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SMALLPOX INOCULATION IN AFRICA

BY EUGENIA W. HERBERT

Inoculation. C'est la plus belle découverte qui ait été faite en médecine, pour la conservation de la vie des hommes. *Encyclopédie*, t. 18 (1782)

THIS article attempts a preliminary survey of the evidence for the practice in Africa of smallpox inoculation (as distinct from vaccination). It suggests regional patterns of diffusion, frequently linked with trade routes, although the broader question of whether inoculation was simply adopted as the result of external contacts or whether, in some areas at least, it may have been due to independent invention, cannot be answered for the present. Indeed, a great deal more research remains to be carried out in the field of African medicine generally before its historical impact can be assessed. The arguments of this article may well call for correction in the light of further information, and I should welcome any new references which appear to throw light on the topic: these could form the subject of a supplementary note in a later issue of this Journal.*

In 1706 the Rev. Cotton Mather of Boston, scion of an illustrious family of Puritan divines and also an enthusiastic scientist and physician *manqué* was given a slave by his devoted parishioners. He named him Onesimus, after a slave of St Paul, and as a matter of course enquired whether he had had the smallpox. Even a cursory look at advertisements for slaves in America shows that this question was always uppermost in the minds of slave-owners. Onesimus, 'a pretty Intelligent Fellow',

answered, both, Yes, and No; and then told me, that he had undergone an Operation, which had given him something of the Small-Pox & would forever praeserve him from it; adding that it was often used among the Guramantese, & whoever had the Courage to use it, was forever free from the fear of Contagion.¹

Mather made further enquiries among the 'Army' of African slaves in Boston who corroborated this account, indicating that they, too, had had

* Dr Andrew Roberts has contributed greatly to this article through his stimulating comments and the extensive documentation he has provided for East, Central and South Africa.

¹ G. L. Kittredge, 'Introduction' to Increase Mather . . . and Cotton Mather, *Sentiments on the Small Pox Inoculated* (Cleveland, 1921), 4. 'Inoculation' is used throughout this paper to refer to the process of transferring smallpox artificially from someone infected with the disease to someone who is not but hopes thereby to contract a mild case and subsequent immunity. It is synonymous with 'variolation', used in the modern medical literature but not in the eighteenth century. Vaccination refers to infection with cowpox to give immunity to smallpox and was first described by Jenner in 1796.

An earlier version of this paper was presented to the Connecticut Valley African Colloquium, Hartford, Conn. I am most grateful to Robert Farris Thompson for his perceptive comments and suggestions.

the operation 'while they were yett in Barbary'; indeed they had the marks to prove it, all of which made them potentially very useful for tending those ill with smallpox. He was also told that captains assembling slave cargoes on the coast of Guinea often took slaves who had not yet had smallpox ashore to have them inoculated, 'that the poor Creatures may sell for a better price'.²

One can imagine something of Mather's excitement when he subsequently read an account in the *Transactions* of the Royal Society for 1714 (which probably took a year or more to reach him) of a similar form of inoculation practised with great success over the past forty years at Constantinople and widely known among the Circassians, Georgians and 'other Asiaticks'.³ On 12 July 1716 he communicated this excitement in a letter to Dr John Woodward, a leading English physician and Fellow of the Royal Society. Mather emphasized how closely the African practice paralleled that reported from Constantinople and urged that the technique be tried without further delay in England, where smallpox was endemic (it was only episodic in the colonies). He added, 'For my part, if I should live to see the Small-Pox again enter into o^r City, I would immediately procure a Consult of o^r Physicians, to Introduce a Practice, which may be of so very happy a Tendency'.⁴ Mather hoped that the English would try it first, but they did not (in spite of a second communication to the Royal Society from Constantinople). Before long, however, Providence offered Mather his chance.

