RGS published most consistently any information originating from the Expedition. This is not surprising given its strong connection with African exploration. This also occurred because the RGS was a forum where a much larger variety of topics could be discussed. The patterns of publication also tell us much about the nature of 'writing up' an expedition. In the patterns we can discern where, and under whose authority, the metropolitan side of the Expedition's works was performed. But to stop our analysis at the surface of the articles would leave much of the story hidden. The natural history of the Zambezi Basin was revealed in these articles, but investigating the way in which the information was transmitted and received will tell us something more about the internal politics of the Expedition and the character of Victorian Science and its corporate view of Africa. The next sections take a closer look at how these articles came about and the reaction they generated. We begin with tracking Kirk's activities in London after completing his fieldwork.

CONTINUING THE WORK OF COLLECTING SPECIMENS

Kirk arrived in London from the Zambezi on Friday 9 October 1863, and travelled via the overland route which involved a land crossing in Egypt from the Red Sea to the Mediterranean. He had left the Expedition on 19 May 1863 along with Charles Livingstone, and some crew members. Their journey included stops at Mozambique Island, the Comoros, Zanzibar, the Seychelles, Aden, Suez, Alexandria, Malta and finally Southampton. Charles Meller left on 17 July the same year. On his arrival he went directly to the Geological Society, possibly to look for (and fail to find) Murchison. The next day he reported to the Foreign Office in order to organise the outstanding salaries for the subordinates who had accompanied him. The following Tuesday, Kirk made the rounds of scientific London listing his activities in the briefest prose:

> October 13th. Call on Prof. Owen at British Museum, give Dr. Gunther the small tortoise—Call on Dr. Sclater, Zoolog: Soc: hand over to him the Lepidosiren. Call on Sir R. Murchison—he is down death on the Expedition. I can see.[40]

Kirk's journal reveals that he was beginning the most crucial stage of the Expedition, meeting the leaders of the scientific community and presenting important specimens for analysis. He was also handling more mundane administrative issues. The following week Kirk went to the Zoological Gardens and also met with Sir William Hooker and discussed the placement and analysis of the specimens. At the meeting Hooker showed Kirk a copy of a letter from Livingstone that caused Kirk to be particularly offended. Livingstone had sent letters to the elder Hooker via the Foreign Office which indicated that Kirk and Meller had large amounts of specimens with them. Livingstone asked Hooker to ensure that the collections did not fall into private hands. In other words, make sure that Kirk or Meller do not sell the specimens for private gain. In his journal that day Kirk thought Livingstone's letter to be 'ungentlemanly'. The botanists had no intention of misappropriating the specimens, it was always clear that they were government property. To learn of Livingstone's mistrust was particularly upsetting. Livingstone had always placed a lot of faith in Kirk and this official expression of mistrust is surprising.

Livingstone stepping in at such a late stage and expressing concern for the fate of the scientific collections may demonstrate how little he knew about how the scientific work had been performed. Probably unknown to Livingstone, Kirk and Meller regularly corresponded from the field with William and Joseph Hooker at Kew Gardens about their collections. In this revealing correspondence we learn much about what Kirk and Meller felt about being natural historians working for Livingstone. It was not good. The leaders of Kew Gardens were told repeatedly that Livingstone's leadership consistently hindered investigations into the natural history of Zambesia. When Kirk learned that his leader was now trying to ensure the collections were protected and not stolen the information must have held some dark irony.

Once he saw that the specimens were delivered to the appropriate institutions, Kirk hoped to see his Expedition salary extended to include the period he assisted in their analysis. Livingstone and others hoped that Kirk would spend three or four years working on the specimens and then publish a book-length account of 'the botany and natural history of the Expedition in a separate work'.[41] Kirk's salary was never extended and he never published a popular book, preferring articles in specialist journals. Kirk wrote to his old mentor, John Hutton Balfour that he worked solely for the good of botany.[42] This may partly explain why the scientific work of the Expedition has always been obscure.

Another aspect of metropolitan scientific life revolved around the societies. Kirk attended numerous scientific meetings in the Autumn and Spring seasons while suffering through recurrent (probably malarial) fevers.[43] He worked on the specimens that he could, but he was also beginning to see that because he was not the owner of the collections, his access to them was subject to continual negotiation. Kirk lost control of his zoological specimens and they quickly became lost in, what he called, the 'Great Sea' of the British Museum.[44] He had little chance of even getting lists of the specimens. At Kew, where Kirk was well known, the situation was better for access and his work on specimens there resulted in a series of publications.[45] At the British Museum the Zambesi Expedition specimens were dealt with as part of its day-to-day work.

Meller, who left the Expedition in July 1863, was forced to convalesce in southern France. He had asked Kirk to take care of his specimens

for him. Meller, who joined the Expedition in early 1861, had always felt that his work in the Zambezi no more than complemented Kirk's earlier work and published nothing concerning those specimens. However, Meller did publish his statistical investigations concerning the incidence of fever among members of the Expedition. The data were collected by Kirk and Meller. These articles are very telling because in them Livingstone's claim that the Shire highlands were 'salubrious' was questioned. No change in the incidence of fever was observed between the delta and the highlands. Although the causes of malaria were not yet understood, Meller's article directly challenged a microclimatic explanation for fever aetiology. However the articles did note that Africans succumbed to fever less then the Europeans, and the local Zambesian Africans suffered the least of all. These findings gave some power to the idea of human acclimatisation to particular regions. In a short report that Kirk made to the Botanical Society of Edinburgh he concluded that due to the climate of the region, 'Europeans may rule the country [eastern Africa], but will never colonise it'.[46] He held this position firmly until the end of his life.[47]

Once located at appropriate institutions, specimens came under analysis by a variety of experts. Not all of the analysts were located at the British Museum or Kew Gardens. Distributing specimens for analysis was an important part of the work done in connection to the Expedition, and it was work that relied heavily upon established professional networks. Specialists were identified through their reputation in publication and via personal acquaintance. Geographical location or 'in house' status may have also been important when assigning workers to identify specimens, but, as the case of the Unionid mussels demonstrates, experts outside the institution were often called upon. The evidence here suggests that these networks were not always planned in advance but, rather, were established contingently, depending upon the types of specimens produced.

The example of the six Unionid mussels that were sent to Philadelphia illustrates how fieldworkers possessed varying control over the later representation of their specimens. For example, in Dohrn's article on the *Unio* specimens, Kirk was only quoted to provide information concerning local context and regional distribution. Likewise, others cited Kirk in their articles naming specimens from the Zambezi

collections, adding his first hand knowledge of context (e.g., location, habit and uses) to desiccated taxonomic descriptions. But the degree to which Kirk's field information was incorporated into the descriptions was entirely up to the analysts and their necessarily synthetic works. For example, George Bentham offers varying consistency in using Kirk's contextual information when describing specimens of African *Anonaceae* (custard apples):

> *Artabotrys brachypetala* at Tete on the Zambesi. The fruit is said to be pleasant eating. Kirk.
>
> *Unona obovata* hot springs at the foot of Moramballa on the Zambesi. Kirk.
>
> *Popowia ? kirkii* on the Zambesi at the foot of Moramballa and opposite Senna (Kirk, who reports the fruit to be pleasant eating.)
>
> *Monodora sp*. from Shiramba on the Zambesi (Kirk). Fruits only known, which are globular, about 1 inch diameter, and with a thin pericarp as in the last but marked outside by 8 to 10 longitudinal raised costae. Dr. Kirk describes it as a bush which, at the time he gathered the fruits (July, 1859), had neither leaves nor flowers.
>
> *Anona arenaria* Widely spread over tropical Africa; described as growing in great abundance over vast tracts of country in Senegambia and Sierra Leone by Leprieur, Barter, and others, in Bornou by Edward Vogel, and on the Zambesi by Kirk.[48]

In many of the publications in Appendix A are found similarly brief allowances of contextual information concerning the local use of particular plants and animals. Often the specimens were included in papers that dealt with a particular genus or family of organisms. The fact that the Zambesi Expedition was involved or that the specimens originated in Africa may not have been highlighted at all.[49] This indicates that the way in which specimens were used depends upon particular disciplinary styles of knowing. The industrial analysis of fibres from the buaze bush represents a utilitarian interest. In malacology or ornithology there were both empirical and aesthetic interests involved.[50]

As a fully trusted collector assisting the analyst, Kirk acted as a dislocated avatar for the Zambezi Basin. Bringing the foreign space with

him into the articles published about the specimens, Kirk repositioned the specimens back in the field. From a reader's perspective, Kirk lifted the specimens from the African environment and handed them to the analyst. The distance between cabinet and field was rendered minimal—despite the long and convoluted journeys they took—a necessary rhetorical consequence if local specimens were to have universal scientific significance. This supports Barnett's conclusion that such abstracted knowledge was necessary because:

> Signifiers of embodiment or interest are markers of particularity and run counter to the required self-abstraction, which is the condition of being recognised as a subject of nineteenth-century scientific discourse.[51]

Equally necessary was the downplaying of any contributions made to our knowledge of such specimens by local informants or assistants as any more than subservient and anonymous informants. In the extract above they are completely invisible—it is Kirk's assessment of flavour that is reported. However, in Kirk's journals we find that this kind of information was often acquired through informants. In reading the large number of disparaging remarks about African cuisine throughout the published and private papers of the Expedition one point rings clear: Africans' taste in food varies widely from that of our European explorers and locals' statements about flavour were not valid testimony. It should be noted that European food was not necessarily safe for the explorers either. This was loudly demonstrated by the great mulligatawny incident of September 1859, when an over-spiced pot of the soup (or possibly poison, they suspected) caused Kirk to sleep restlessly amongst his colleagues because 'Heavy artillery had been at work all night on both sides of me'.[52]

In his own articles, Kirk freely used his own impressions of the environment he observed. This lengthy quote shows how Kirk mixed in gleanings from his own field notes with the detailed examinations made later at Kew. Switching rapidly between ethnographic and botanical information Kirk provides a view of plants ranging from the microscopic to the regional, as in this article on a new banana which Kirk named *Musa livingstoniana*:

> Hab[itat]. The mountains of Equatorial Africa. Gorongoza, south latitude 19°; Manganja, south latitude 14°; Maravi country, south latitude 12°, and the Niger region?
>
> In habitat this banana is indistinguishable from Musa Ensete, Gmel. Syst., and Hook. Journ. Bot. And Bot. Mag. Vol. lxxxvii. tab. 5. 223, 224 (M. Ensete, Bruce), which is also a native of the same region.
>
> Where found several grew together, and the natives had built huts under their shade. Possibly it is cultivated in some parts.
>
> It is 18 feet high; the stem thick, conical, and bulged at the base, where it is of a purple colour.
>
> The leaf is nearly sessile, the midrib thick, and the blade broad. In these respects it resembles M. Ensete; but the seed is very different. All we know of the fruit is from fallen and withered specimens. There is a pendant group of many leathery capsules, each 4 inches long, with several seeds; these are the size of a pea, 5" long, 4" broad, tuberculated on the surface, rounded, with flattened facets: at one extremity is a deep hilum with raised prominent edges; at the other a disk shaped elevation.
>
> The testa is black, but not glossy as in M. Ensete, hard and brittle. The albumen is white and mealy, deeply convex at both ends, where the hilum and the disk-shapetd elevation project inwards.
>
> The natives ascribe virtues to these seeds, as fetish; and wear them in the purification of women. The seeds of M. Ensete are used in a similar way, but for another purpose.
>
> I find in the Museum of the Royal Gardens, Kew, seeds sent from the Niger Expedition by Mr. Barter, undistinguishable form those brought home by myself.
>
> The common banana (M. sapientum) is grown in the country, but has been introduced as its distribution shows.[53]

Articles with a wider gaze and more economic interests were published in the interdisciplinary space of the RGS. Kirk wrote his first lengthy report on the region late in 1860 and it was included with Livingstone's despatches to the Foreign Office before being passed to the RGS. In the paper, titled 'Report on the Natural Products and Capabilities of the

Shire and Lower Zambesi Valleys' he detailed agricultural productions and trading patterns while discussing topography and hydrography. He also examined the success of foreign plants, such as cotton, and reports on their own experiments at Tete in planting different varieties. By the time of this report, the original plan of setting up a station on the Batoka Highlands had been completely forgotten and Kirk swung his attention towards the Shire Highlands, which held some potential. During the cold season he proposed that 'European vegetables and fruits, also wheat could be raised'. At that time he also believed that it was an area that could be settled by Europeans (a position he would later reverse). The second half of the report dealt with economic botany. Kirk focused his attention upon the, 'more important vegetable productions', namely: cotton, sugar cane, oils, Indian rubber, coffee, wood and timber, dye stuffs and cereals. The report is guarded, listing possibilities without extensive detail and overall it appears to be influenced by Livingstone's optimism.[54] The report was not a finished product and Kirk had to explain to Livingstone that one could not be produced until he could work at Kew with all his specimens and references in one place, a methodological requirement that the leader of the Expedition had little respect for when worried about demonstrating outputs. At the time Kirk was deciding whether or not to stay with the Expedition as he had the option to leave after two years. He decided to stay out of a sense of duty, though he was somewhat perplexed by the appearance of a second botanist, Charles Meller. Meller and Kirk got along very well, but it was odd that Kirk had not been forewarned of his colleagues' arrival.

