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The Patterns and Meaning of a Great Lake in West Africa

GERALD J. RIZZO

The cartographical history of Africa has often left much to the imagination. The idea of a great inland lake along the Niger River in West Africa, for example, has had a rich tradition in written accounts and on maps from Ptolemy onwards. One tendency was to dismiss the notion that any such body of water existed; another was to find divers ways of reconciling tradition and the sparse scattering of new 'facts' that reached European mapmakers. The fundamental problem was ignorance about the hydrology of the interior of Africa, especially in the region of the Niger River. Not until the nineteenth century was the presumed connection between the Niger and Senegal rivers laid to rest, together with the older view that the Niger flowed underground through the eastern highlands to the Nile. Only then was the Niger's actual course established, flowing first east and then, after a great bend, south to debouche into the Gulf of Guinea.¹

While the attention of historians focused mostly on the African coastline and the eastern lakes, the early maps of West Africa had regularly showed a prominent inland lake on the southern edge of the Sahara. The cartographical history of this lake has invited further investigation. In this paper we ask how did the image originate, by what physical feature could it have been inspired, and why should it have been considered important in the history of the sub-Saharan region.

We approached the issue by looking at four hundred primary maps dating from 900 to 1900.

The analysis of this database confirmed that one of the most consistent features throughout the archival record was the image of a lake in West Africa within the region of the middle Niger River.² From maps on which the lake was named (which was not always the case), we have identified numerous toponyms, including Nigrîte Palus, Nilides Palolus, Wangara, Sigisma, Guber, Guarda, Bogs of Guarda, Maberia, Nigris Morass, Dibbie Sea, Lake Dibbie and Lake Debo. This analysis has led to the conclusion that whatever the feature was called, and whatever shape it was given, the mapmakers were each attempting to portray a common physical reality. That entity was the fluctuating area of lakes and branching streams in the middle course of the Niger River, between Djenné and Tombouctou known today as the Inland Niger Delta (Fig. 1).

The inland delta, as a unique local feature, is shown on modern maps at best as a limited area of swamp at the southern edge of the Sahara. It is rarely given a name and remains mostly unnoticed in the world's view of modern Africa. Yet, the true meaning of this great wetland lies in the fact that it was once home to a thriving civilization centred on an array of specialized urban settlements near Lake Debo, in the vicinity of modern Djenné (old Jenné-Jeno).³ For more than fifteen hundred years Jenné-Jeno had been the focus of one of the most dynamic urban agglomerations in the sub-Saharan interior. What the early maps reflect is

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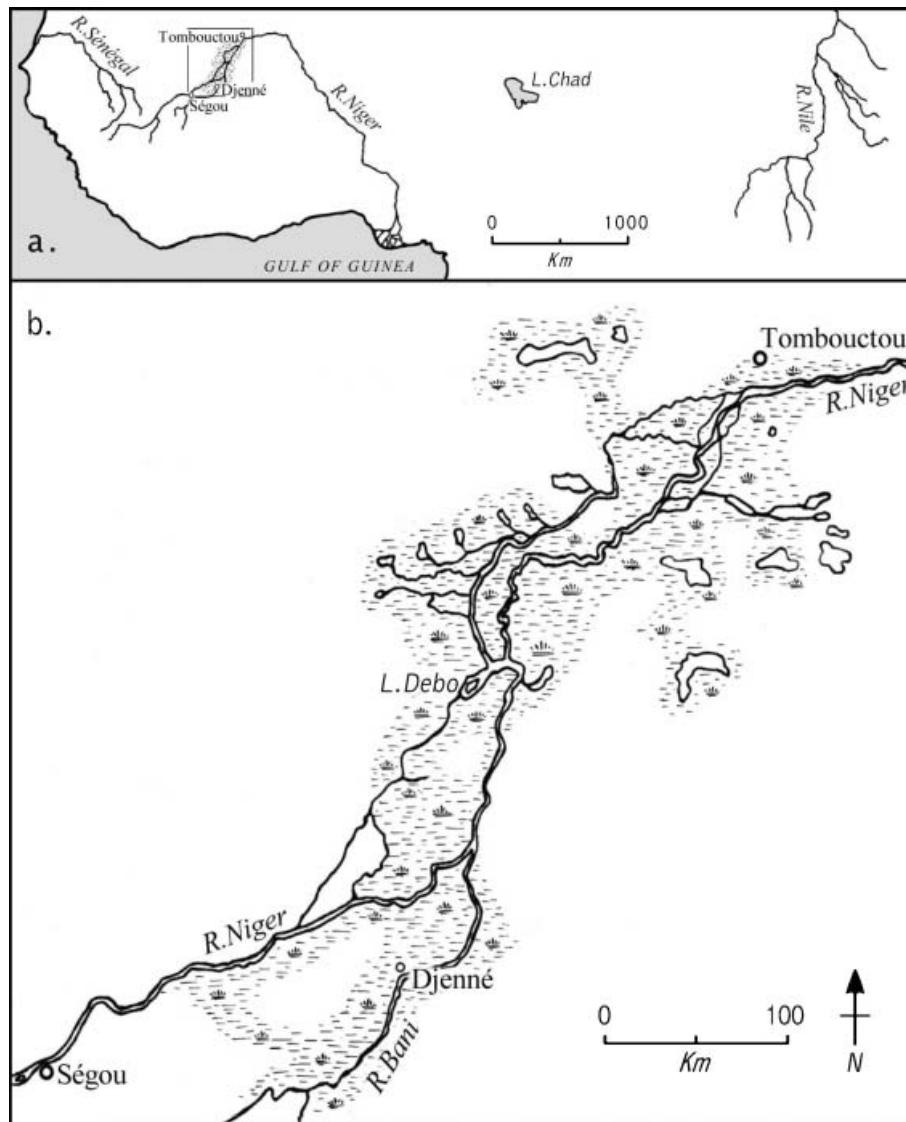


Fig. 1. The Inland Niger Delta, West Africa. (a) Sketch map to show the course of the Niger River in relation to the Senegal River, with which it was long thought to be joined, and the Egyptian Nile, to which in Antiquity the Niger was said to flow. (b) Detail of the area of 'the bend' of the Niger, showing the braided channel, marshes and lakes of the Inland Niger Delta. (Source: *Times Atlas of the World*, Vol. IV.)

contemporary knowledge of this entity at different times in the past.