The preoccupation with smallpox on the part of Mather and his contemporaries is understandable when it is realized that smallpox was to the seventeenth and eighteenth centuries what the plague had been to the Middle Ages. The disease seems to have increased terrifyingly in virulence, no longer reaping a harvest primarily of children but of the entire population, young and old, rich and poor, kings and paupers⁵ (Louis XV and Gezo of Dahomey were to be its last royal victims). 'No other disease which the Bostonians experienced ever caused such concentrated mortality',⁶ and the epidemic of 1721 was to prove one of the most devastating events in the city's history.⁷

Smallpox broke out in Boston in the early summer of 1721; as soon as it became clear that the disease could not be checked by the usual means of quarantine, Mather began a massive campaign in favour of inoculation. He enlisted a phalanx of prominent clergymen, including Benjamin

² G. L. Kittredge, 'Some Lost Works of Cotton Mather', *Massachusetts Historical Society Proceedings*, LXV (1911-12), 438, 450.

³ Emanuel Timonius, 'An Account of the Procuring the Small Pox by Incision, or Inoculation . . .', *Philosophical Transactions*, no. 339 (1714), 72-82.

⁴ Quoted in Kittredge, 'Introduction', 4.

⁵ Genevieve Miller, *The Adoption of Inoculation for Smallpox in England and France* (Philadelphia, 1957), ch. 1 *passim*.

⁶ John B. Blake, 'Smallpox Inoculation in Colonial Boston', *J. Hist. Medicine & Allied Sciences*, VIII (1953), 285.

⁷ G. B. Warden, *Boston, 1689-1776* (Boston, 1970), 81.

Colman who had himself been out interviewing Boston Negroes. Colman had obtained essentially the same information as Mather, namely that inoculation was an accepted practice in Africa whenever it became clear that smallpox could not be prevented from spreading; that inoculation virtually eliminated deaths from the disease; and that it seemed to confer lifetime immunity. How the practice had started in Africa, Colman's informants could not say, only that it had been done since long before they were born.⁸

Mather was far less successful in winning over the medical profession (what there was of it), the press and public opinion generally. Only Dr Zabdiel Boylston was willing to perform inoculations, and the controversy that raged by mid-summer was almost as virulent as the disease itself.⁹ Boylston and Mather wrote a tract to defend the procedure; the tract is particularly interesting in that it attempted to transcribe the Africans' account in pidgin English:

I have since mett with a considerable Number of these Africans, who all agree in One story; That in their Country *grandy-many* dye of the *Small-Pox*; But now they learn This Way: People take Juice of Small-Pox; and Cutty-skin, and Putt in a Drop; then by'nd by a little Sicky, sicky: then very few little things like *Small-Pox*: and nobody dy of it; and no body have *Small-Pox* any more. Thus in *Africa*, where the Poor Creatures dy of the *Small-Pox* like Rotten Sheep, a Merciful GOD has taught them an *Infallible Praeservative*. Tis a common Practice and is attended with a *Constant Success*.¹⁰

Somewhat defensively, Mather and Boylston declared: 'I don't know why 'tis more unlawful to learn of Africans, how to help against the Poison of the Small Pox, than it is to learn of our Indians, how to help against the Poison of a Rattle-Snake.'¹¹ And in the same vein Colman declared, 'I believe I shall be scoffed at for telling this Simple Story [a slave's description of inoculation as he remembered it], but . . . whosoever seeks the Truth and desires to be informed will not despise it. And he that has learnt any thing as he ought, has this—to be willing to learn of the poorest Slave in Town.'¹²

The attacks on the 'inoculating ministers' and on Boylston were vicious, and not exclusively verbal: on one occasion a grenade was tossed into Mather's house. Not the least of the points made against them was their credulity in believing African slaves.¹³ Nevertheless the heroic doctor did

⁸ Benjamin Colman, *Some Observations on the New Method of Receiving the Small-Pox by Ingrafting or Inoculating* (Boston, 1721), 15-16.

⁹ For accounts of the controversy, see Perry Miller, *The New England Mind from Colony to Province* (Cambridge, Mass., 1953), ch. 23; Kittredge, 'Introduction'; and Warden, *Boston*, 86-7, 89-90.

¹⁰ Kittredge, 'Introduction', 6, from *The Angel of Bethesda*, where the account is almost identical with that published by Mather and Boylston during the controversy.

¹¹ Kittredge, 'Some Lost Works', 430.

¹² Colman, *Observations*, 16.