A dénouement to this story of collections and their treatment is the twenty-two-year delay of four crates of specimens from the Expedition. They had been assumed lost by everyone until a terse letter to Joseph Hooker as Director of Kew Gardens from the naval dockyards in Portsmouth, sent on 26 September 1883, requested that he please collect the items. Upon inquiry the dockyard manager denied any responsibility previous to his desire to be rid of the crates. Further queries showed that the crates had been put into a private section of the warehouse in 1861 and forgotten. In 1883 the crates were opened at Kew and the specimens examined properly. While none were particularly exciting, they were in remarkably good condition. Not

surprisingly, when he learned of the whereabouts of his lost specimens Kirk was rather annoyed at the strange incident and complained to Thistleton-Dyer, Assistant Director at Kew, about the lack of care given to 'collections of great scientific importance made by an expedition under the auspices of HM Government and conveyed to this country in a man-of-war'.[55]

Aside from the lost crates, most of the materials including geographical descriptions arrived in Britain in a timely manner. Many of these descriptions formed part of Livingstone's despatches to the Foreign Office and were copied out and forwarded to the RGS. As noted above, the RGS was the place where the region as a whole was topical and a variety of issues could be discussed in reference to reports from the Expedition. Unlike the more discrete boundaries of botany and zoology, the intricate diplomatic and political problems encountered by the Expedition were pertinent issues in conjunction with the geology, hydrography and climatic discussions. The following section looks more closely at the internal discourse of the RGS and how it discussed information received from the Expedition.

'CRITICAL GEOGRAPHY' VS. 'ACTUAL OBSERVATION': THE ROYAL GEOGRAPHICAL SOCIETY AND THE ZAMBESI EXPEDITION

The focus of this section is on the results of the Zambesi Expedition and their evaluation by members of the RGS. Fortunately, for much of this period the minutes of the meetings were published in the *Proceedings* and thus the content of the discussion that took place after a paper was read can be readily examined. Following a look at debates concerning the work of the Expedition, the epistemic and theoretical considerations that helped to structure those debates will be examined. At the time of the Zambesi Expedition the Royal Geographical Society, under the leadership of Murchison, was actively courting a connection between itself and African exploration in the British public imagination.[56] Using the monthly meetings known as its 'African Nights', the most recent information concerning the exploits of explorers on the continent were spectacularly revealed before giant maps dominated by white spaces. Livingstone's great fame during the

run up to the Zambesi Expedition was in part due to this opportune linkage between one of London's most popular scientific societies and his uncanny ability to survive great hardship while crossing large swathes of Africa on foot. The millworker-turned-missionary's first journeys were lauded by the public as a great feat of endurance and by geographers as an exemplary instance of precision in providing accurate astronomical positions:

> Great as are the deserts [sic] of Dr. Livingstone as a discoverer of new lands, or as a missionary and philanthropist, his real title to the high estimation of the Geographical Society is, that by astronomical observations he has determined the longitude as well as latitude of so many sites, hitherto entirely unknown to us, and has constructed detailed maps of those regions.[57]

Though Livingstone did know how to use a sextant, not everyone was as supportive of Livingstone's work. Even before the Expedition left Britain an anonymous author attacked the plans being made for the new expedition in late 1857. We are told that at a meeting of cotton merchants in Manchester that was attended by Livingstone:

> [Livingstone] was subjected to an extensive examination in commerce and various branches in Natural History [of the Zambezi Valley]. This, in our opinion, was hardly fair to Dr. Livingstone, who is not, and pretends not to be, a merchant, a manufacturer, a statistician, a geologist, a mineralogist, a botanist, or a zoologist.[58]

This not-so-subtle critique of Livingstone led directly to an assault on the entire plan for the Expedition on the grounds that Livingstone was unqualified to provide the information he did and that, furthermore, African societies were incapable of producing commodities fit for export to Britain. In other words, the entire plan was doomed from the start as it was based upon a false precept, the civilising mission itself. This argument follows the spirit of Charles Dickens who made a damning critique of the 1841 Niger Expedition and wrote 'It might be laid down as a very good general rule of social and political guidance, that whatever Exeter Hall champions, is the thing by no means to be done'. [59] The author of the present letter called into question the rationale for the Zambesi Expedition and by extension, the entire civilising mission project as it pertained to Africa. The letter also raised

a criticism of Livingstone that is frequently repeated: aside from his medical qualifications, he had little training as a natural historian or geographer. This stands in contrast to his supporters who utilised adjectives such as 'scientific', 'rational', 'critical', or 'disinterested' when referring to the explorer's work.

Such critics of Livingstone during the height of his fame wrote in contrast to the rhetoric deployed to promote Livingstone and his endeavours. To really understand how Livingstone was lauded in 1857–8, we can consider the 'Farewell Livingstone Festival', an RGS-led event held about four weeks before the Expedition departed and one which brought more than 250 supporters together for rounds of toasts wishing the Expedition well.[60] In the many speeches 'science', in particular, was indicated as the 'higher end' of Livingstone's work and speakers predicted that many fields of research would benefit from the Expedition. As discussed in Chapter 3, science figured strongly as a justification for public expenditure.

With the send-off parties over, it did not take long after the Expedition departed for the tone of extreme optimism to change. There was soon a sober reflection in the RGS upon the difficulties facing a project with such loosely defined goals. On 24 May 1858, coinciding with the Expedition's first mistaken attempts to find its way through the Zambezi delta, Murchison gave his yearly presidential address to the RGS. In respect to the Expedition he asked for those present to be prepared to hear of great difficulties to their navigation of the river.[61] This comment foreshadowed critiques of the entire project based upon arguments that the difficulties in navigating the river were already known prior to the Expedition and that Livingstone had knowingly misrepresented the situation in order to gain support.

Perhaps more surprisingly, the RGS's *Proceedings* in June 1858 presented a description of the Zambezi River prepared by J. Lyons MacLeod who had recently returned from a position as HM Consul on the Ihla de Moçambique, the Portuguese capital of the colony. Based upon the testimony of the Governor of Tete, Major Tito Augusto d'Aranjo Sicard and a Briton living on the island, George Wilson, MacLeod's report was a summary of a larger study of the resources of the entire eastern coast of Africa he had given at the annual meeting of the British Association for the Advancement of Science that same year. He published the report as a book in 1860.[62] It is surprising that

such detailed information concerning a river about to be explored under official auspices was already available from an official British correspondent. Generally, MacLeod shared in Livingstone's optimism about commercial opportunities in Mozambique offering little cause for controversy, but overall the availability of such detailed alternative information formed the grounds for criticism of the Expedition's own results.

Initial reports from the Expedition were read to the RGS on 10 January 1859. The presentation included notes from Thomas Baines, the storekeeper and artist, and maps by Richard Thornton, the geologist.[63] The extracts from Baines's journal presented a grim picture of a river possessing a sinuous and shifting channel with hidden sand bars at every turn. Their steamer *Ma Robert* was reported to be underpowered and drew too much water. The first to comment on this gloomy report was MacGregor Laird, whose shipyard built the steamer. He protested against the slight on his ship, arguing that the letters made clear that Livingstone regularly ordered the boat to be dangerously overloaded and mishandled. He added that the river appeared to be far too shallow for any serious commercial operations. Consul MacLeod countered with his opinion that the Zambezi was, according to his Portuguese informants, perfectly navigable for at least eight months of the year. Comments from John Crawfurd, president of the Ethnological Society and a former Indian administrator, were negative and particularly pessimistic about the ability of Africans to contribute to an industrial economy. James MacQueen, a noted expert on African geography, argued that little in the report was unknown to him and was already available in Portuguese travel narratives. The minutes of this meeting were soon sent to the Expedition with other correspondence and Livingstone reported receiving them by June 1859. He thought that the negative accusations were curious.[64]

A far more serious debate erupted after an extensive report—including allusions to members' previous criticisms—was read to the RGS on 28 November 1859.[65] By this point, members of the Expedition had twice viewed the crucial Kebrabassa (Cahora Bassa) rapids and the results revealed it to be an insurmountable obstacle for any ship, despite Livingstone's continuing claims to the contrary. Here we begin to see some indications of metropolitan doubt. The published summary of the minutes included the editorial comment

that 'Mr. C. Livingstone's opinions and Dr. Livingstone's conclusions, appear more favourable than those of Mr. Baines'. While the provision of astronomical positions for locations along the river was widely appreciated by the RGS members—and almost worth the trip—the navigability of the river was a problem that could jeopardise the entire project. It was curious that the the two most experienced explorers on the Expedition had different opinions about the river. This allowed for the disagreement at the RGS meeting as well. Where MacLeod was optimistic, Crawfurd queried bluntly, 'With two and three feet water only in its upper course, what sort of navigable river was that?' Present also at the meeting was Commander Bedingfeld, who had left the Expedition in its early stages over disagreements with Livingstone, and who made a lengthy report about the river and its poor navigability. Thus further doubt was cast.