The depiction of a great lake in West Africa can be distilled into one of four patterns, with distinct map stemmata or lines of descent. Each model had a specific lifespan, so the classification is also broadly chronological. In the literature, eight specific accounts, most of which incorporate direct African testimonies, are quoted to underlie the different cartographical models of the lake. The first two models had separate beginnings that came together in Renaissance Venice to create a third version that endured for some two hundred years

until the definitive modern form began to emerge in the early eighteenth century.

The Ptolemaic or Dumb-bell Model

The earliest record of a sub-Saharan wetland or lake dates from the fifth century BC, when the Greek historian Herodotus related how a group of young Libyans crossed the Sahara to mark their coming of age. They then found themselves in a vast tract of 'very great swamps and sundry pools', beyond which was a town whose inhabitants were black, and past which 'a great river with crocodiles [the Niger, or the Nile of Negroes] flowed from the

west towards the sunrise'.⁴ In the first century AD, Pliny the Elder gave a similar description of the Niger River and its lake based on information obtained from the Berber ruler, Juba II.⁵ The earliest known cartographical representation of this geographical tradition comes from Claudius Ptolemy's mid second-century Geography. In his outline for the Fourth Map of Libya, he lists a river connecting two lakes, the *Nigrite Palus* in the west and the *Libya Palus* to the east, thus framing the Niger in the form of a dumb-bell (Fig. 2a).⁶

Although Ptolemy's description of Africa was unavailable in medieval Europe, a similar view was found in Paulus Orosius's *History against the Pagans*. Orosius was writing in North Africa in the early fifth century, some two and a half centuries after Ptolemy. He described a river called Nuhul beyond the Atlas Mountains that 'disappears in the sands and after a short interval, gushes forth into an enormous lake and then flows eastward', to sink again before meeting the Nile.⁷ Orosius's account, which was derived from the late fourth-century writer Tyconius (*Commentary on the Apocalypse*) and in turn used by successive authorities such as Isidore of Seville (c.560–636) in his *Etymologiae* and Beatus of Liébana (d. 798) in his *Commentary on the Apocalypse*, gave a wide dissemination to the idea of a linked pair of lakes along the course of the Niger. These lakes found their way onto medieval *mappaemundi*, notably the Anglo-Saxon (c. early eleventh century), Guidonis (Guido) of Pisa (c.1119), Sawley (c.1129), Ebstorf (c.1235), and Hereford (c.1280).⁸ This Ptolemaic-Orosian pattern of dumb-bell lakes persisted on many Renaissance world maps from the fifteenth to the sixteenth centuries.⁹

The al-Idrisi or 'Braided' Model

Ptolemy's account of the geography of Africa was familiar to early Islamic scholars who continued to study his work. By the twelfth century, however, other ideas about the hydrology of the sub-Saharan interior were also circulating in the Islamic world.¹⁰ A perspective from the west coast of Africa stems from the Berber Almoravid dynasty in Morocco, whose history was compiled by the Muslim historian from Andalusia, Abu Ubayd Abd Allah, Ibn Abd al-Aziz al-Bakri (d. 1094). Al-Bakri recounted how a group of Lemtuna people had moved south from Morocco to an 'island which floods in cycles'.¹¹ From the west coast of Africa, the Almoravids spread the Muslim doctrine along the Senegal River to the interior of Ghana

and Mali, creating an impression that this river was conjoined with the Niger in a westward flow.

Under the influence of these Almoravids, an alternative cartographical pattern began to emerge. In 1154 Abu 'Abd Allah Muhammad ibn Muhammed al-Sharif al-Idrisi completed his *Nuzhat al-mushtaq fi ikhtiraq al-afaq* [The book of pleasant journeys into faraway lands], a work which probably incorporated information from the now-lost silver planisphere that other scholars at Roger II's court in Palermo had created a few years earlier. In his text al-Idrisi describes an island where gold was traded which he called Wangara, '300 miles long and 150 miles wide surrounded by the Nil [Niger or Nile of the Negroes] on all sides during the whole year' (Fig. 2b). Al-Idrisi, however, must carry the historical burden of projecting an errant westward direction for a conjoined Senegal-Niger River which persisted for another five centuries.¹² Nevertheless, his work proved highly influential in disseminating the notion of a lake with islands in a braided reach of the Niger River.

The al-Idrisi model gained currency as an alternative pattern, and during the next five centuries, Muslim, Catalan and some European mapmakers adopted the idea for their own maps. Although al-Idrisi's view itself was unknown throughout most of the Renaissance, other links spread his version of the lake to Grenada (through, for example, the writings of ibn Sa'id between 1269 and 1286) and to North Africa (through, for example, the work of ibn Kaldun, who was writing in Tunis and Cairo between 1378 and 1402).¹³ Thence the information would have passed into Christian European literature through the writings of missionaries such as Ramon Llull (c.1272), who wrote in Catalan from Genoa, Majorca and Tunis, and an anonymous Franciscan friar who left similar geographical accounts of Africa based on information supplied by Europeans who had travelled with the trans-Saharan salt caravans.¹⁴ Both Llull and the Franciscan told of a region where black men lived on 'an island in the middle of a Great Lake' that was formed by five rivulets spanning 'twenty days journey in length and ten in width'.¹⁵ Thus we find this West African lake featured as 'lacq nill' in the *Catalan Atlas* of Abraham Cresques, 1375, and in the Este map, c.1450, all associated with Majorca which had remained under Muslim dominance until 1248.

The lake also appeared prominently on early Venetian maps such as those by Pietro Vesconte (c.1320), Fra Mauro (1459) and Giovanni Leardo