¹³ In the vanguard of the attackers was James Franklin, publisher of the Hell-raising *New England Courant*, to whom the young Benjamin Franklin was then apprenticed.

inoculate enough people to provide dramatic evidence of the efficacy of the technique. Triumphant Mather rushed a letter to the Secretary of the Royal Society as soon as the epidemic was over, informing him that of some 300 people inoculated, only five or six died and that these may well have acquired the infection before being inoculated. At the worst, then, the death rate was 2 per cent as opposed to about 14 per cent or more for those infected naturally.¹⁴

As it happened, England was in the throes of a smallpox epidemic at the same time as Boston, and doctors there were finally moved to try inoculation (if very tentatively), thanks to a number of circumstances: the example and influence of Lady Mary Wortley Montagu (who had seen inoculation at first hand and had had her own son inoculated in Constantinople); successful trials on prisoners at Newgate and on municipal orphans; the daring of the Princess of Wales in asking to have her own children inoculated; and now the evidence coming from America, statistical data for the first time, confirming the reports from Constantinople and Africa. By mid-century, inoculation had become fairly well accepted in both America and England, and in succeeding decades on the continent.¹⁵

Mather's report of inoculation in Africa is the earliest that exists, to my knowledge. Was it in fact a common practice there, as his and Colman's soundings imply and the account of Cadwallader Colden in 1753 seems to corroborate?¹⁶ Was it an indigenous practice or was it derived through outside contacts? I can only suggest the most tentative answers, based on the sources I have found. These sources are of two main types: travellers' accounts for the earlier period and reports of anthropologists and medical personnel for the colonial and post-colonial era. Travellers and anthropologists would not necessarily have been aware of the practice unless smallpox happened to be prevalent in an area during their visits. Medical personnel in recent times have been eradicating smallpox through vaccination and where they have even noted inoculation they have tended to consider it an obstacle to the achievement of their aims. In some cases

Subsequently the latter became one of the most ardent and effective proponents of inoculation in America. See Bernard Fay, 'Franklin's *New England Courant*', *Penn. Mag. of Hist. & Biog.* LVII (1924), 348.

¹⁴ *Phil. Trans.* no. 374 (1722), 215. This was by no means the end of the battle for inoculation; not until 1764 was the practice so widespread that an outbreak of smallpox in Boston failed for the first time to have a marked impact on the city's mortality statistics: Blake, 'Smallpox Inoculation', 291.

¹⁵ See G. Miller, *passim*; Robert Halsband, 'New Light on Lady Mary Wortley Montagu's Contribution to Inoculation', *J. Hist. Medicine & Allied Sciences* VIII (1953), 390-405; Raymond P. Stearns and George J. Pasti, 'Remarks upon the Introduction of Inoculation for Smallpox in England', *Bull. Hist. Medicine* XXIV (1950), 103-22; Hans Sloane, 'Account of Inoculation', *Phil. Trans.* XLIX, pt. 2 (1756), 516; C. W. Dixon, *Smallpox* (London, 1962), ch. xi.

¹⁶ Cadwallader Colden, 'Extract of a Letter . . . to Dr. Fothergill . . . Read Dec. 24, 1753', *Medical Observations and Inquiries* I (London, 1757-84), 227-9.

it has undoubtedly gone 'underground' as it did when it became illegal in Europe.

Mather, Colman and Colden all gathered the impression from their informants that inoculation was quasi-universal at the time they had left Africa. One would like to know where, specifically, Boston and, in Colden's case, New York, were getting their slaves at this time. Boston's slave trade was geared mainly to the demands of the West Indies, but when prices there were low or the market temporarily oversupplied, slaves were brought back to Boston for sale as domestics, artisans and occasionally farmhands. Unfortunately there seems to be little information about their ultimate origins. A good number seem to have been African-born rather than second-generation slaves: a communication from Governor Dudley to the Board of Trade in 1708 put the number of Negro slaves in Boston at 400 and claimed that 'above halfe of them [were] born here', but he may have been exaggerating the latter figure to gloss over the amount of smuggling going on.¹⁷