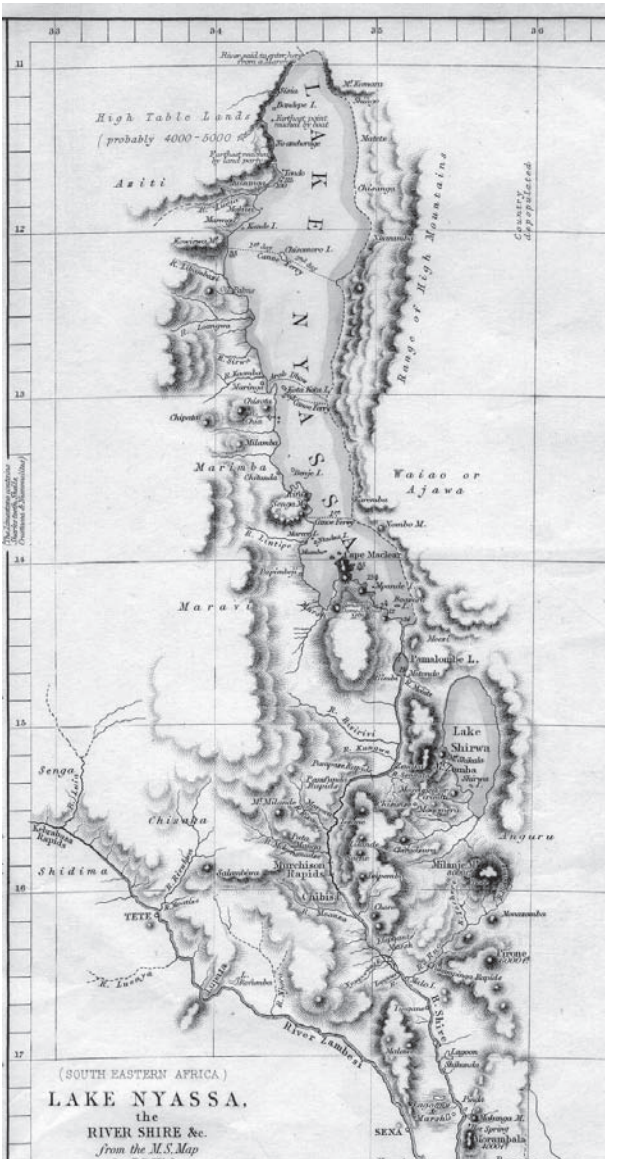
MacQueen's comments on the report followed and he insisted that one may find all of the Expedition's supposed discoveries already inscribed on Portuguese maps and in Portuguese texts—which makes one wonder if any of these texts were consulted when the Expedition was organised. Somewhat bizarrely, at this meeting MacQueen thanks Murchison for directing him to the 1623 map of Antonio Sanches, where the entire coast of East Africa was accurately portrayed, including the interior lakes . On the point of the river's navigability MacQueen was vitriolic: 'It is useless to shut our eyes to the fact that the expedition in its great object, namely, the exploration of the Zambezi as a valuable commercial channel, has for the present completely failed'.[66] As to Livingstone's replacement idea of opening up cotton trade in the newly discovered Shire Highlands he continued '[the plan is] the wildest delusion that ever entered the human brain, even were the lands ours—which they are not'. Despite such harsh comments, which again reached the Expedition in the field, Livingstone consistently implied, and repeated in the 1865 *Narrative* that the Shire Highlands could be a source of cotton 'larger than the cottonfields of the Southern States of America'. What is also interesting is the degree of negative criticism the Expedition was receiving in later 1859, when the Expedition's funding would be extended for over three more years.

Criticism was no less heated in face-to-face encounters. As the Expedition faded to a close during 1863–4 and its members drifted

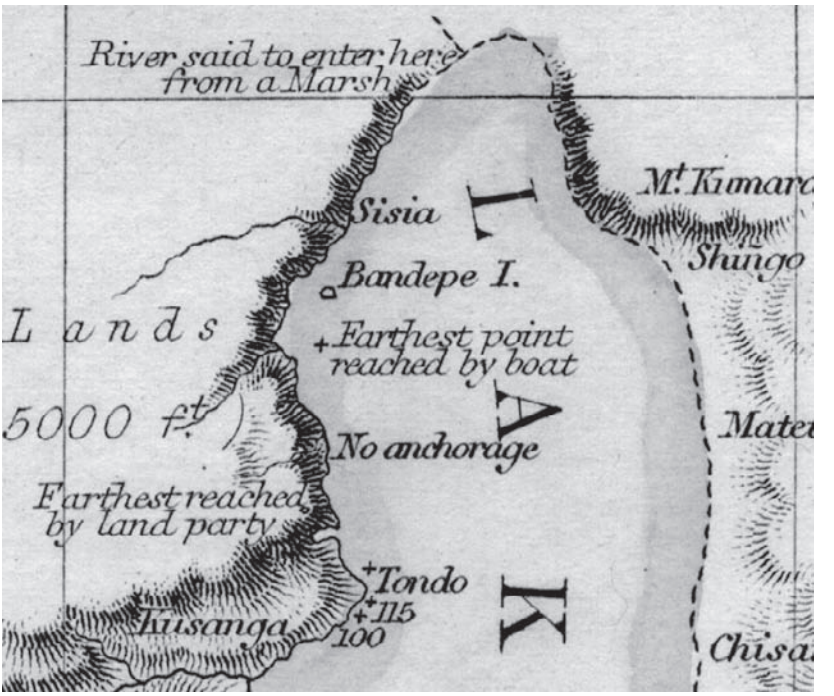
towards London, analysis of the Expedition's geographical findings at the RGS continued. The data from the Zambesi Expedition had to be added to a map of southern Africa that was beginning to fill in, though not without difficulty. Events came dramatically to a head at an RGS meeting on 13 June 1864. William Desborough Cooley, a notorious critic of explorers' reports who disliked Livingstone in particular, read a paper accompanied by a map that contradicted many of the Expedition's findings.[67] Murchison, as chair of the meeting saw a potential for an argument caused by Cooley's conclusions in light of recent observations, especially given that Kirk was sitting in the room. Reputations were at stake. The *PRGS* reports Murchison's request to the audience before a letter from Livingstone was read:

> All deference should be shown to Mr. Cooley's powers as a critical geographer, for he was sure the Society desired to do justice to every man, whatever his labours might be, whether in critical geography or actual observation.[68]

Clements Markham then proceeded to read out Livingstone's most recent report which was accompanied by a map drawn by Kirk himself. The two maps differed widely in their portrayal of Lake Nyassa. Murchison commented that there was a 'great discrepancy between the observations of the Portuguese who visited the country many years ago [which Cooley based his findings on] and the *de facto* recent observations of Dr. Livingstone and Dr. Kirk'.[69] This discrepancy laid the foundation for a heated discussion about the geography of the region which included comments by explorers Kirk and John Speke, along with some of the great 'critical geographers' of the RGS, James MacQueen, Francis Galton, and Charles Beke. For those geographers who had staked their reputations upon the practice of textual and cartographic criticism, such discrepancies in the face of direct observations presented great challenges to their conclusions and methodologies. Nevertheless, in the end Kirk's '*de facto*' description of the lake's dimensions were accepted over Cooley's secondary analyses of Portuguese descriptions. Murchison concluded the RGS meeting with a restatement of the Society's ideology of exploration, indicating where the truth may lie:



14. Based upon the manuscript map produced by Kirk and published in connection to Kirk's article, 'Notes on the Gradient of the Zambesi, on the Level of Lake Nyassa, on the Murchison Rapids, and on Lake Shirwa.' *Journal of the Royal Geographical Society* 35 (1865): 167-69.



15. Kirk's map—detail of 14.

> When gentlemen go into such countries, risking their lives to search out the truth and making astronomical observations which fix latitudes and longitudes it is obvious that all preceding accounts, derived from Portuguese and Arab travellers who did not make such observations, must give way to facts.[70]

This statement of how he assessed credibility clearly defines the processes of geographical fact-making—and who may perform it—while reinforcing the authority of properly constructed facts over all other forms of knowledge. The opening sentence hints at themes of 'gentle' status and its relation to truth that indicates here not so much a strict class barrier but rather an acknowledgement of the fluid social markers of credibility: an individual's training, reputation and experience, emphasising character over birth. As modern readers we may puzzle at the ability of homebound geographers to contradict field reports, especially with the recently returned explorers in the

room, but two concerns allowed the discussions to proceed without irony. First, the scientific credibility of the RGS relied in part 'upon the knowledge it produced being open to rational public scrutiny'.[71] Secondly, that because the geography of Africa was known to ancient authorities and more recent Portuguese settlers, RGS discussions of recent observations necessarily debated the balance of authority between what Murchison called 'critical geography' and actual 'observation'.

Even though we have such strong statements for the empirical superiority of 'actual observation', the victory for Kirk was not complete. Direct observation would only win those particular arguments where it indeed occurred. The fact that neither Kirk nor Livingstone actually observed the northern end of Lake Nyassa, but relied instead upon local testimony, meant that the question of a river connecting it to Lake Tanganyika remained open to critical geographers and their forms of evidence and argument. Speke had claimed that Lake Tanganyika overflowed south into Lake Nyassa based upon his interpretation of information provided by Sheikh Hamed bin Sulayyim at his island in Lake Tanganyika.[72] MacQueen thought any such connection impossible because his Portuguese sources never mentioned anything to indicate a larger river in that area. Later that year, at the Bath meeting of the BAAS, Murchison referred again to these open questions and the validity of Cooley's analyses, asking: 'Are we not at this moment most anxious to determine, by positive observation, whether there exists a great series of lakes and rivers proceeding, as Cooley has suggested, from Tanganyika on the north to Lake Nyassa on the South?'[73]

This Victorian discussion between historical accounts of Africa and recent explorers' reports, initiated by Portuguese discoveries made during the fifteenth century, has its origins in the 'eternal Renaissance dialogue between ancient authority and modern experience'.[74] Hence our explorers were permitted extensive authority only when they directly and appropriately observed geographical phenomena. Such 'ocular demonstration' was powerful evidence, but it was not complete in terms of regional description, as it was limited to the explorer's line-of-sight.[75] In any analysis beyond reporting direct observations, critical geographers of long-standing respect, such as MacQueen and Cooley, possessed authority equal to the explorers when corroborating other

forms of geographical evidence. Nevertheless, such critique certainly challenged explorers who highlighted the epistemic value of 'being there' and the insight that experience could provide. Such debates became very personal. Explorers resented the attacks upon their credibility and as professionals they resisted being treated as nothing more than remote-sensing mechanisms for metropolitan analysts. Understanding this, we can further appreciate Richard Burton's preface to his 1860 publication, *The Lake Regions of Central Africa,* a copy of which was sent to the Expedition in the field:

> Modern "hinters to travellers" direct the explorer and the missionary to eschew theory and opinion. We are told somewhat peremptorily that it is our duty to gather actualities, not inferences—to see and not to think; in fact, to confine ourselves to transmitting the rough material collected by us, that it may be worked into shape by the professionally learned at home. But why may not the observer be allowed a voice concerning his own observations, if at least his mind be sane and his stock of collateral knowledge be respectable?

What else can we infer about expeditionary science from such debates between explorers and metropolitan analysts? In reviewing closely the treatment of the Zambesi Expedition's findings by geographers, we find the RGS meeting room functioned as a space of presentation where reporting took place. But this presentation was not one sided, as we have seen. The metropolitan geographers talked back to the fieldworkers in this space, criticising methods and observations while trying to reinforce a division of labour between observers and analysts. Ideally, the field was a space of pure observation, while analyses occurred in the more controlled empirical setting of the metropolis. As seen above, this ideal was neither strictly met nor were the different workspaces precisely located. Critical geographers also worked in a metropolitan field of texts and maps while explorers could not resist drawing conclusions in the field. These conflicts of method and authority underscore all the debates that I have been discussing here.[76] These conflicts were also about *where* method and authority were constructed and therefore there is a geographical component to this social explanation for the conflict.

Beyond informing our understanding of debates within the RGS, discourse on method both obscures and reveals issues concerning the

micropolitics of science, the nature of accepted ideologies of science, and the particular cognitive development of the individuals involved in the discussion.[77] The RGS's wider public statements about its methods worked to hide internal debates about the proper application of those methods. Where we see radical empiricists challenging those who argued from the slightest notion of theory or speculation, we must recall that they were all working within a larger ideological consensus that sought to promote scientific ways of knowing as unified, accessible and transferable to other discourses.[78] Following the example of Alexander von Humboldt, who had died in 1859 and who was extensively eulogized by members of the RGS, British geographers strove to work inductively from particular empirical descriptions to general understandings of how the whole world worked, while simultaneously demonstrating their competence to the wider scientific community. It must be kept in mind that geographers at this time continued to endure accusations of working within a less intellectually rigorous discipline.[79]

It was not only in geography that such debates could take place, although the RGS was the natural home for such discussions. In the examination of botanical and zoological fieldwork in the previous chapter, it was shown how debates about method could reveal where race, class, and education contributed to determinations of authority and credibility. In geography, metropolitan analysts and critics used similar criteria when assessing credibility while seeking to exert control over fieldworkers and their methods in order to maintain the status of their discipline. The following example is a debate that took place outside of geographical discourse and in reference to zoological collections. Using published materials uncovered during this research, the next section looks at criticisms of Livingstone, Kirk and the entire Expedition coming from a powerful member of Germany's scientific community.