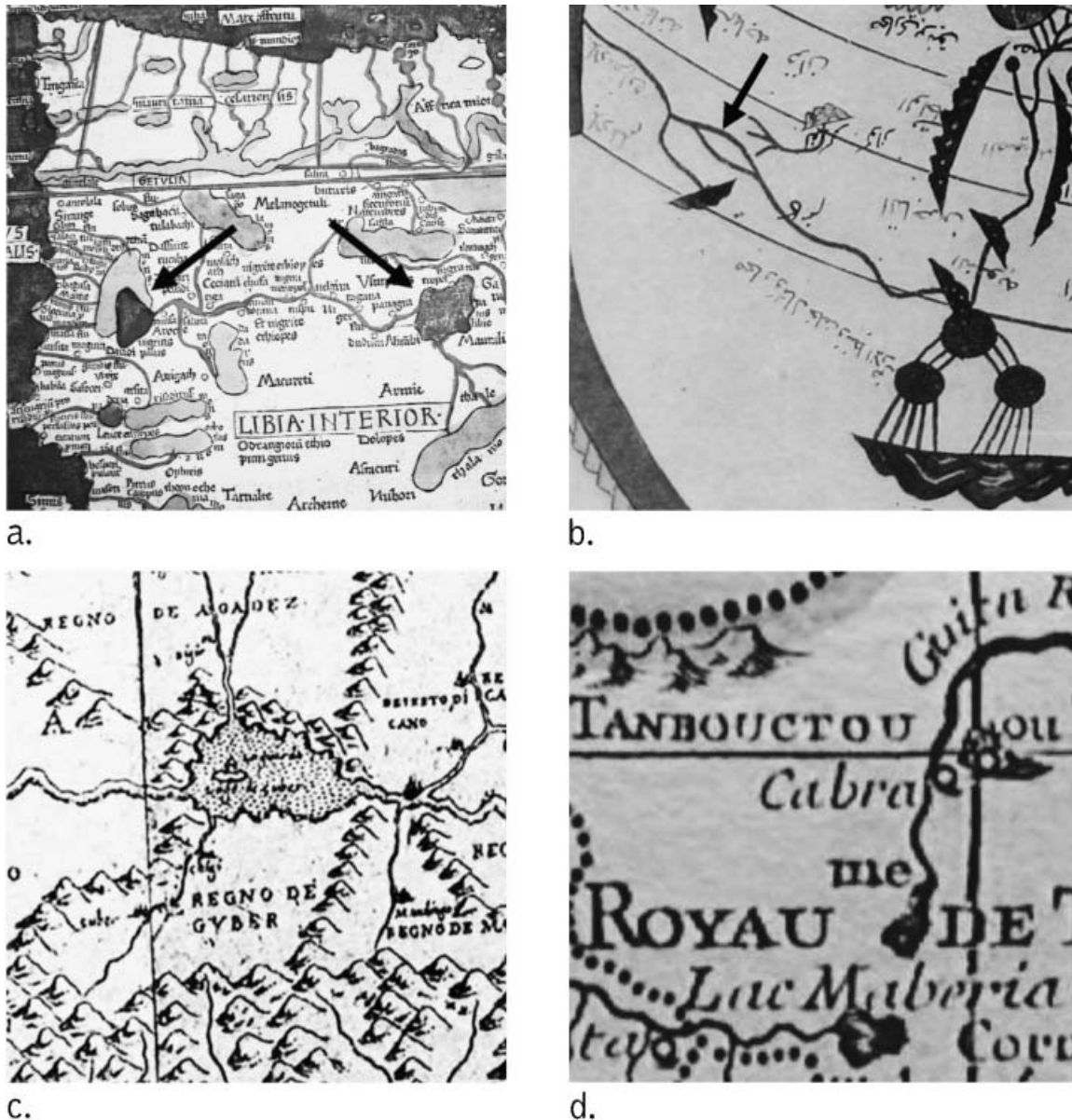


Fig. 2. Classification of cartographical patterns for a 'Great Lake' in West Africa on maps from the second century onwards: (a) Claudius Ptolemy's 'dumb-bell' form, with two lakes linked by the Niger River, shown here on the Fourth Map of Africa from the Ulm edition of the *Cosmographia* (1482); (b) al-Idrisi's 'braided' form, with the Niger split into two channels by an island (Wangara), from a sixteenth-century copy of his *Book of Pleasant Journeys* (1154); (c) Giacomo Gastaldi's 'Guber/Guarda' form, with the fortified island of La Guarda in the centre of Lake Guber, on *Il disegno della geografia moderna de tutta la parte dell'Africa*, 1564; (d) Guillaume Delisle's 'separation' form, with the Senegal and Niger shown as two separate rivers, the lake (unnamed) on a branch of the Niger, and the (mythical) Lake Maberia, from his *Carte d'Afrique* (1722). (The extracts in Figs. a, c and d are reproduced with permission from the Afriterr Library, Boston, and that in b is reproduced with permission from the Bodleian Library, Oxford: Pococke MS 375, fols. 3v–4r (1553).)

(1452), where it is labelled as a 'Sandy Sea'.¹⁶ Other Venetians, such as the merchants Andrea Bianco and Alvise Cadamosto produced independent but converging accounts of the coast of West Africa.¹⁷ In 1455–1456, Prince Henry of Portugal had commissioned Cadamosto to sail to Gambia and the Cape Verde Islands. Cadamosto recounted

how he had been told of a trade that was conducted in total silence on waters the Africans 'consider to be the [Inland] Sea'. He went on to say, 'there come another race of blacks who do not wish to be seen or to speak. They arrive in large boats from which it appears that they come from islands and disembark . . . leaving gold for salt'.¹⁸

Martin Behaim, the Nuremberg map and globe maker who was in Lisbon between 1482 and 1484, heard of a great lake in the interior of West Africa from the Portuguese navigator Diogo Gomes. In 1484 Gomes related to Behaim the history of his voyage to West Africa between 1455 and 1460. Local Africans had told Gomes about a ridge of hills north of Sierra Leone where 'very large rivers ran eastward from them, and . . . a certain great river named Emin [that is, the Niger], and that there was also a great lake'.¹⁹

It was surely Gomes who prompted Behaim to display this lake so prominently in his depiction of Africa on his hemispheric map and globe in 1492, and it must have been Gomes who provided Renaissance Europe with firm testimony that the two rivers—the west-flowing Senegal and the east-flowing Niger—were quite separate. Cartographers accepted the perception of the lake, but the weight of al-Idrisi along with the prospect of a westward conduit for interior trade, kept the view of a united Senegal-Niger entrenched for two more centuries.