In a few cases cited by Donnan, Gold Coast Negroes are specified in advertisements, apparently reflecting the general North American preference, but Bostonians were probably far less knowledgeable about supposed African ethnic differences than their Charleston cousins. Boston captains traded especially with the Gold Coast, where their rum was in particular demand; occasionally, however, they may have put in at Senegambian or other West African ports, but they do not seem to have gone regularly to the Congo or Angola in the early eighteenth century. Colden's informants added the interesting detail that they prepared children for inoculation by having them 'abstain from all flesh meat, and drink plentifully of water acidulated with the juice of limes, which grow plentifully in this country'.¹⁸ This would apparently suggest the littoral or forest rather than the savanna.

Mather refers to Onesimus as a 'Guramantee' and talks about Africans being inoculated while they were 'yett in Barbary', but one must be cautious as usual with such vague toponyms. He may simply be employing quaint terms for black Africans and Guinea, or he may indeed be suggesting a more precise origin in the Central Sahara and its environs. Hornemann visited the Fezzan in 1800 and specifically describes the treatment for smallpox in Murzuk without alluding to inoculation at all.¹⁹ But if 'Guramantee' refers more broadly to the Kanuri-speaking people of the Central Sudan, there is subsequent evidence that inoculation was a recognized technique in the area. Denham comments on a smallpox epidemic that broke out in Kukawa in 1823: 'They are not ignorant of

¹⁷ Elizabeth Donnan, *Documents Illustrative of the Slave Trade to America* III (Washington, 1930-5), 23-4 and *passim*; see also I, 94-5: an account of a cargo of Madagascar slaves arriving in Massachusetts; and Lorenzo Johnston Greene, *The Negro in Colonial New England, 1620-1776* (New York, 1942), 34-6.

¹⁸ Colden, 'Extract', 228-9.

¹⁹ E. W. Bovill (ed.), *Missions to the Niger*, I (London, 1964-6), 110.

inoculation, and it is performed nearly in the same manner as amongst ourselves, by inserting the sharp point of a dagger, charged with the disease'.²⁰ Barth mentions that the practice was known but not common in Bornu in the mid-nineteenth century; in contrast, it was widely used among the Marghi to the south of the Kanuri.²¹ In the colonial period Meek found it among the Katab (Zaria Province) and the Jen²² and Jukun of the Benue Plateau. The Jukun technique, he notes, was to take lymph on a wisp of straw from pustules of a person who had been ill for eight or nine days and apply it with a razor to the left forearm of the person being inoculated.²³ Baba of Karo has left a concise description of her own inoculation as a Hausa child about 1892:

... they used to scratch your arm until the blood came, then they got the fluid from someone who had the smallpox and rubbed it in. It all swelled up and you covered it until it healed. Some children used to die; your way of doing it is better.²⁴

The early evidence for the western Sudan is sparser. Clapperton found the smallpox raging at Kwari, en route to Sokoto, but he makes no mention of inoculation as part of the treatment.²⁵ Mungo Park had been told by Dr Laidley at Pisania that 'the Negroes on the Gambia practice inoculation' and that epidemics occasionally spread into the Sudan from the Moorish regions to the north, but he does not even list smallpox with the diseases prevalent among the Mandingos.²⁶ Golbéry, a much less reliable source for the Senegambia at the same period, claimed vaguely that children were inoculated in many African countries.²⁷ In Cayor, at any rate, the practice is verified shortly after by Mollien, who credited it with drastically reducing the 'ravages of this frightful ill'.²⁸ In the 1880s Binger observed it in a few Bambara villages south of Bamako but does not imply that it was any more widespread.²⁹

In contrast to the rather uneven historical record, Dr Pascal Imperato has found abundant use of variolation among many of the ethnic groups in present-day Mali.³⁰ The Bambara of Segou frequently employed it during the epidemic of 1913, using a thorn previously dipped into a fully

²⁰ Ibid. III, 404.

²¹ Heinrich Barth, *Travels and Discoveries in North and Central Africa, 1849-55*, II (London, 1857-8), 399.

²² C. K. Meek, *Tribal Studies in Northern Nigeria* II (London, 1931), 73, 529.