WILHELM CARL HARTWIG PETERS AND THE ZAMBESI EXPEDITION

An important, but largely forgotten critic of the Zambesi Expedition, Dr. Wilhelm C. H. Peters wrote from his position in Berlin as Professor of Zoology and director of the Zoological Museum. Earlier in his

career, Peters (1815–1883) spent nearly six years in Mozambique between 1842 and 1848, including nine months' residence at Tete. He gathered extensive zoological and botanical collections and published descriptions of his collections, with assistance, over a period of thirty years. The magisterial *Naturwissenschaftliche Reise Nach Mossambique* is an important series of volumes in the history of African zoology. But unfortunately, because Peters published so slowly, disputes occurred between the naming of his specimens from the 1840s and those collected by Kirk and the others. The Britons could possibly claim ignorance, but the members of the Expedition certainly knew something of Peters's work because a small book on the languages of Mozambique was specially printed for the Expedition and complied by Wilhelm Bleek with Peters's assistance.[80]

Peters was first angered by Kirk's zoological work after reading an article given by John Edward Gray on 9 February 1864 to the Zoological Society of London which identified Mozambican lizard specimens collected by Kirk. The following excerpt from the article started the row, Gray wrote:

> *Gerrhosaurus robustus* Dr. Peters gave the name *caaiia* but Kirk says this name means "I don't know," which was probably the response of a native asked. Common near Tete. The native told Dr. Kirk that it entered fowl-houses and killed the fowls, and that it bit very hard.[81]

Here we have another example of the classic exploration story of the animal or plant named 'I don't know' by an ignorant, overreaching explorer. But Peters was not a naïve explorer and was quick to respond to this slur against his ability to gather local information. His response, dated 14 July 1864 appeared in the *Proceedings of the Zoological Society of London* on 8 November that year:

> As from this it might appear that I had collected the very important indigenous names of animals which I met with in Mozambique in a thoughtless and unremarkable manner, you will allow me the following remarks:
>
> … I never took down a name from a person whom I did not understand; and all native names I have published have been carefully compared and corroborated by several persons.

> … I am particularly indebted to Senhor Pascoal, Senhor Candido Jose da Costi Candozo, Senhor Nunez, and Senhor Botleho for their assistance in pronouncing and writing the native names. All four were natives (not negroes), spoke very fluently the Portuguese language, and knew the productions of the country. In doubtful cases about the native names of zoological objects, they called their negroes and the names were discovered.[82]

Peters described his collection methods further and then dramatically revealed that the word in question, 'Caaia', was a misprint in a Berlin journal and thus the error made its way to London. He also contradicted Kirk by stating that the word signifying 'I do not know' at Tete is 'penu'. Peters then questioned Kirk's report that the *Gerrhosaurus* was reported to leave the river and invade the fowl-houses. Commenting on his personal experiences at Tete, Peters concluded his complaint:

> I cannot believe that the language of Tette can have changed so much since my time, *that a word which only exists in a misprint at* Berlin should have been introduced instead of a word which was used every day, and at the same time, in three different dialects.
>
> Neither did I hear that the *Gerrhosaurus* enters the fowl-houses and kills the fowls, which is rather astonishing as the *Gerrhosaurus* does neither climb nor fly, and the fowl-houses, at least at Tete, are provided with perches, on account of the rats. Dr. Kirk will, perhaps, be able to tell us whether the same native who gave him such valuable information about the *customs* and *common* appearance of the *Gerrhosaurus* was his teacher in the language of Tette?[83]

This response was fierce, launching a direct attack upon Kirk's field methods and choice of informants. Kirk replied to this letter tactfully, acknowledging that he did not know about the misprint and that he never meant to launch an *ad hominen* attack in print. He had also written to Livingstone for advice concerning the linguistic points of Peters's comments.[84] But these concessions did not lead him to give Peters the upper hand completely as Kirk's response demonstrates:

> From a letter of Dr. W. Peters in the *Proceedings of the Zool. Soc.* 1864, p. 377, I find that a casual word of mine has given that gentleman some annoyance which on my part was not intended. On handing over the Reptiles collected by me in Eastern Tropical Africa to the

> British Museum, Dr. Gray remarked that one of them, *Gerrhosaurus robustus*, was, according to Dr. Peters, named '*Caaiia*' by the natives of Tete. I had not seen Dr. Peter's paper 'On the reptiles of Mosambique,' and I remarked that this word meant in the native language, 'I don't know.' To this I attached no importance, nor was it meant for publication; still less was I aware that the word, '*Caaiia*' had been a misprint.
>
> Dr. Livingstone writes me thus: "Mr Moffat has been collecting words in the Sechuana language for the last forty-three years, and finds new ones every week. In eight years I had upwards of seven thousand and rejected many hundreds as either uncouth or to me quite useless. I think there were eleven names for a lion, and no end of words meaning different shades of fools!" Dr. Peters has referred to me a vocabulary of the Mozambique languages, published by Dr. Wm. H. J. Black [Bleek], from manuscripts of his and other materials, now including minerals. Only about 900 words are given here, whereas, judging from what Dr. Livingstone says of the Sechuana, this dialect must contain an equal number of terms; and no one could, in my opinion, in nine months collect even the common expressions. Let me assure Dr. Peters that there is no necessity for supposing that the language has changed since 1845, because one word is omitted from his vocabulary. The word '*penu*,' which Dr. Peters gives as signifying 'I don't know,' does so only inferentially, and means literally 'perhaps,' 'it may be,' 'possibly.' There are other expressions more definite, and in common use. In regard to the last part of Dr. Peters' letter, I will remark that the majority of Tette fowls live in the huts of the people, and not on perches. And may I remind him of the widespread idea in Africa that the bite of the Chameleon (*Chamaeleon dilepis*) is venomous to man, although it possesses no means of inflicting more than a slight squeeze with its weak jaws. He will therefore possibly concede that the same people may believe that the *Gerrhosaurus* kills fowls.[85]

While conceding some zoological expertise to Peters, Kirk was not about to allow his four years' residence in Zambesia to be upstaged by Peters's nine months. Kirk also reminds Peters that the book Bleek made up, and which Peters contributed to, was very well known to the members of the Expedition as it was printed for them specially. Calling upon the expertise (in sub-Saharan languages) of Robert

Moffat, David Livingstone's father-in-law, Kirk marshalled years of experience behind him and brought into question Peters's ability to make credible conclusions about languages spoken near Tete. He also, in very clear terms, disagreed with Peters on the sleeping habits of the chickens of Tete and his overzealous reliance upon local testimony concerning animal behaviour.

At face value, this entire argument borders on the ridiculous: the men are arguing, in print, about where chickens sleep at night. But much more was at stake. The evidence provides a direct view of the degree to which trust and reputation contributed to the construction of knowledge about foreign nature. Both Kirk and Peters were respected members of the pan-European scientific community and their reputations secured the trust placed in their reports of field observations. We can assume that almost none of the readers of the *PRGS* was planning on going to Tete themselves to verify the information. If Kirk and Peters, both respected men of science were not even able to agree on the chicken coops, then however well they may have presented their data, others (with good reason) would begin to suspect their veracity and ultimately their future reputation as trusted observers.

Expeditionary science from beginning to end, was threatened by such disagreements. In the same way that laboratory experiments were thought to be reproducible, here, if two Europeans visited the same African locale, they should report similar observations. Livingstone was plagued by similar troubles when his reports of the Cahora Bassa rapids offered conclusions that were different from those of Baines and the others. The field observer must be considered accurate to be effective. Any threat to this accuracy was taken very personally, even if it concerned chicken coops. A final point to consider is that even though Peters claims that the name 'caaiia' was a misprint, it is curious that the word 'kaya' is a casual way of saying 'I don't know' in the languages spoken near Tete. (e.g. chiNyanga, chiSena). Peters may have been caught out after all.

Another aspect of this debate brings us back to the local informants discussed in the previous chapter. Though on the surface they appear scarcely more important than the lizards and chickens, this debate in fact dealt specifically with Kirk and Peters's skill in interrogating

informants. Peters explained his corroboration of sources carefully, and so drew his readers into his fieldwork methodology. Though located in the 'wilds' of Zambesia, Peters indicated that he maintained an organized, sceptical, European gaze and chose his informants based upon criteria brought from Europe.

Kirk challenged this attack on methodological grounds. Relating to his fieldwork in this instance, he made almost no mention of informants, preferring instead to offer reports of first hand observations. His knowledge of local languages was personal and extensive, only referring to other linguistic research when discussing the more universal methodology of gathering vocabularies in foreign lands. Kirk replied to Peters's criticisms by indicating his superior experience to the readers of the *PRGS*, who would also be quick to notice the lack of simple reliance upon local informants in Kirk's response. Kirk drew upon the standards of his scientific community well, and appears to have won the day.

The zoological debate was clearly personal and contributed to Peters's overall displeasure with the claims of discovery for the Expedition, but his critique did not stop there. It was the Livingstone brothers' publication of their *Narrative* in 1865 that angered Peters the most. Peters took great offence at what he called 'Dr. Livingstone's pretensions' to claim discoveries in the region, given his obvious ignorance of what was already known. Peters prefaced the 1868 volume, titled Zoologie IV: Flussfische (Freshwater Fish) of the *Naturwissenschaftliche Reise Nach Mossambique* with aa attack on Livingstone that included the following barb:

> It was not to be expected that a man like *Livingstone*, a man distinguished by his insurmountable wanderlust, extraordinary physical tenacity and great intrepidity, yet a man of little acquaintance with the literature of his own native land, should somehow have any knowledge of the literature of Germany.[86]

The foreword to this volume contains a lengthy diatribe against Livingstone and is reproduced in Appendix B.

Pardoning Livingstone's ignorance, Peters then accused the entire scientific community in Britain of even more irresponsible disinformation. The British, he wrote, were clearly ignorant of German geographical knowledge because Livingstone was able to

claim false geographical discoveries before the RGS and BAAS without any challenge or consequences. Furthermore these were discoveries that Peters claimed were already 'incorporated in the regular school curriculum in Germany'.[87] Peters also slyly mentioned that of the fish specimens returned by the Zambesi Expedition, most were already represented in his own collection—which he made over a much shorter period of time.[88]

Peters's attack was based in the main upon a question of cartographic interpretation: the representation of the Zambezi delta and in particular the location of the main distributary. Livingstone alleged that the Portuguese had been regularly producing false maps showing the main distributary of the Zambezi to be the Kwakwa, with its mouth at Quelimane. He argued that this lie was given to mislead British anti-slavery blockade ships, thus allowing Portuguese slavers to escape via the true entrance.[89] In fact, the Kwakwa may have been an important outlet when Quelimane was first established in the early sixteenth century. In the 1860s it was still directly navigable during periods of high flood, and during lower water porters were used to transfer loads between the two rivers regularly, but it was not a major channel.