Gastaldi's Lago di Guber/Guarda Model

In the sixteenth century further attention was drawn to the presence of a lake in sub-Saharan Africa through the cartographical works of Giacomo Gastaldi. After outlining the lake on maps for Pietro Andrea Mattioli's Italian-language edition of Ptolemy's *Geography* (1548), Gastaldi created a map of Africa for the walls of the Sala dello Scudo in the Doge's Palace in Venice (1549).²⁰ These maps showed a great lake in West Africa that was not Ptolemaic in shape and was only vaguely like the al-Idrisi model. The lake was clearly a version of his own that merged all the Renaissance views into one image with a distinctive shape and toponyms. The same prominent lake appeared in West Africa on the maps Gastaldi prepared for the 1554 edition of Giovanni Battista Ramusio's *Delle navigationi et viaggi*, with most of the interior place-names derived from Leo Africanus's account of his travels in West Africa, published in Rome in 1526.²¹

In 1564, Gastaldi published his landmark eight-sheet wall map, *Il disegno della geografia moderna de tutta la parte dell'Africa*, based on his map for the Doge's Palace. The triangular lake he showed in the middle of the Niger River was labelled *Lago di Guber*, as on his earlier maps, but here Gastaldi added a new detail, a fortified island in the centre of the lake called *La Guarda* (Fig. 2c).²² Although Gastaldi maintained the tradition of a great lake

in the middle reaches of the Niger, he failed to challenge al-Idrisi's notion that the Niger and Senegal rivers were linked and that the united river flowed to the west. Of all Gastaldi's maps, it was the map of 1564 that was to serve as a template for cartographers, engravers and publishers for the next two hundred years. In fact, Gastaldi's Lake Guber/Guarda appeared on nearly every printed map of Africa for the next two hundred years, from those issued by Tramezzino in Venice to such famous names as Ortelius, Blaeu, Sanson, Speed, Homann and Coronelli.²³

Gastaldi used Leo Africanus's description of the fifteen kingdoms in the region south of the Sahara to place the names Gualata, Ghine (Ginne), Melli, Tombouctou, Gago, Guber (Gobir), Agadez, Kano, Bornu and Nubia on his map.²⁴ The toponyms provide clues to the identity of the interior lake, but there are problems. Gastaldi was not only wrong in thinking that the Niger flowed westwards, but also in locating several places—Tombouctou and Guber in particular—too far to the west (Fig. 3). In order to understand how Gastaldi's geography fits the modern map of the region, we need to shift the names of all the kingdoms on his map to the east in relation to the lake (Fig. 4). Once the sequence of Tombouctou, Agadez and Bornu is moved eastwards, then each name comes closer to its actual position. Similarly, when the southern place-names of Ghine, Gago and Guber are shifted to the east, then Ghine's location is closest to the southern edge of the lake rather than Guber/Gobir, a place which had neither physical nor cultural links with either the river or the lake.

Gastaldi appears to have been confused by Leo's description of both Ghine and Guber as flooded regions, although Leo clearly stipulated that Ghine/Ginne became 'environed with the overflows of the Niger in the manner of an island'; whereas Guber was located in a hilly region farther east.²⁵ Other contemporary sources, such as the accounts of Duarte Pacheco Pereira (d. c.1530), and later Arabic and Songhay chronicles such as the *Ta'rikh es-Sudan* by the historian Abd al-Rahman es-Sa'di (c.1652), who lived in Tombouctou, confirm that Gastaldi was in error and show that Leo's Ghine should, in fact, have been understood as Ginne [Jenné-Jeno, Djenné], the place in the middle Niger to which the Juula people came to trade.²⁶ This lacustrine environment offered ideal facilities for loading and unloading cargo and gold brought from the south. Gastaldi's map sign for the

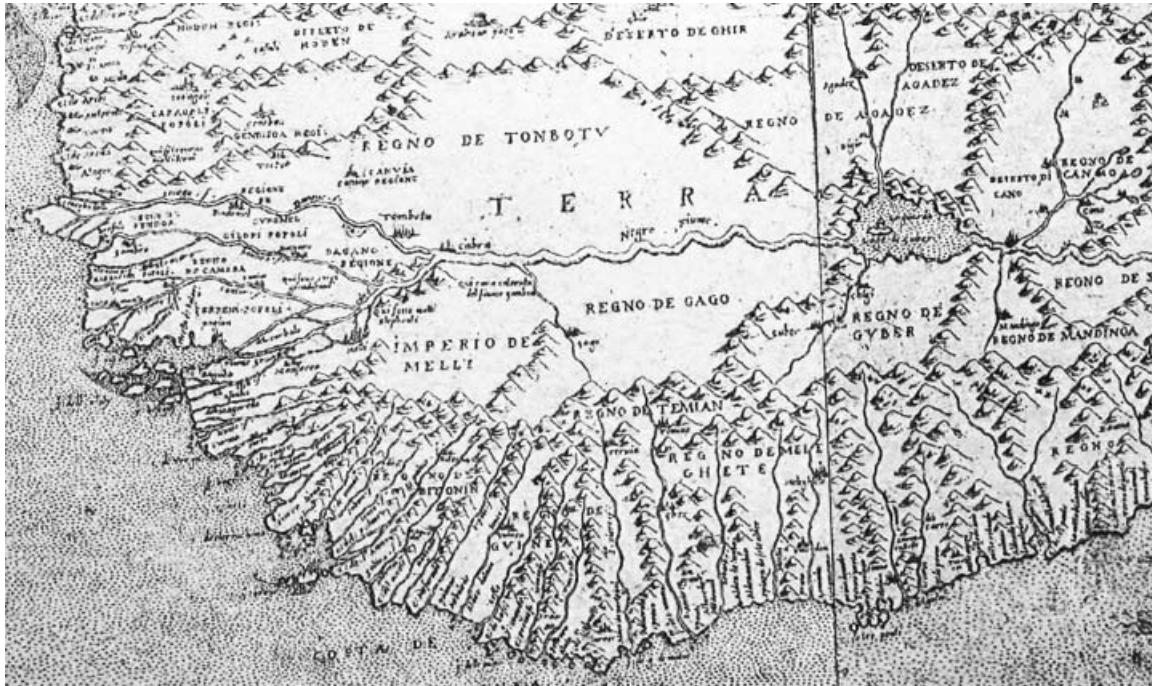


Fig. 3. Giacomo Gastaldi, *Il disegno della geografia moderna de tutta la parte dell'Africa*, 1564. Copperplate. 8 sheets. Detail showing the Niger and the Senegal rivers as one river flowing west and debouching into the Atlantic in a number of distributaries. Note the westerly displacement of Tombouctou (*Tombotu*), on the northern arm of the Senegal-Niger. (Reproduced with permission from the Afriterrra Library, Boston.)