²³ C. K. Meek, *A Sudanese Kingdom* (London, 1931), 312.

²⁴ Mary Smith, *Baba of Karo* (London, 1954), 46.

²⁵ Bovill, *Missions to the Niger*, IV, 671.

²⁶ M. Park, *Travels in the Interior Districts of Africa... 1795-7* (London, 4th ed., 1800), 232, 410 ff.

²⁷ S. M. X. Golberry (*sic*), *Travels in Africa*, trans. W. Mudford II (London, 1808), 249.

²⁸ Th. Mollien, *L'Afrique Occidentale en 1818* (Paris, 1820 [1967]), 72.

²⁹ L. G. Binger, *Du Niger au Golfe de Guinée... 1887-89* (Paris, 1892), I, 25.

³⁰ Pascal James Imperato, 'The Practice of Variolation among the Songhai of Mali', *Trans. Roy. Soc. Trop. Medicine & Hygiene*, LXII (1968), 869-70; *idem*, 'Observations on Variolation Practices in Mali', *Tropical and Geographical Medicine*, xxvi (1974), 429-39.

developed smallpox vesicle to inoculate by scratches made on the surface of the forearm. In 1959 it was observed among the Bambara of the Kolokani District north of Bamako but in a novel form:

The village blacksmiths carried out the practice, preparing the variolation site on the deltoid area of the arm by touching it with a hot iron poker. Vesicular fluid from an active case of small-pox was then rubbed into the area of burned flesh.³¹

In 1963 an epidemic broke out among the Bozo fishing communities of the middle Niger and neighbouring Bela villages. The Chief Medical Officer noted that both the Bela and Bozo resorted to inoculation, most of it being done by Bela blacksmiths with a technique similar to that used by the Kolokani Bambara. Indeed, the Bela are well known in Mali for inoculating both themselves and their former Tuareg masters.

Imperato also found some evidence that the Dogon have carried out variolation in the past, rubbing matter from smallpox pustules into scratches below the umbilicus of children. The Songhai in several villages in the Ansongo region were still resorting to inoculation during an epidemic in the summer of 1967. Two slightly different techniques were used, one employing a thorn to insert variolous matter (obtained from a donor with a light case), the other using a bird or chicken feather. In one village where statistical information could be obtained, Imperato found that the death rate among those who had been neither vaccinated nor variolated was almost 17 per cent (comparable to the mortality in Boston in 1721), while it was zero for those who had been vaccinated or variolated, the difference being that none of the former group developed smallpox at all while 18.3 per cent of the latter did, including both mild and severe cases, although there is a strong possibility that they may have contracted natural infections before being variolated since all had been directly exposed.³²

Along the Lower Guinea Coast, in southern Nigeria and in the Congo, inoculation seems to have been virtually unknown in the pre-colonial period. Writers from Bosman to Mary Kingsley concur that 'smallpox is a vile scourge to Africa'³³ but mention only the most inadequate methods of dealing with it. Bosman claimed that during the thirteen or fourteen years of his residence on the Gold Coast early in the eighteenth century 'thousands of Men have been swept away' by the disease.³⁴ Miss Kingsley found the mortality rate from it 'simply appalling', especially among the tribes of the southwest coast.³⁵ Michaux graphically describes the 'terrible variole du Congo qui pardonne si rarement', to which he himself fell

³¹ Ibid. 869.

³² Ibid. 870-2.

³³ Mary Kingsley, *West African Studies* (London, 1899), 158. Cf. idem, *Travels in West Africa* (London, 1897), 401.

³⁴ Willem Bosman, *A New and Accurate Description of the Coast of Guinea* (2nd English ed., London, 1721), 108.