Overall it is clear that Peters was offended here because his Portuguese friends were insulted. He indicated, firstly, that everyone already knew that the Kwakwa was not an important channel of the Zambezi. Second, Peters argued that, if anything, the Portuguese were only guilty of following the maps drawn by an earlier British expedition on the Zambezi led by William Owen in 1823. In crossing the line from science to politics, Peters alluded to the diplomatic tensions caused by the Expedition's activities in Portuguese territory and demonstrates for us how politics and geography were linked through exploration. Indeed, the Expedition and its impact upon future boundary commissions separating Portuguese and British spheres of influence could be examined in the light of Burnett's work along these lines in British Guiana.[90]

Peters's remarks remind us that news concerning expeditions travelled far beyond Britain. Expeditions—and their reporting and consequences—were international events. Geographical societies around the world exchanged journals and information about newly

explored areas. New images of Africa produced by the Zambesi Expedition contributed to cartographies of Africa worldwide.[91] In this case, a conflict of opinion about geographical information resonated through considerations of national pride, precedence, and territorial claims. Summing up his opinion on these debates, Livingstone wrote a reply to those who would challenge his discoveries in the region. This was written as a direct response to a pamphlet concerning his claims of discovery circulated in early 1861 by the Minister of Colonies for Portugal, the Viscount de Sá da Bandeira titled *Zambesia e Sofála. Mappa Coordenado Sobre Numerosos Documentos Antigos e Modernos Portuguezes e Estrangeiros* (Lisbon: 1861). Livingstone sent this response to John Washington at the Admiralty in August 1862 and is quite clear about whose knowledge he considers credible:

> Native information has been appropriated by Europeans and possibly some more reliable geographical knowledge may have been buried in the Portuguese archives but it may be presumed that only when the interior and lakes were visited by Englishmen and the results given to the world that the discoveries can be said to be made at all.[92]

CONCLUSION

It was partly because the scientific community was so selfconscious in the early 1860s that the Expedition received such harsh criticism. Livingstone, the great 'scientific explorer', was proving to be less a 'man of science' than people had hoped. A number of his great claims turned out to be nothing more than conjecture based upon insufficient evidence and questionable methodologies, such as the navigability of the Cahora Bassa rapids and the Rovuma River, the healthfulness of the Shire Highlands and local capacities for commercial agricultural production. Such inconsistencies not only indicated methodological irresponsibility, they potentially damaged the entire scientific community and its public support. Leaders in the scientific community, especially Murchison, deliberately used men like Livingstone as lightning rods for public attention, and hopefully, public funds.[93] Less popular projects would benefit by riding the coat

tails of the famous, and in this case they did. Should large projects become discredited, the leading men of science might also be discredited and then adjacent support for less popular projects would be lost as well. In an era when more formal links between science and the Government were still being forged, the scientific community had to maintain a high level of self-regulation.

While the civilising goals of the Zambesi Expedition were not achieved, botany, zoology and the earth sciences all benefited from the fact that a British expedition was sent to the Zambezi. A great deal of specimens, data, photographs and paintings resulted; and these were appreciated not only by pale scientists hiding in a herbarium, but also the wider intellectual community. In more polite reviews, the scientific results of the Zambesi Expedition, while neither publicly earth-shattering, nor scientifically tremendous, were at least noticed:

> Although the results of this expedition have not been in all respects commensurate with the sanguine hopes that had been formed of it, it has been the means of extending our geographical knowledge by several important discoveries; and Dr. Livingstone and his fellow-travellers have collected much information on the geology, botany, ornithology, and zoology of the districts which they have leisurely surveyed; they have thrown much light on the hydrography of the south-eastern part of Africa, and obtained a far more complete knowledge of the native tribes, their languages, habits, state of civilisation and religion, than was possible in the former expedition.[94]

But, allowing this positive comment to stand on its own ignores its opposite. There was intense public criticism focused upon what Livingstone said the region *should* be like and how it actually turned out to be. The deaths of the UMCA missionaries especially angered a public that still remembered the disastrous Niger Expedition of 1841–1842 when so many people died for so little. An anonymous letter printed in *The Times* makes a point-by-point attack on Livingstone's rhetoric and its results:

> We were promised cotton, sugar, and indigo, commodities which savages never produced; and, of course we get none. We were promised trade, and there is no trade, although we have a Consul at £500 a year. We were promised converts to the Gospel, and not

> one has been made. We were told the climate was salubrious, and a Bishop and some of the best missionaries of the temperate region of South Africa, with their wives and children, have perished in the malarious swamps of the Zambesi. In a word, the thousands subscribed by the Universities and the thousands contributed by the Government, have been productive only of the most fatal results.…Dr. Livingstone is unquestionably a traveller of talents, enterprise, and excellent constitution, but as it is now plain enough that his zeal and imagination must surpass his judgement.[95]

It did not pass by many observers that—outside of science—little more was known about the Zambezi region in 1864 as compared to 1857 that was not negative. Slavery, especially the internal market, was rampant and getting worse; the Zambezi was not a deepwater river; the climate was less than welcoming, and promising interior regions were difficult to reach. In his original book about the region Livingstone had made great claims and few were immediately realised. By the end of the Zambesi Expedition many agreed with James Stewart, who had been very inspired by Livingstone's first book, *Missionary Travels*. After spending most of 1862 and part of 1863 as a guest of the Expedition investigating the possibilities for a Scottish mission station, Stewart recorded in his journal:

> In the afternoon I went down to the river-bank a short way and threw with all my strength into the turbid muddy weed-covered Zambesi my copy of [a] certain 'Missionary Travels in South Africa'. The volume was fragrant with odours of and memories of the earnestness with which I studied the book in days gone by. How different it appeared now! It was nothing short of an eyesore, the very sight of its brown covers. I do not think it is as the Rev. R. M [?] is said to have called it, 'a pack of lies,' but it would need a great many additions to make it the truth. Thus I disliked the book and sent it to sink or swim into the vaunted Zambesi. So perish all that is false in myself and others.[96]

7 Conclusion

> When a native of the temperate north first lands in the tropics, his feelings and emotions resemble in some respects those which the First Man may have had on his entrance into the Garden of Eden. He has set foot in a new world, another state of existence is before him; everything he sees, every sound that falls upon the ear, has all the freshness and charm of novelty. The trees and the plants are new, the flowers and the fruits, the beasts, the birds, and the insects are curious and strange; the very sky itself is new, glowing with colours, or sparkling with constellations, never seen in northern climes.[1]
>
> …
>
> [The European] must never forget that, in the tropics, he is an exotic plant.[2]

These two quotes, taken from the extreme ends of the Livingstone brothers' *Narrative,* evoke the dual nature of the tropics in the mid-Victorian imagination. On the one hand a place of overwhelming beauty, and on the other a region of deadly miasmas and insufferable climate. By 1858, the tropics were an essentially *different* kind of place for Europeans and the analysis of the methods used by the members of the Zambesi Expedition to manage this difference has occupied large portions of this book. The central problem of Victorian scientific practice was to observe wild, often tropical, nature and explain it using the evolving and universally-applicable structures of European natural history. It is this idea of the Zambezi Basin as a place where scientific practice was *taken to* that I would like to discuss here by way of conclusion. I will first review the findings of the main chapters before turning to a brief discussion of the general themes.

Chapter 3 examined the formative period of the Expedition. The 'culture of exploration' dominant in the 1850s was examined in order to see how an expedition was built from the social, ideological, scientific and technical 'tools' available at the time.[3] Initially, the motivation for the Expedition appears to have been dominated by the 'civilising mission ideology', often summarised as the 'three Cs': Commerce, Christianity and Civilisation. If these qualities of British life were accepted by the people of central Africa, then the slave trade would disappear along with millennia of 'darkness'. The first step, Livingstone argued, was exploration. Places needed to be mapped first, then the inhabitants could be introduced to civilisation. He referred to this as 'opening up' or 'the thin edge of the wedge'.

Many biographers have in the past isolated the idea of the civilising mission as the main motivation for the Zambesi Expedition. However, a closer look at the specific mood concerning Africa in the later 1850s, especially 1857, revealed that Africa was not as high on the popular agenda as supposed. The continent was a commercial backwater while larger issues like the Indian Mutiny dominated the press. Moreover, the evidence surviving from the formative period demonstrated that leading figures in the scientific community were involved in lobbying for and then planning the Expedition from the beginning. The members of the Expedition who served below Livingstone were chosen only with the approval of the scientific community and the briefs given to these members were written by men of science.

Stafford's research into the life of Sir Roderick Murchison finds that the geologist used expeditions to Africa to test his structural theories.[4] This investigation extends that conclusion and finds that the Expedition was used by many branches of science to either test theories or collect data. Furthermore, it is shown here that without the involvement of the scientific community and the promise of data and collections, the Government may have not found cause to fund Livingstone's second expedition. Science and the civilising mission thus used each other to procure public support. The tension between empirical and humanitarian goals that occurred throughout the Expedition was part of its foundation.

These tensions were most clearly realised in the conflicts discussed in Chapter 4, which takes a close look at the use of technology by the

explorers and in particular steam navigation and imaging technologies. Steamships were great symbols of British industrial superiority and were used on the Expedition in part because of the image they projected. When they failed to live up to this image, frustrations and anger resulted. The chapter details the negotiations undertaken to bring steam to the Zambezi and the struggle to deploy it effectively once there. The role of the steamers as symbols of power is examined through the interactions that occurred between the explorers and the locals aboard and around the ship.

The chapter also examines the images produced by the Expedition, linked to steam power because many of the most iconic images of the project include the steamers. Baines created images of steam power that glorify and ridicule its use on the river. His images are the most important chronicle of the hopes and failures of their early years in the field. Elsewhere Baines turned his eye to recording the flora, fauna and human inhabitants of the region, providing important records of Zambesian life in the later 1850s. His images were not photographs, they brought activities and space together to reveal distributed processes in local settings. In some senses this is a disingenuous archive, it is not 'real' in that the refining of sugar did not happen in the way Baines portrayed it. Once we understand what he intends, then we can see much larger spaces implied in a compressed village scene. He took his role as a mediator seriously and offers very 'efficient' images of local practices.

In photography, the situation is more complicated because, for now, the whereabouts of many of the images is not known and they may no longer exist. We do not have direct access to Charles Livingstone's work. In the calotypes made by Kirk we can see how he used photography to record life *in situ*. He also attempted landscapes and made images of local material culture, though without the people. He used processes that required long exposures preferentially. Despite these shortcomings the images are historic because they are the first. Photographers did not return to that part of the world for over a decade.

The analysis of fieldwork continues in Chapter 5. The spaces of collection were examined in detail. The role of local informants was considered in depth and their epistemic contributions considered.

The absence of the local voice in the records of their fieldwork was queried and found to have causes related to ideologies of race, class and empiricism. It was necessary for the British explorers to demonstrate their control over the spaces of collection in order for the knowledge they gathered to be accepted as valid elsewhere. Thus geographies of credibility are uncovered. Evidence for this came from written and material sources, the latter in the form of extant specimen collections. But the local voice was not everywhere obscured and this chapter also shows how local information persisted through representations of the region.

The politics of the spaces of collection cannot be fully understood by just examining fieldwork or sites of analysis; they must be studied in concert. In Chapter 5 the practices of field spaces are connected to the empirical concerns of metropolitan spaces. Simple centre-periphery models and reductive ideas of 'centres of calculation' are challenged because the networks which specimens followed from field to analysis did not match such a pattern. The zoological specimens in particular were shown to have been distributed widely through a loose network of naturalists linked by professional relationships. This conclusion does not deny the central importance of the British Museum or Kew Gardens in this but rather suggests that 'facilitation' rather than 'calculation' may be a better way to describe the organisational work that was performed at these sites.