fortified island of 'Guarda', with its symbolic beacon, would have been wholly appropriate for the island community of Jenné which, we now know, was at that time 'guarded' by a two-kilometre stone wall on a marshy site in the middle of the lattice of the streams and channels of the Inland Niger Delta. The stronghold of Jenné had stood as a beacon of independence against the Tuareg as late as 1434 and had survived a seven-year siege that ended in 1473 (Fig. 5).²⁷ More vital as a route node than Tombouctou, the Jenné

community could certainly be described as the 'guarded' link on the busy trade routes linking Saharan salt and the gold that came from forest sites, some as far away as the highlands of Senegal in the region of the headwaters of the Niger and the Senegal rivers.²⁸

The Delisle Separation Model

The information Diogo Gomes had gained from his African sources (and passed on to Behaim in 1484), told of a mountain ridge dividing the Niger River system from that of the Senegal. Although this idea supported the original Ptolemaic pattern of West African hydrology, Behaim—and later Gastaldi—ignored the divide but maintained a single great lake with a westward-flowing river, as in al-Idrisi's model.²⁹

It was not until the early eighteenth century that the connection between the Niger and Senegal rivers found on the al-Idrisi- and Gastaldi-inspired maps was successfully challenged by Guillaume Delisle, whose plotting of the middle Niger was the most accurate to date. In 1714 Delisle published his *Orbis Veteribus Noti Tabula Nova*, a map of the western hemisphere, and then, in 1722, his *Carte d'Afrique* and *Carte De L'Afrique Francoise ou Du*

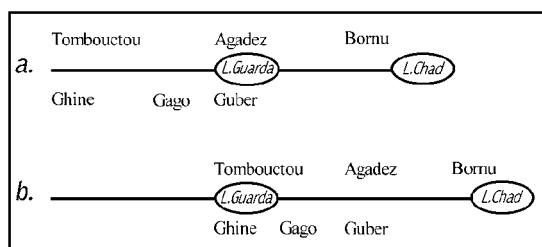


Fig. 4. (a) On Gastaldi's maps of Africa, many place names are shown too far towards the west (see Fig. 3). If the place-names are shifted eastwards in relation to Lake Guarda, as in (b), they appear in approximately the correct position, with Ghine/Ginne at southern edge of the lake instead of Guber/Gobir.

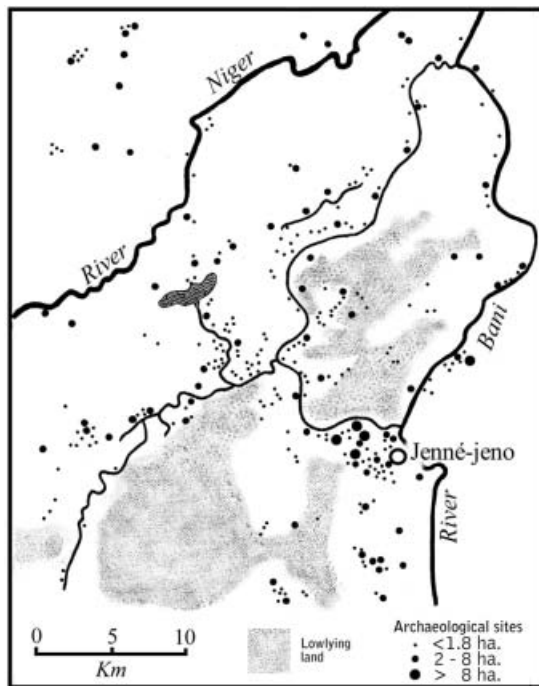


Fig. 5. Archaeological sites indicating the former density of population south of Lake Debo, in the vicinity of Jenné-Jeno, 250 BC to AD 1500. Adapted from Susan Keech McIntosh, *Excavations at Jenné-Jeno, Hambarketolo, and Kaniana, Inland Niger Delta, Mali, 1981 Season* (Berkeley, University of California Press, 1995), 411, Fig. 10.13.

Senegal. On all three, he showed the Senegal and Niger rivers as quite separate. He also divided the interior lake into two lakes (Fig. 2d). One lake was a mythical *Maberia*, shown as the source of a westward-flowing Senegal River; the other unnamed actual lake produced the eastward-flowing Guien (Niger) River. Twenty-seven years later, another French cartographer, Jean Baptiste Bourguignon d'Anville, endorsed Delisle's depiction of the two separate rivers, both on his own map of 1749 and in his essay of ten years later, declaring that the lake in the Niger was the same as Ptolemy's *Nigrite Palus*, and Pliny's lake *Nigris*.³⁰

Delisle's and d'Anville's separation of the Senegal and Niger river systems was based mainly on information obtained from Mandingo and Bambara traders by French explorers who were in the region between 1698 and 1720. André Brue, who had been on the coast from 1691, had travelled up the Senegal River to Galam in 1698, where he established Fort St Joseph before being recalled to France. He returned to the Senegal coast as governor, and from 1716 to 1720 sent a succession of expeditions to repair the fort after

its repeated destruction. Eventually the explorers reached the Falls of Felou. The most valuable information on the geography of regions still farther inland came from a Farim, who was chief of Kaynura, and his son, with whom Sieur Compagnon lodged in 1716, and from Malade, a trader from Tombouctou, who in 1719 gave detailed reports of the commerce and political situation there.³¹ The explorers' reports were deposited at the French Academy, and the text was summarized and published in French by Jean Baptiste Labat in 1728 and 1731, and in English by Thomas Astley (1745).³² According to these accounts, the Senegal River flowed westward from a lake named Maberia, but that lake's 'situation could not be well marked from their report'.³³ There continued to be confusion about whether one or two lakes existed, although any lake called Maberia was subsequently proved to be mythical. Delisle, however, with access to more records, interpreted the accounts to indicate there was indeed an unnamed lake (close to the Lake Maberia) from which a river named Guien (Niger) flowed northeast to Tombouctou.