³⁵ *West African Studies*, 158.

victim and survived, it seems, only by submitting to the indigenous treatment of being scalded and then flayed.³⁶

In our own century, there are isolated reports of variolation on the Gold Coast. Hausa migrants seem to have been notorious for practising it illegally, and during an epidemic in 1920 a 'fetish woman' in Accra inoculated with matter taken from active cases and scratched into the forehead. Ten years later it was reported that two *mallams* were carrying out arm-to-arm inoculation during an outbreak of smallpox in Yendi.³⁷ Even more recently, in 1957, health officials in Sierra Leone described the activities of an old woman in the Makeni District who gathered scabs from people who were recovering from smallpox, mixed them with clay and assorted herbs, and scratched the decoction into the arms of people who wanted it.³⁸

A survey of preventive medicine in modern Nigeria refers to variolation among the Ishan, a group related to the Edo-speaking peoples of the Benin region, in which the matter is given to children on the back of the left hand or forearm—this and the Jukun are the only cases I am aware of in which the left is specified, with its implied impurity.³⁹ Talbot describes a curious and altogether different type of 'inoculation' among the Ekoi of the Niger Delta which employs not matter from smallpox pustules but the milky juice of a particular tree.⁴⁰ Historically and linguistically the Ekoi, or Ejagham, are oriented toward the Benue and Sudan rather than southward, but one is at something of a loss whether to view this as an example of aberrant diffusion or of local herbal medicine. Talbot does not mention analogous practices among neighbouring peoples. The eclecticism of these techniques reported from West Africa under the colonial administration is obvious; unfortunately there has been almost no attempt to investigate their antiquity or the geographical limits of their occurrence, nor to collect oral traditions about the practice, its rationale and its possible sources.

I have not found any evidence in Donnan's records or other accounts that slave captains had their cargoes inoculated by indigenous methods before leaving Africa: indeed, the not infrequent reports of smallpox decimating cargoes during the Middle Passage would seem to belie this. However, by 1789 the European surgeon at Cape Coast Castle was instructed to perform mass inoculation to save the company personnel and slaves during an epidemic (by this time, on the eve of Jenner's successful trial of vaccination, inoculation was almost universally accepted in Europe and America). In one fell swoop and 'with indefatigable perseverance, [he] successfully inoculated 1760 persons'. There is no suggestion, however, of indigenous precedents; it was European medicine being thrown into the

³⁶ Oscar Michaux, *Au Congo . . . 1889-97* (Namur, 1913), 110.

³⁷ Scott, cited by Imperato, 369.

³⁸ Imperato, 869.

³⁹ Oladele A. Ajose, 'Preventive Medicine and Superstition in Nigeria', *Africa*, xxvii (1957), 268-73.

⁴⁰ P. A. Talbot, *The Peoples of Southern Nigeria* III (London, 1926), 945.

breach. A few years later the officers at Cape Coast attempted to restore the delapidated shell of Phipps's Tower as a smallpox hospital, but lightning rent the masonry beyond all hope of repair.⁴¹

How the officers viewed this omen we are not told. If Herskovits's findings on Dahomeyan religion can be accepted, a similar happening in that country would be extremely suggestive: smallpox, as he discusses it, has an unquestionably divine etiology. It is sent by the gods as punishment, the most severe punishment in the Earth gods' repertoire. Any attempt to prevent the disease by mortal means simply invites alternative devastation in the form of lightning.⁴²

Elsewhere on the continent, there is some historical evidence for inoculation in East, Central and South Africa. In the 1770s, smallpox broke out on a ship carrying a cargo of slaves from Zanzibar to Ile de France in the Indian Ocean. The French captain, Morice, had been trained as a surgeon back home and inoculated 430 of the crew and slaves, thereby saving most of them. His technique was certainly learned in France (which had finally got around to accepting the practice after long opposition from the Sorbonne establishment and the clergy), but he makes the interesting if vague comment that 'even in the interior of the country [East Africa] they know of inoculation'.⁴³

In north-eastern Africa, a form of pseudo-inoculation was reported by James Bruce in the later eighteenth century. Bruce describes 'a species of inoculation', called 'the buying of the small pox' in Sennar, among the Shilluk, Nuba and Guba and among slaves from Dyre and Tegla: both black and Arab women, 'upon the first hearing of the small pox anywhere', went thither, wrapped a piece of cotton cloth around the arm of an infected child and then proceeded to bargain with the mother about how many pocks she would sell them. Money had to change hands. Then the women took the piece of cotton home and tied it around the arm of their own child

certain as they say, that the child infected is to do well, and not to have more than the number of the pustules that were agreed and paid for. There is no example, as far as I could learn, either here or in Abyssinia, of this disease returning, that is, attacking any one person more than once.⁴⁴

In fact, what Bruce is describing is not inoculation at all, since the skin is not broken to insert variola; rather, it seems to be a variation on the folk

⁴¹ A. W. Lawrence, *Trade Castles and Forts of West Africa* (London, 1963), 45. Cf. Christopher Fyfe, *A History of Sierra Leone* (London, 1962), 150. The Dutch also vaccinated extensively at Elmina during the epidemic of 1861: Harvey Feinberg, personal communication.