The final chapter leads chronologically to the end of the Expedition, when the fieldworkers returned to Britain to unpack, collate, analyse and present their results to the scientific community. Whereas the previous chapter looked from the field to the metropolis, here the focus is on the metropolitan spaces of science. To this end a review of scientific literature which used data or specimens from the Expedition was made. The institutions and individuals who performed analyses were identified. This was done so that the representation of the Zambezi Basin in Britain could be examined where it happened: obviously in the *Narrative*, but also in the discussion of a few specimens among many in taxonomic publications where the context of the collection site is almost totally absent.

In periodicals and in debating halls the critics of the Expedition challenged its empirical results. These statements reveal for us the

difficulty of moving knowledge from distant, local fields to the universalised discourse of Victorian science. Credibility is challenged precisely, with critics locating where testimony is being used as evidence, where the explorers had limited control over their observations or where interpretations were considered biased. The Kirk/Cooley debate over the geography of Lake Nyassa was tensely discussed as the critical geographers faced off against an 'actual observer'. The direct observation of natural phenomena by disciplined senses—in this case a British explorer using the appropriate instruments—was acknowledged by everyone present to offer the firmest conclusions. However, where this did not occur, the home-based geographers challenged the travellers' interpretations.

Wilhelm Peters, writing from Berlin, criticised the zoological results of the Expedition fiercely, particularly comments made by Kirk. This resulted in a published debate over the local name and behavioural characteristics of the lizard *Gerrhosaurus robustus*. Their arguments criticised each others' field methods, especially the ability to interpret local testimony. The strength of metropolitan knowledge was inextricable from field practice. Both Peters and Kirk realised this and defended their methods of gathering information to prove that they were reliable reporters of distant nature. As few opportunities existed to doublecheck or replicate their work, trust was critical. The reason that the Kirk/Peters debate was so important is that Peters was a man of science and he had been to the Zambezi as well. He offered the only criticism based upon this personal experience.

...

This research has used the Zambesi Expedition to examine a number of assumptions that historians and geographers of Victorian science have developed. By and large these assumptions are not challenged here but they may now be better understood through this detailed analysis of the activities surrounding and performed within a single expedition. The emphasis here has not been on changes in theories or practices over time, but rather on the relationships between practices performed between and within different spaces. Theories, in this analysis, are one of the many parts of practice and as such play

only a supporting role. The Expedition was mainly about collecting and thus did not—nor was it expected to—alter general assumptions about nature. In fact, the general assumptions about nature were being overturned in the metropolis during the Expedition, as the controversies over Darwinism began while it was in the field. With this in mind, these closing words will bring together the different spaces of expedition considered here.

The Zambezi was a place where the investigators were foreigners and where these outsiders perceived local concerns that threatened to swamp their universal scientific discourse at every bend in the river. Their dutifully trained senses were assaulted by an rush of exhilarating novelty while their bodies endured disease. Instruments rusted, specimens were spoiled with rot or vermin, and the river itself thwarted steam navigation while resisting all attempts at survey. Politically, the situation was incomprehensible: European colonists paid tribute to Ngoni kings, black men called themselves Portuguese, settlers fought against government soldiers, the slaves were independent and well-armed and a monarch in Lisbon claimed to be in control. The political and environmental climate was not just challenging—it was uncontrollable.

It is therefore not surprising that the original plan for the Expedition was to travel far beyond the region of Portuguese settlement and high above the malarious lowlands of the Zambezi valley. On the Batoka Plateau a small British consular station (with a Union Jack flying overhead) would provide an ordered space centred on a prefabricated iron house. From here temporary forays into the surrounding wilds could be made in order to catalogue the natural resources of the region, always with a controlled space to return to. This fixed outpost of British culture would allow for the careful and methodical production of an accurate representation of African nature. It was intended that the metropolitan spaces of scientific discourse would be linked to the middle of southern Africa through practices of disciplined observation, accurate mapping, recorded images and the return of catalogued, preserved specimens. The skills and standards for all these practices were British. They were transported to the Zambezi in the form of instruments, manuals, instructions and embodied knowledge. In the plan for the Expedition, we find clear support for Livingstone's recent

conclusion that science as a cultural practice 'is best exemplified with particular clarity in the field'.[5]

Scientific practice was also shown to be contested in the field: different aspects of practice entailed different conceptions of space. The failure of the original plan because of barriers to steam navigation in the form of the Cahora Bassa rapids led to struggles between the explorers and the environment and between the explorers themselves. The duties of managing the Expedition restricted the time allowed for research. The locations for collecting were dictated more by the steamers, with their demands for fuel and inability to proceed through shallow water, rather than the empirical concerns of botany or geology. The letters of Kirk and Meller to Kew Gardens demonstrate very clearly that there were serious conflicts over the geography of scientific practice. Thornton only succeeded in proceeding unfettered in his geological research when his duties to the Expedition were removed. When Livingstone asked him to rejoin Thornton agreed only with the proviso that he should be able 'to travel about the country very much where I wished'.[6]

Despite these conflicts, this research has shown that a large amount of specimens and data were gathered in the field and returned home successfully. Many of them remain preserved in Natural History collections around Britain today. It has also shown that the collections were often trusted to be what the fieldworkers said they were. This is no small feat to be filed away in the archives of Victorian science. These same specimens are found today in active herbaria and zoological collections, they continue to be consulted as data in biogeographical studies and for systematics. Scientists in the twenty-first century continue to accept, and to rely upon, the credibility of the members of the Expedition as scientists. The work of the Expedition is ongoing. This raises an important question about the remarkable ability of scientific knowledge to circulate not only among peers, but through history.

The latter part of this intriguing question has not been fully addressed here but the first part has. The field offered a specific set of challenges to the members of the Expedition while they were trying to produce scientific knowledge. They reacted to the challenges by using strategies that would answer two purposes: solve the problem locally

and use a solution that would be universally acceptable, that is, one that would meet the standards of the British scientific community who believed in the universality of their science. The explorers were thus always acting with two places simultaneously in mind: field and metropolis. In this sense, they were never only locals on the Zambezi, nor could they be. To properly understand the social interests that shaped scientific practice in the field it has been necessary to disclose the metropolitan discourses that informed that practice.

The maintenance of credibility has been isolated as a key theme here. It was required of the appointees to the Expedition prior to their selection and was renegotiated throughout the project. Livingstone began to lose credibility among geographers and other supporters as his predictions of the navigability of African rivers began to dry up, though his reputation would soon recover. Kirk and Meller never lost credibility. Their results were accepted and even where challenged, they argued their positions successfully. They both went on to careers as Consuls, along with Charles Livingstone whose work as a technician was deemed accurate. Baines, for reasons that have nothing to do with the success of his assignment as the artist, lost his hardearned credibility as an explorer, but only in Britain. In South Africa Baines continued his career as an explorer and landscape artist.

Given these career consequences we find, in turn, an interesting result. Many of the explorers' contemporaries in 1864 considered the Expedition, taken as a whole, to be something of a failure. But this did not lead to ignominy for all involved. Instead they were able to use the Expedition as evidence of their abilities and expertise and move on. This serves to remind us that credibility was about *practice* and not results. With the only partial exceptions of Baines and Thornton (who was later exonerated) none of the leading members was successfully accused of improper behaviour. The failure of the Expedition to achieve its grandiose plans to civilise the southern tropics was not a failure of method. Rather, political, climatic, technological and geographical difficulties were offered as obstacles to success. In any case, the Expedition as a whole was not the concern of the botanists, zoologists, geophysicists and cartographers who were perfectly happy with the results produced for their field. Here, the fieldworkers had acted appropriately and their results were, if not a huge success, at least thoroughly respectable.

One area where credibility was energetically negotiated was in the testimony of local informants. Whether Portuguese, Goanese, Makololo, Manganja or Chikunda it was undecided among the fieldworkers and metropolitan analysts how to assess who deserved recognition and warranted credible status. The purpose of expeditions was to put British observers on the scene and thus to bypass uncertified testimony. Fieldwork proved to be more complicated and required the frequent use of local testimony. Such testimony was unregulated by the metropolitan community and was thus, suspect. The task of the fieldworkers became in some instances to assimilate local knowledge into their own conclusions and then argue in the metropolis for its validity. The field encounters, taking place as conversations, were fraught with possibilities for prevarication, distortion and misinterpretation. The debates between Kirk and Peters or those between the critical geographers and the explorers reveal that within the spaces of a society's meetings and publications the management of field difficulties contributed directly to metropolitan assessments of credibility. When the explorers argued successfully for their informants, the information provided by these informants was allowed to 'participate' in science through the medium of the members of the Expedition.

This last point is crucial. By tracing knowledge from the field to the metropolis the persistence of the local voice within British science can be seen. Local testimony was discussed and debated, used to challenge conclusions and used to support them. Not all locals were the same, and issues of race, class and language figured strongly into the recording and representation of the local informant. Nevertheless, their knowledge was valued. This conclusion challenges findings that emphasise the obscuring or elision of local voices in Victorian epistemology. Local testimony could not stand alone and did require a 'chaperone' in the form of the fieldworker but was nevertheless accorded some independent value and indeed, in some cases, was actively sought.

This conclusion alters an emphasis often used in representations of scientific travel narratives. As documents seen in the mode of imperialism they are, as Barnett has classified them, 'Narratives of Possession'.[7] Here we have examined such documents in the mode of

empiricism, uncovering the practices used to reliably represent Africa in Victorian Britain. I would argue that the latter form of analysis is the most prudent. The imperial aspects of Victorian science are not lost in the identification of the social and empirical interests that contributed to the construction of credible knowledge about the Zambezi Basin. Rather, imperial interests stand alongside the empirical, religious, scientific, geographical, technological, personal and institutional interests that constructed practice. The letters of instructions given to the Expedition demonstrate this plurality clearly. We should not give precedence to imperial interests simply because we are writing a history of Europeans in Africa. A complete social explanation for the construction of scientific knowledge requires that all relevant interests are considered.

It has also been shown that these interests were realised in different spaces. Scientific practice was performed in precise locations and across oceans. The geography of knowledge changes when different types of practice are discussed: geomagnetic observations, botany, zoology, geography, ethnography or medicine. This indicates again that expeditions have a plural if not also multiple character. This book has tried to capture the many practices involved so that the Zambesi Expedition, as a knowledge-producing endeavour, may be more thoroughly understood. An optical metaphor comes to mind: the Expedition was a lens turned upon the Zambezi Basin by the British scientific community; the region was brought into focus through that lens. However, the lens was that of an arthropod, a compound eye which perceives different images and has multiple foci. The *Narrative* written by the Livingstone brothers was an attempt to bring many of these images together, but they acknowledged that the natural history was largely overlooked in the book and left that for Kirk to write. This never occurred and thus the results of the Expedition have only ever appeared—and remain—in isolated disciplinary spaces or as only limited instances in larger syntheses to different purposes. In a sense, then, this work has been an exercise in historical restitution in replacing scientific encounters. Here I have brought together these scattered findings—united at one time but in another place—to reconstruct the scientific practices of the Zambesi Expedition.

Appendix A

EXTRACTED BIBLIOGRAPHY OF SCIENTIFIC LITERATURE RELATED TO THE ZAMBESI EXPEDITION.

Note: See Table on p151. This list contains articles that refer to data or specimens collected by members of the Zambezi Expedition and is comprised of chiefly 'hard' scientific literature. Dates limited to the range from 1858 to 1877. This list does not include newspaper or other popular media.

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Appendix B

FOREWORD FROM PETERS'S *NATURWISSENSCHAFTLICHE REISE NACH MOSSAMBIQUE*

'Foreword' from: Peters, Wilhelm Carl Hartwig. *Naturwissenschaftliche Reise Nach Mossambique*. 5 vols. Berlin: G. Reimer, 1852-1882. Vol. Zoologie IV Flussfische. 1868

Translated from the German by Dr Alison Hiley, Language Links Scotland.