Well after Delisle's time, serious attempts began to be made to verify the identity of the lake that had been noted in so many maps and travellers' accounts through the ages. In 1796, on the first of two expeditions to explore the Niger, Mungo Park had seen for himself a separate Niger that flowed 'slowly to the eastward' (his emphasis). At Silla, Park was almost within sight of the lake when he had to turn back, although not before collecting from local traders 'all the information I could, concerning the further course of the Niger . . . and I heard the same account in so many different kingdoms, and from such a variety of people, whose veracity I had not occasion to suspect'. Park recorded the name of the body of water as 'Lake Dibbi', meaning the 'Dark Lake' in the 'Region of Riches', relating that it was so big that 'canoes lose sight of land [for] one whole day'.³⁴ All this was confirmed on his second journey there in 1805, when he met an elder of the Somonie tribe, who drew the sketch map which was eventually published with Park's diary.³⁵

The Physical Basis

It was in 1828 that René Caillié, on his historic journey to Tombouctou, reached this lake and confirmed all the components of this story from a vantage point at the entrance of the lake he called Debo:

When the river overflows, the lake appears much more extensive, its banks are no longer perceptible, and it might be mistaken for an inland sea . . . I could not recover from my surprise at seeing so great a mass of water in the heart of this country. There was something very majestic in the sight. Were a fort built on one of the three [islands,] it would command the environs, and the navigation would be under the control of the possessor.³⁶

Among the myriad of names by which the lake has been known, Debo remains the only name in common use today, reflecting the indigenous Songhai terms for 'flat-mat' or 'royal drum'.³⁷

Finally in 1853, Heinrich Barth surveyed Lake Debo and positioned it definitively within the tangled Niger marsh.³⁸ When we applied a Geographical Information System (GIS) overlay to fit the earlier maps to our current land-use maps, we found that Gastaldi's Lake Guber, Delisle's anonymous lake and the Lake Debo of today are all the same feature. The lake that the early mapmakers wanted to represent lies within 1.5 degrees of the centre of the modern Inland Niger Delta (15°N, 4°W). This Inland Delta is the 'great lake' that from the time of antiquity was being described as lying in the midst of the marshes and islands of the braided Niger River (see Fig. 1). Here, at the southern edge of the Sahara, a real inland sea spreads out where the middle Niger forms a broad alluvial fan dissected by countless channels to form a huge indeterminate wetland extending some four hundred kilometres downstream before the waters re-gather into one main channel at the Niger River bend.³⁹

We started this article with the ancient accounts and the earliest cartographical representations of a lake that seemed to be no more than a myth. We have found four distinctive models in the way the lake was shown on maps from antiquity to early modern times. Now the material record of archaeological fieldwork has clearly revealed that for more than fifteen hundred years, a cluster of specialized urban settlements was prominent in this part of the African interior among the lakes and marshes of the Inland Niger Delta (Fig. 5). The people of the 'inland sea' formed a cohesive and self-sustaining society.⁴⁰ The enduring lake that was transmitted from map to map stood for much more than just a shallow body of water. What we were meant to see in this recurring image, in effect, was not just an outline of a lake, but a densely inhabited region with a vibrant economy. From the start, the semiotic of the map was always pointing to the civilization that was centred on Jenné-Jeno, a 'sea of busy commerce'.

NOTES AND REFERENCES

1. There is a considerable literature on the idea of a lake (sometimes called the Sudan Sea) in the interior of western Africa and its association with the Niger River; examples include James Grey Jackson, *An Account of the Empire of Marocco, and the Districts of Suse and Tafilelt, Compiled from Miscellaneous Observations made during a Long Residence in, and various Journies through these Countries* (London, Bulmer, 1809); idem, *An Account of Timbuctoo and Housa, Territories in the Interior of Africa* (London, Longman, 1820), 435–51; James Rennell, *Geographical Illustrations of Mr Park's Journey*, [Appendix to] Mungo Park, *Travels in the Interior Districts of Africa: Performed in the Years 1795, 1796 and 1797* (London, John Murray, 1816 edition), 365–458; Thomas J. Bassett and Philip W. Porter, 'From the Best Authorities': The Mountains of Kong in the cartography of West Africa', *Journal of African History* 32 (1991): 367–413; Francesc Relaño, *The Shaping of Africa: Cosmographic Discourse and Cartographic Science in Late Medieval and Early Modern Europe* (Aldershot, UK, and Burlington, VT, Ashgate, 2002); and Charles W. J. Withers 'Mapping the Niger, 1798–1832: trust, testimony, and "ocular demonstration" in the late Enlightenment', *Imago Mundi* 56:2 (2004): 170–93.

2. We recorded twenty features from each of 400 continental maps of Africa, and constructed a spreadsheet that allowed queries documenting that an inland lake appears in 95 per cent of the maps in this random sample examined at Harvard Map Library, the Universities of Illinois and Florida, the New York Public library and the library at Afriterra.org

3. The archaeological history of the region has been brought to light only since 1977. Susan and Roderick McIntosh have identified three phases of human occupation between 250 BC and AD 1400 and have traced settlement distribution and trading activities for each phase. They also point to the way these former inhabitants used intensive specialization in order to adapt to the major environmental changes that have affected the region. Susan Keech McIntosh, *Excavations at Jenné-Jeno, Hambarketolo, and Kaniana, Inland Niger Delta, Mali, 1981 Season*, University of California Publications in Anthropology 20 (Berkeley, 1995), and Roderick James McIntosh, *The Peoples of the Middle Niger* (Oxford, Blackwell, 1988). See also Samuel Sidibe, 'The Dia archaeological project: rescuing cultural heritage in the Inland Niger Delta (Mali)', *Antiquity* 75 (2001): 837–48.

4. Herodotus, *The History of Herodotus*, ed. G. C. Macaulay (London, Macmillan, 1890, and New York, Barnes and Noble, 2004), Book II, v. 31–33.

5. Pliny, *Natural History*, Loeb Classical Library (Cambridge, Mass., and London, Harvard University Press, 1938–1949), Book V, 10, 51–54. See also Robin Hallett, *The Penetration of Africa: European Exploration in North and West Africa to 1815* (New York, Praeger, 1965), 45–48.

6. Claudius Ptolemaeus, *Geographia* (Rome, 1478; Amsterdam, Theatrum Orbis Terrarum facsimile ed., 1969); and *Claudii Ptolemaei Geographia*, ed. Karl Müller (Paris, 1883–1901), Book IV, 6.

7. Paulus Orosius, *Seven Books of History against the Pagans*, transl. Roy J. Deferrari (Washington, Catholic University Press, 1964), Book I, 2, 29 (pp. 10–11).

8. For the suggested link between Tyconius, Isidore and Beatus, see John Williams, 'Isidore, Orosius and the Beatus Map', *Imago Mundi* 49 (1997): 17; and Relaño, *Shaping of Africa* (note 1). The maps are, respectively,

British Library, Cotton MS Tiberius B.V., fol. 56v; Bibliothèque Royale de Belgique, Brussels, MS 3897-3939, cat. 3095, fol. 53v; Sawley Map, Honorius of Autun, Durham Cathedral Priory; and Hereford Cathedral; the Ebstorf map is no longer extant.