Foreword

The present volume comprises those fish which present not merely a scientific interest, but which are also of politically economic importance as a chief means of subsistence.

The fact that I have restricted myself in this work to those fish which occur in fresh waters scarcely needs justification. The maritime fish which occur on the coasts of Mozambique (cf. *Berichte der Königl. Akademie der Wissenschaften zu Berlin. [Report of the Berlin Royal Academy of Sciences*], 1855, p.428 ff.) belong to the fauna of the great East Indian-Australian Ocean and therefore do not hold the same special interest as the river fish in relation to the regions I have travelled. Besides, *Colonel Playfair* and *Dr Günther* have just recently published a fine work, *Fishes of Zanzibar*, London 1866, a work which is based on the material gathered by the former and draws on all the literature on the subject; the work concerns all those fish which occur on the East coast of Africa. Any similar work would thus be utterly superfluous at the present time.

As can already be ascertained from earlier communications (*Berichte der Königl. Akademie der Wissenschaften zu Berlin. [Report of the Berlin Royal Academy of Sciences*], 1852 and 1855), the number of species I have observed in the Zambezi River region alone amounts to forty-three. According to the list drawn up by *Rüppell* in the year 1835, the total number of fish observed in the Nile previous to his findings ran to thirty (thus including those of the great Napoleonic Nile Expedition, to which he was able to add a further twenty), whilst this number has very recently doubled. In view of this, my Zambezi River count can be viewed as a relatively high result for a first expedition, and for one undertaken with such relatively limited means. On the other hand, and against expectation, the big British Zambezi Expedition of 1858 to 1864 only augmented the number of those Zambezi fish which I had presented in my earlier published findings by one single species (Arius kirkii), while many of those species which I had collected were not even observed at all by that expedition. In view of the manner to which certain of my scientific publications

have been variously alluded to in the work *Narrative of the Expedition to the Zambezi and its Tributaries,* London, 1865, I consider myself completely justified in drawing special attention to this fact. It was not to be expected that a man like *Livingstone*, a man distinguished by his insurmountable wanderlust, extraordinary physical tenacity and great intrepidity, yet a man of little acquaintance with the literature of his own native land, should somehow have any knowledge of the literature of Germany. It was also scarcely to be expected that the English geographers should be familiar with the specialist chart published in accordance with my materials by *Kiepert* in 1849[1], or with my own briefly described itinerary in the *Monatsberichten der Gesellschaft der Erdkunde zu Berlin [Monthly Proceedings of the Berlin Geographical Society],* 1848, p.268 ff. ; but it was to be expected that the English geographers should be familiar with such important recently published works as *Kiepert*'s Atlas and the communications by *Petermann* which utilise this material. This appears not to be the case, however. For otherwise some quarter or other in England would have taken exception to *Livingstone*'s pretension[2] that the true mouth of the Zambezi was first discovered by him and that he was the first to establish that the River Quellimane was not the mouth of the Zambezi – a fact which had long before this alleged discovery been incorporated in the regular school curriculum in Germany. With regard to this pretended discovery, he would probably not then have dared to raise such accusations against the Marquis de Sa da Bandeira, a man so universally revered and highly respected by all parties for his strict sense of integrity and veracity. Even if they were not entirely unfounded, such accusations brook no educated response.[3] For if, in his chart published in 1861,[4] my honest friend, in whose vigorous active interest I was able to take pleasure throughout the whole duration of my journey, made an erroneous assertion with regard to the course of the Zambezi (both for the current period and for the dry season), then this is only because he followed the British sources too trustingly, namely the chart which stemmed from Owen's expedition.[5] It was not his intention, as Livingstone so irresponsibly charged him,[6] to mislead the English cruisers, which had been sent to counter the slave trade, and thereby promote that trade which is so pernicious for the Portuguese colonies. The view has long since prevailed that it can only be in the interest of the Portuguese Government to suppress the slave trade in its colonies, and one of the chief proponents of this view is none other than the Marquis de Sa da Bandeira. Livingstone knows as well as I do, however, that without the connivance of the governors, the slave trade would come to an end. It thus sounds strange coming froSm his lips when he seeks to exculpate his friend, the disloyal Major Tito de Sicard (a man who had already made an ill-famed name for himself in my day) and to lay the blame for the latter's crime at the feet of the Government in Portugal. I should have thought that the recent events in Jamaica would have been ample proof that it is not always possible, even for the best government, to prevent injustice and lawlessness in distant colonies, where it must rely on its representatives. The fact that the Marquis de Sa da Bandeira himself dealt with such undutiful officials with unrelenting severity and incorruptible justice is too widley known for anybody who has any kind of knowledge of Portuguese affairs to be in any doubt over it. Thus, moreover, when Livingstone commences the foreword to his *Narrative* etc. by stating that he will report on the river systems, natural productions and means (*capacities*) of regions which had not been explored at all before him, he should at very least have restricted this claim to the explorations of his own countrymen, although even this would not have been quite correct: for indeed a small collection of plants originates from the markedly unsuccessful 1823 English Zambezi expedition, over and above the malevolent plan to falsify the course of the river (which Livingstone attributed to the Marquis de Sa da Bandeira, and which the English Admiralty published).

With regard to the specialist execution of this volume, it only remains for me to say that those deviations which occur in relation to my earlier preliminary communications are the result of repeated, more precise investigations, and moreover that I have abandoned my earlier intention to illuminate the tables – from a scientific point of view this is unnecessary, besides which it would be both extremely difficult to execute to complete satisfaction, and in addition it would add unnecessarily to the costs. As for the rest, the statements regarding the colours are based only on those illustrations made from living animals. I have taken great trouble over the precise inquiries into the indigenous names and I hope thereby to have rendered the recovery of the species considerably easier for my successors. I have attempted in vain to receive specimens of some of the Zambezi fish whose names were given to me in Sena (for example *mesiríri*, *mansório* and *copœra*). Nor could I clarify to which genus a ribbon-shaped fish "*camupángo*" (that is, little band) belongs, which is said to occur in Lake Nyanja.

Berlin, April 1868

NOTES

1 Oestliches Hoch-Africa mit Madagascar und dem Äthiopischen Archipel. Entw. u. gez. von *Weiland*. 1840. Berichtigt (mit Benutzung der Reise des *Dr. Peters* in Mozambique und am Zambeze) von *Kiepert*. Weimar, im Verlage des geogr. Instituts. 1849 [Upper Eastern Africa, with Madagascar and the Ethiopian archipelago, drawn up and delineated by Weiland. 1840. Report (with reference to the travels of Dr Peters in Mozambique and the Zambezi) by Kiepert. Weimar, published by the Geographical Institute, 1849.

2 Both in the Convention of the British Association for the Advancement for Science in Bath in the year 1864, and in the Proceedings of the Geographical Society of London, and in the above quoted travel work.

3 *loco citato*, p.16, 241, 460, 461

4 Zambesia e Sofála. Mappa coordenado sobre numerosos documentos antigos e modernos portuguezes e estrangeiros. Pelo V.de de Sá da Bandeira. 1861

5 Chart of the East coast of Africa including Madagascar. Capt. W.F.W.Owen. From 1622 to 1826. Sheet 4.

6 *l.c.* p.16. "The Kwakwa, or river of the Quillimane, some sixty miles distant from the mouths of the Zambezi, has long been represented as the principal entrance to the Zambezi, in order, as the portuguese now maintain, that the English cruisers might be induced to watch the false mouth, while slaves were quietly shipped from the true one; and strange to say this error has lately been propagated by a map issued by the colonial minister of Portugal." - - Would any other gentleman in Europe construct a map such as that mentioned in the text and send it to the English Government as showing the true mouth of the Zambezi?" - - p.460 - - "though it was notorious, that His Excellency had made use of our previous information in constructing a map, in which by changing the spelling he had attempted to prove that Dr. Livingstone had made no discoveries at all." - - p.461 - - "we must declare the conduct of the Portuguese statesman to Africa to be simply infamous."

Glossary of Abbreviations

ANSP	Academy of Natural Sciences of Philadelphia
APS	American Philosophical Society, Philadelphia
DLC	David Livingstone Centre, Blantyre
EUL	Edinburgh University Library
PRO	Public Records Office, Kew, London
NAZ	Archives of Zimbabwe, Harare
NHM	Natural History Museum, London
NLS	National Library of Scotland, Edinburgh
RBGE	Royal Botanic Gardens, Edinburgh
RBGK	Royal Botanic Gardens, Kew
RGS	Royal Geographical Society, London
RME	Royal Museum, Edinburgh
RNML	Royal Naval Museum Library, Portsmouth
RSL	Royal Society Library, London
STS	Science and Technology Studies
UMCA	Universities' Mission to Central Africa

Notes

CHAPTER 1

1 M. Newitt, *Portuguese Settlement on the Zambesi: Exploration, Land Tenure and Colonial Rule in East Africa* (Harlow, 1973).
2 W. Owen, 'Particulars of an Expedition up the Zambezi to Senna', *Journal of the Royal Geographical Society,* 2 (1832), pp. 136–152.
3 Newitt, *Portuguese Settlement on the Zambesi*, p. 36.
4 Ibid., p. 104.
5 A. Isaacman and B. Isaacman, *Slavery and Beyond: The Making of Men and Chikunda Ethnic Identities in the Unstable World of South-Central Africa, 1750–1920* (Portsmouth, 2004).
6 Newitt: *Portuguese Settlement on the Zambesi*, p. 140; Isaacman and Isaacman: *Slavery and Beyond*, p. 52.
7 Newitt: *Portuguese Settlement on the Zambesi*, p. 344.
8 Ibid.: especially chapters 13–16.
9 Isaacman and Isaacman: *Slavery and Beyond*, pp. 71 and 290.
10 G. Martelli, *Livingstone's River: A History of the Zambezi Expedition, 1858–1864* (London, 1970).
11 For a detailed discussion of the coastal survey techniques used by the Expedition see V. Bosazza and C. Martin. 'Geographical Methods of Exploration Surveys in the 19c', in C. Martin, ed., *Maps and Surveys of Malawi*, (Rotterdam, 1980), pp. 26–58.
12 See A. Ross, *David Livingstone: Mission and Empire* (London, 2002) or T. Jeal, *Livingstone* (London, 1973).
13 Royal Geographical Society Archives, DL 2/8/4
14 D. Livingstone to T. MacLear, 2 August 1862, in J. Wallis, ed., *The Zambezi Expedition of David Livingstone, 1858–1863*, (London, 1956), p. 371.
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17 This journey is detailed in G. Shepperson, ed., *David Livingstone and the Rovuma: a Notebook* (Edinburgh, 1965).