9. Among the Renaissance world maps that have a pair of lakes in the interior of West Africa are those by Francesco Rosselli (1492), Matteo Contarini (1506), Martin Waldseemüller (1507), Johann Ruysch (1508), Bernardo Sylvanus (1511), Peter Apian (1520), Oronce Fine (1534), and Sebastian Cabot (1544). Printed editions of Ptolemy's *Geography* also tended to exhibit the Ptolemaic form of a pair of linked lakes (the dumb-bell model) on both the old and new maps. Gastaldi's small-format edition of 1548 was the first to show a different model.

10. For Arabic sources for the cartography of Africa, see especially Nehemia Levtzion and J. E. P. Hopkins, *Corpus of Early Arabic Sources for West African History* (Princeton, Markus Wiener, 2000); William Desborough Cooley, *The Negroland of the Arabs Examined and Explained* (London, Arrowsmith, 1841). An Arab rectangular map of the inhabited world (a 13th-century copy of a work originating in the late 11th century), also shows a prominent inland-lake in West Africa: see Jeremy Johns and Emilie Savage-Smith, 'The Book of Curiosities: a newly discovered series of Islamic maps', *Imago Mundi* 55 (2003): 7–24, plate 1.

11. I. Hrbek, 'The Almoravids', and J. Devisse 'Trade and trade routes in West Africa', *Unesco General History of Africa III: Africa from the Seventh to the Eleventh Century*, ed. M. El Fasi (Berkeley, University of California Press, 1985, and Oxford, Heinemann, 1995), 336–66 and 367–435.

12. Al-Idrisi's *Book of Roger* is translated in part and quoted in Levtzion and Hopkins, *Corpus of Early Arabic Sources* (see note 10), 104–11. For a re-creation of the map, see Konrad Miller, *Charta Rogeriana Weltkarte de Idrisi* (Stuttgart, 1928). See also S. Maqbul Ahmad, 'Cartography of al-Sharif al-Idrisi', in *The History of Cartography*, Vol. 2, Book 1, *Cartography in the Traditional Islamic and South Asian Societies*, ed. J. Brian Harley and David Woodward (Chicago, University of Chicago Press, 1992), 156–74.

13. Al-Idrisi's text was unavailable in Christian Europe until 1592, when an edition in Arabic was printed in Rome: *De geographia universalis* (Rome, Typographia Medicea, 1592).

14. Ramon Llull, *Libre de Blaqueria* (c.1272), and idem, *Libre de Contemplacio* (c.1272); the anonymous Franciscan friar's work is *Libro del Conoscimiento* (c.1350–1360).

15. For the quotations from Llull and the anonymous friar, see Pekka Masonen, *The Negroland Revisited: Discovery and Invention of the Sudanese Middle Ages* (Helsinki, Academia Scientiarum Fennica, 2000), 74–111, and Relaño, *Shaping of Africa* (see note 1), 103–14.

16. The earliest European maps to show an al-Idrisi-style braided-island pattern were not portolan charts, but maps of the world that incorporated information taken from the charts, such as the map Pietro Vesconte created for Marino Sanudo's *Liber Secretorum* (c.1320), and Paolino Veneto's copy of Vesconte's map in his *Chronologia magna* (c.1325). By the late 14th century, the lake is shown on portolan charts, such as those by Francesco and Marco Pizigano (1367), Abraham and Jafuda Cresques (1375), Pirrus de Noha (c.1414), Mâcia de Viladesters (1413) and Gabriel de Vallseca (1439). The al-Idrisi braided river is also found on the so-called Borgia map (c.1450), the Este world map (c.1450), Giovanni

Leardo's world map (1452), and the map of Hectomano Freducci of Ancona (1497). On these maps, see David Woodward, 'Medieval *mappaemundi*', and Tony Campbell, 'Portolan charts from the late thirteenth century to 1500', both in *The History of Cartography*, Vol. 1, *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, ed. David Woodward and J. B. Harley (Chicago, University of Chicago Press, 1987), 286–370 and 371–463 respectively, and plates 9, 16, 17, 18, 20, 21, 22, 24, 27; Relaño, *The Shaping of Africa* (see note 1), 103–15, plate 9; and John Kirtland Wright, *The Leardo Map of the World 1452* (New York, American Geographical Society, 1928), 5, 16 and facsimile plate. About the same time a great lake appeared in a compressed form west of the Nile on Chinese maps by Chu Ssu-Pen (1320) and Kangnido (1402): see Kuei-sheng Chang, 'Africa and the Indian Ocean in Chinese maps', *Imago Mundi* 24 (1970): 21–30; and Gari Ledyard, 'Cartography in Korea', in *The History of Cartography*, Vol. 2, Book 2, *Cartography in the Traditional East and Southeast Asian Societies*, ed. J. Brian Harley and David Woodward (Chicago, University of Chicago Press, 1994), 235–344, esp. 244–45, 248, 266, 289, Figs. 10.3 and 10.4, and dust-jacket figure.

17. For Andrea Bianco's chart of 1448, see A. E. Nordenskiöld and Francis A. Bather, *Periplus: An Essay on the Early History of Charts and Sailing Directions* (Stockholm, 1897), 19.

18. Cited in G. R. Crone, *The Voyages of Cadamosto and Other Documents on Western Africa in the Second Half of the Fifteenth Century* (London, Hakluyt Society, 1937), 22–23; Masonen, *Negroland Revisited* (see note 15), 129–36.

19. Crone, *Voyages of Cadamosto* (see note 18), xxv, 4, 94.

20. Robert Karrow, *Mapmakers of the Sixteenth Century and Their Maps* (Chicago, Speculum Orbis Press for the Newberry Library, 1993), 223.

21. Leo Africanus's Arab name was al-Hassan ibn-Mohammed al-Wezaz al-Fasi. He was born in Grenada, at the time of the Moors, but he later lived in Rome under Pope Leo X's patronage, where in 1526 he published an account of his earlier travels to fifteen kingdoms in western Africa. Leo's text was published in Giovanni Battista Ramusio, *Primo volume delle navigationi et viaggi ne lual si contiene la descrizione dell'Africa et del paese del Prete Ianni, con varii viaggi del mar Rosso a Calicut, et insino all'isole Molucche, dove nascono le spetiere et la navigatione attorno il mondo* (Venice, Tommaso Giunti, 1550; 2nd ed., 1554). The map has the title *Primo Tavola*; see also Masonen, *Negroland Revisited* (note 15), 165–234.