CHAPTER 2

1 W. D. Cooley, 'Dr. Livingstone's Errors', *Fortnightly Review*, 4 (1866), pp. 96–110, quote from p. 97
2 See D. Livingstone and C. Livingstone, *Narrative of an Expedition to the Zambesi and Its Tributaries: And of the Discovery of the Lakes Shirwa and Nyassa, 1858–1864* (London, 1865).
3 G. Clendennen, 'Historians Beware: You Can't Judge a Book by Its Critics; or, Problems with a Nineteenth Century Exploration Record', *History in Africa,* 21 (1994), pp. 403–407.
4 G. Clendennen, 'Who Wrote Livingstone's Narrative?' *The Bibliotheck: a Scottish Journal of Bibliography and Allied Topics*, 16 (1989), pp. 30–39.
5 J. Wallis, ed., *The Zambesi Journal of James Stewart 1862–1863* (London, 1952) and J. Wallis, ed., *The Zambezi Expedition of David Livingstone, 1858–1863* (London, 1956).
6 E. Tabler, ed., *The Zambezi Papers of Richard Thornton, Geologist to Livingstone's Zambezi Expedition* (London, 1963).
7 Daphne Foskett was an influential collector and scholar of portrait miniatures.
8 A. Benson, 'Forward' in F. Debenham *The Way to Ilala: David Livingstone's Pilgrimage* (London, 1955), p. 6.
9 E. Tabler, E. Axelson, and E. Katz, eds., *Baines on the Zambezi 1858 to 1859* (Johannesburg, 1982); J. Carruthers and M. Arnold, *The Life and Work of Thomas Baines* (Vlaeberg, 1995); M. Stevenson, *Thomas Baines: An Artist in the Service of Science in Southern Africa* (London, 1999).
10 J. Wallis, *The Northern goldfields diaries of Thomas Baines* (London, 1946).
11 J. Wallis, *Thomas Baines of King's Lynn: Explorer and Artist, 1820–1875* (London, 1941)
12 See also the discussion in G. Clendennen, ed., *David Livingstone's Shire Journal, 1861–1864* (Aberdeen, 1992).
13 O. Ransford, *Livingstone's Lake: the Drama of Nyassa* (London, 1966).
14 Published as T. Holmes, ed., *David Livingstone: Letters and Documents*, 1841–1872 (London, 1990).
15 J. MacKenzie, *David Livingstone and the Victorian Encounter with Africa* (London, 1996).
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17 W. C. Devereux, *A Cruise in The 'Gorgon'* (London, 1869).
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20 Tabler: *Papers of Richard Thornton*, p. xviii and .
21 R. Foskett, ed., *The Zambesi Journal and Letters of Dr. John Kirk, 1858–63* (Edinburgh, 1965).
22 B. Lightman, 'Introduction', in *Victorian Science in Context*, B. Lightman, ed., (Chicago and London, 1997), quote from p. 9.
23 R. Drayton, *Nature's Government: Science, Imperial Britain, and the 'Improvement' of the World* (New Haven and London, 2000); N. Rupke, *Richard Owen: Victorian Naturalist* (London, 1994); R. Stafford, 'Geological Surveys, Mineral Discoveries, and British Expansion, 1835–1871', *Journal of Imperial and Commonwealth History,* 12 (1984), pp. 5–32.

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32 S. Shapin, *A Social History of Truth* (Chicago & London, 1994).
33 B. Barnes, D. Bloor, and J. Henry, *Scientific Knowledge: A Sociological Analysis* (Chicago and London, 1996).
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37 D. Bloor, 'Toward a Sociology of Epistemic Things', *Perspectives on Science,* 13 (2005), pp. 285–312.
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3 Murchison to Clarendon, 19 and 24 October 1856, Bodleian Library, Oxford, Clarendon Papers, Dep.C.103, ff. 691–94 and 695–97 respectively. Cited in Ibid.
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13 D. Livingstone, 'Evening Meeting: Lecture by Dr. Livingstone', *The Times*, 20 September 1864.
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28 [M. Oliphant], 'The Missionary Explorer', *Blackwood's Edinburgh Magazine* 83 (1858), pp. 385–401.
29 28 December 1857, RNML, MSS 120 (Box 1/1857).
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48 Foreign Office to Humphrey Lloyd (BAAS), 18 December 1857, RSL, MC.5.323
49 D. Livingstone to J. Hooker, 26 October 1857, Ibid.
50 R. Murchison to J. Washington, 17 December 1857, RNML, MSS 120/Box 1/1857
51 W. Hooker to J. Washington, 16 December 1857, RNML, MSS 120/Box 1/1857.
52 For a post in Persia Hooker asked Balfour for a 'young medical man, very zealous in Botany', W. Hooker to J.H. Balfour, 2 March 1857, RBGE, John Hutton Balfour Correspondence, vol 7, 233.

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57 D. Livingstone to J. Hooker, 28 December 1857, NLS, MS 10779(10a), originals in RBGK.
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111 Driver: *Geography Militant,* p. 25.
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113 A reading of the 'Hints to Travellers' in this light can be found in Driver, *Geography Militant*: 57–58.

CHAPTER 4

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62 Tabler, et al: *Baines on the Zambezi*, p. 91. The event is also recorded by Kirk and Livingtone, Foskett: *Zambesi Journal of Dr. John Kirk*, p. 30; Wallis: *Zambezi Expedition of David Livingstone,* p. 8. Wallis has Livingstone recording the event a day earlier.
63 8 June 1858, Foskett: *Zambesi Journal of Dr. John Kirk*, p. 38.
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CHAPTER 5

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11 D. Simpson, *Dark Companions: The African Contribution to the European Exploration of Africa* (London, 1975).
12 G. Clendennen, 'David Livingstone on the Zambezi: Letters to John Washington, 1861–1863', *Munger Africana Library Notes*, 32 (1976), pp. 1–89 and G. Clendennen, ed., *David Livingstone's Shire Journal, 1861–1864* (Aberdeen, 1992).
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60 A letter to Joseph Hooker the previous day (18 December, 1861) indicates this. RBGK Director's Correspondence v.42/162.
61 John Kirk to William Hooker, 19 December 1861, RBGK Director's Correspondence v.42/163.
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75 Ibid.

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81 Bassett: 'Indigenous Mapmaking in Intertropical Africa', p. 41.

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CHAPTER 6

1 Original emphasis. 'Instructions in matters relating to vegetable products, geology, zoology and meteorology: for Dr. Meller', RNML MSS120/Box 2/ Miscellaneous.

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12 Ibid.: 201.
13 R. Drayton, 'Science and the European Empires', *The Journal of Imperial and Commonwealth History*, 23 (1995), pp. 503–10.
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15 Ibid.: 143.
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22 Quoted in R. Yeo. 'Scientific Method and the Rhetoric of Science in Britain, 1830–1917', in J. A. Schuster and R. R. Yeo eds., *The Politics and Rhetoric of Scientific Method*, 1986), pp. 259–297, at p. 282.
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32 Originals are held in the RBGE Library, Balfour Correspondence vol. 7.
33 Lindsay was the physician superintendent of Murray's Hospital in Perth and an acknowledged expert on lichens.
34 A. Desmond, 'The Making of Institutional Zoology in London, 1822–1836', *History of Science,* 23 (1985), pp. 153–185, 223–250.
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36 See Thornton's instructions written by Murchison in J. Wallis, ed., *The Zambezi Expedition of David Livingstone, 1858–1863* (London, 1956), p. 430.
37 R. Thornton, 'Notes on a Journey to Kilima-Ndjaro, Made in the Company of Baron Von Der Decken', *Journal of the Royal Geographical Society*, 35 (1865), pp. 15–21.
38 Discussed in E. Tabler, ed., *The Zambezi Papers of Richard Thornton, Geologist to Livingstone's Zambezi Expedition* (London, 1963), pp. xiii–xiv.
39 First promulgated by Murchison in 1852, see R. I. Murchison, 'Presidential Address', *Journal of the Royal Geographical Society,* 22 (1852), pp. lxii–cxxvi. The role of this theory in directing exploration is analysed in R. Stafford, 'Roderick Murchison and the Structure of Africa: A Geologic Prediction and Its Consequences for British Expansion', *Annals of Science,* 45 (1988), pp. 1–40.
40 As discussed in the previous chapter, Murchison was upset over the lack of a great geographical discovery that could be used to create a spectacle. R. Foskett, ed., *The Zambesi Journal and Letters of Dr. John Kirk, 1858–63* (Edinburgh, 1965), p. 530.
41 D. Livingstone and C. Livingstone, *Narrative of an Expedition to the Zambesi and Its Tributaries: and of the Discovery of the Lakes Shirwa and Nyassa, 1858–1864* (London, 1865), pp. 7–8.
42 Kirk to JH Balfour 13 December 1863, RBGE John Hutton Balfour Correspondence, vol.8, n.103. In April 1866 Kirk accepted an appointment as Agency Physician and Vice-Consul to Zanzibar under GE Seward. He and Helen, his wife, spent twenty years in Zanzibar.

43 For example, between 7 April 1864 to 16 March 1865 Kirk presented six papers to the Linnean Society. He was elected a Fellow there on 5 May 1864.
44 Kirk to D. Livingstone 25 July 1864, NLS Acc 9942/55.
45 The 1864 volume of the *Report on the Progress and Condition of the Royal Gardens at Kew* mentions Kirk hard at work on his collections.
46 J. Kirk, 'Account of the Zambezi District, in South Africa, with a Notice of its Vegetable and Other Products', *Transactions of the Botanical Society,* 8 (1864), pp. 197–202, quote from p. 200.
47 See a discussion of Kirk's opinion in 1898 in D.N. Livingstone, 'Tropical Climate and Moral Hygiene: The Anatomy of a Victorian Debate', *British Journal for the History of Science*, 32 (1999), pp. 93–110.
48 G. Bentham, 'On African *Anonaceae*', *Transactions of the Linnean Society*, 23 (1862), pp. 463–80.
49 See the titles of the articles listed in Appendix A.
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51 C. Barnett, 'Impure and Worldly Geography: The Africanist Discourse of the Royal Geographical Society, 1831–73', *Transactions of the Institute of British Geographers,* 23 (1998), pp. 239–251, quote from p. 242.
52 Foskett: *Zambesi Journal of Dr. John Kirk*, p. 253.
53 This classification has since been changed, J. Kirk, 'On *Musa Livingstoniana*, a New Banana from Tropical Africa', *Journal of the Linnean Society: Botany*, 9 (1867), p. 128.
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55 Letter, Thistleton-Dyer to Portsmouth Dockyards, 9 October 1883 RBGK Library, Zambesi Expedition Book p.44b.
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63 T. Baines, 'Notes on the Zambesi Expedition', *Proceedings of the Royal Geographical Society of London*, 3 (1858–1859), pp. 99–106; D. Livingstone, 'Latest Accounts from Dr. Livingstone, F.R.G.S., of the Central Africa Expedition', *Proceedings of the Royal Geographical Society of London*, 4 (1859–1860), 19–29.
64 See. D. Livingstone, J. Kirk, and T. Baines, 'Extracts from the Despatches of Dr. David Livingstone, M.D., Gold Medallist R.G.S. (Dated December 17, 1858; February 14, May 12, July 26, and October 15, 1859) to the Right Honourable Lord Malmesbury', *Journal of the Royal Geographical Society*, 31 (1861), pp. 256–96.
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68 Cooley: 'On the Travels of Portuguese'.
69 D. Livingstone, 'Letters from the Zambesi to Sir R. Murchison, and (the Late) Admiral Washington', *Proceedings of the Royal Geographical Society of London*, 8 (1863–1864), pp. 256–63.
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84 R. Foskett, ed., *The Zambesi Doctors: David Livingstone's Letters to John Kirk 1858–1872* (Edinburgh, 1964), p. 99.
85 The vocabulary referred to is authored by Dr Wilhelm Heinrich Immanuel Bleek, not 'Black' as suggested in the letter. J. Kirk, 'Letter Dated 28 February Replying to Dr. Peters', *Proceedings of the Zoological Society of London* (1865), p. 227.

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87 This is not entirely accurate for a minority of Livingstone's British detractors, such as James MacQueen, attacked him regularly on exactly the same grounds. cf. Ibid.
88 It is possible that Albert Günther's refusal in 1874 to allow Peters access to the British Museum's zoological collections may be related to Peters's harsh words about Livingstone and Kirk. See an angry letter from Peters to Richard Owen dated 23 December 1874, NHM, Owen Correspondence, 62.21/302. In the letter Peters stated that he will have nothing to do with the British Museum ever again.
89 Livingstone and Livingstone: *Narrative of an Expedition*, pp. 12–14.
90 D. G. Burnett, *Masters of All They Surveyed : Exploration, Geography and a British El Dorado* (Chicago and London, 2000).
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CHAPTER 7

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