22. Nordenskiöld and Bather, *Periplus* (see note 17), 165; and Karrow, *Mapmakers of the Sixteenth Century* (see note 20), 216–49.

23. Gastaldi's Guarda model appears on 99 per cent of the maps published between 1564 and 1720 that we examined in our study.

24. Leo Africanus, *The History and Description of Africa and the Notable Things Therein Contained*, transl. John Pory, ed. Robert Brown (London, Hakluyt Society, 1896), 1: xxxviii; Masonen, *Negroland Revisited* (see note 15), 165–234.

25. Leo Africanus, *History and Description of Africa* (see note 24), 1: 17–18, 124–25, 196, quotation from 3: 822, 828; Masonen, *Negroland Revisited* (see note 15), 295–301.

26. Duarte Pacheco Pereira, *Esmeraldo de Situ Orbis*, ed. George H. T. Kimble (London, Hakluyt Society, 1937), 80–81; Masonen, *Negroland Revisited* (see note 15), 88–95, 145, 292–328; Edward William Bovill, *The Golden Trade of the Moors* (Princeton, Markus Wiener, 1995), 153–54.

27. At its apogee at the end of the fifteenth century, Jenné occupied more than 200 hectares, on which were housed some 40,000 inhabitants in 69 satellite settlements as well as in the walled centre. It was the focus of an indigenous trading network that extended for a radius of some 350 kilometres: see Susan Keech McIntosh, *Excavations at Jenné-Jeno* (note 3), and Roderick James McIntosh, *Peoples of the Middle Niger* (note 3), 199–203; D. T. Niane, 'Mali and the second Mandingo expansion', in *Unesco General History of Africa 12–16th Century*, ed. D. T. Niane (Berkeley, University of California Press, 1984), 117–18, 156, 203–6; Masonen, *Negroland Revisited* (note 15), 88–89, 295–302.

28. The centre of the gold trade, recorded by al'Idrisi but unknown to Gastaldi, was Wangara, which, according to its description as an island, must also have been in the Inland Delta region and not, as some later maps had it, in the hills to the west or the dry regions to the east. See Susan Keech McIntosh, 'A reconsideration of Wangara/Palolus, island of gold', *Journal of African History* 22:2 (1981): 145–58.

29. Crone, *The Voyages of Cadamosto* (see note 18), 2: 80, 93–94.

30. Jean Baptiste Bourguignon d'Anville, *Afrique publiée sous les auspices de Monseigneur le Duc d'Orléans Premier Prince du Sang* (Paris, 1749) (double-sheet map); and also his essay 'Mémoire concernant les rivières de l'intérieur de l'Afrique, sur les notions tirées des Anciens & des Modernes', *Mémoires de Littérature de l'Académie Royale des Inscriptions et Belles-Lettres* 26 (Paris, 1759), xxvi.

31. André Delcourt, *La France et les établissements français au Sénégal 1713–1763: La compagnie des Indes et le Sénégal*, *Mémoires de l'Institut français d'Afrique noire* 17 (Dakar 1952); Hallett, *Penetration of Africa* (see note 5), 85–96.

32. Jean Baptiste Labat, *Nouvelle relation de l'Afrique occidentale* (Paris, 1728); idem, *Voyage du Chevalier des marchais en Guinée, isles voisines, et à Cayenne, fait en 1725, 1726, et 1727* (Paris, 1730), 4: 32–68; Thomas Astley, *A New General Collection of Voyages and Travels, Consisting of the Most Esteemed Relations, Which Have Been Hitherto Published in Any Language: Comprehending Every Thing Remarkable in Its Kind, in Europe, Asia, Africa, and America* (London, 1745), 2: 52–168.

33. Astley, *A New General Collection of Voyages* (see note 32), 2: 52–53, contains the discussion of Lake Maberia and the unnamed Niger lake.

34. Mungo Park, *Travels in the Interior districts of Africa . . . 1795, 1796, and 1797* (London, W. Bulmer, 1799), 190, 208–12. Jackson, *Account of Timbuctoo* (see note 1), 450 and 523, explains that the epithet 'Region of Riches' described the area from which the Moroccan prince Mulay Hamed Dehebbi obtained his gold.

35. Mungo Park, *The Journal of a Mission into the Interior of Africa, in the year 1805* (London, John Murray, 1815), 2: 165.

36. René Caillié, *Travels through Central Africa to Timbuctoo; and Across the Great Desert to Morocco, performed in the years 1824–1828* (London, Colburn and Bentley, 1830), 2: 20–22.

37. Nehemia Levtzion, *Muslims and Chiefs in West Africa* (Oxford, Clarendon Press, 1968), 63, traces the derivation of *Dabo* to a Mande patronymic group from the Volta basin. Adrian Room, *African Placenames* (Jefferson, NC, McFarland Co, 1994), suggested the translation 'flat-mat', whereas Bovill, *Golden Trade of the Moors* (see note 26), 81, gives the derivation as 'royal drum'. See also Basil Davidson, *Lost Cities of Africa* (Boston, Little Brown and Company, 1970), 85.

38. Barth also confirmed that neither Lake Debo nor the Niger River had any connection with Lake Chad: Heinrich Barth, *Travels and Discoveries in North and Central Africa: Being A Journal of an Expedition Undertaken under the Auspices of H.B.M.'s Government in the Years 1849–1855* (London, Longmans, 1857).

39. The GIS application at afriterrra.org was performed with standardized geo-referencing using projection, coordinates and common control points to rectify each map to the current basis map. The geographical landmarks are taken from the handbook by K. Mason, *French West Africa* (London, Naval Intelligence Office, 1945), 1: 13–56, 2: 168–229.

40. Susan Keech McIntosh, *Excavations at Jenné-Jeno* (see note 3); Christopher Ehret, *The Civilizations of Africa* (Charlottesville, University of Virginia Press, 2002), 228–32; Graham Connah, *African Civilizations: An Archaeological Perspective* (Cambridge, Cambridge University Press, 2001), 108–43, 177; Jackson, *An Account of Timbuctoo* (see note 1), 448, 450, 465, 506.