⁴² Melville J. Herskovits, *Dahomey: An Ancient West African Kingdom* II (Evanston, Ill., 1967), 135-7. Cotton Mather also accepted a divine final cause for smallpox, while adhering to an animalcular theory of immediate cause. Perry Miller underscores the serious theological questions raised by his advocacy of inoculation, questions Mather was unwilling to face: *New England Mind*, ch. xxi.

⁴³ G. S. P. Freeman-Grenville, *The French at Kilwa Island* (Oxford, 1965), 64.

⁴⁴ James Bruce, *Travels to Discover the Source of the Nile, 1768-73*, IV (Edinburgh, 1790), 484-5.

custom of 'buying the smallpox' which was also known in many rural communities in Europe and Arabia, where a child might be sent to purchase crusts from patients recovering from a mild case of the disease or to rub material from ripe pustules on the skin of the arm or top of the hand. But in none of these variant forms does breaking the skin appear to have been an essential part of the operation; hence the effect was as much magical as immunological, although smallpox might result from breathing particles of scab material or from an unintentional break in the skin.⁴⁵

True inoculation, however, was practised in many parts of Ethiopia. Pankhurst cites a number of accounts, indicating that it was common in Tigre and Shoa from 1820 onwards. Catastrophic epidemics seem to have struck with pitiless regularity (roughly every generation) and local chiefs frequently ordered compulsory inoculation as soon as the disease made its appearance in their territories. By 1912 a French doctor long resident in the country estimated that perhaps 20 per cent of the Ethiopian population had been inoculated, a figure which of course must be viewed with caution. Often honey or butter was mixed with the vesicular fluid and mass inoculations took on the character of a religious festival.⁴⁶

To the southwest, in the southern Sudan, Bari informants told the missionary doctor Robert Felkin in 1878 that smallpox had become so bad that inoculation was practised, and has since become the general law; it is performed over the left breast, and the natives say that they believe that the disease will be stamped out in time, so much good has resulted from the practice. It is a noteworthy fact that they have discovered this method; after many enquiries, I am quite certain that it has not been introduced from foreign sources.⁴⁷

In the same area, nearly twenty years earlier, Samuel Baker had reported:

The small-pox broke out among the Turks. Several people died; and, to make matters worse, they insisted upon inoculating themselves and all their slaves; thus the whole camp was reeking with this horrible disease.

Fortunately, my camp was separate and to windward. I strictly forbade my men to inoculate themselves, and no case of the disease occurred among my people, but it spread throughout the country.⁴⁸

Felkin, indeed, may have been misled in concluding that a foreign source was out of the question, though there may have been indigenous intermediaries.

⁴⁵ In China, 'inoculation' was performed either by inserting powdered scabs or pus through the nostril or by wearing clothes from an infected child; K. C. Wong and L. T. Wu, *History of Chinese Medicine* (2nd ed., Shanghai, 1936), 216.

⁴⁶ R. Pankhurst, 'The History and Traditional Treatment of Small-pox in Ethiopia', *Medical History*, ix (1965), 343-56, and idem, *Economic History of Ethiopia, 1800-1935* (Addis Ababa, 1968), 636-7.

⁴⁷ C. T. Wilson and R. W. Felkin, *Uganda and the Egyptian Soudan*, II (London, 1882), 97.

⁴⁸ S. W. Baker, *The Albert Nyanza* (London, 1874 ed.), 219.

Further to the east and south, there are indications that the practice spread during the later nineteenth century. According to Harry Johnston, a Somali trader about the year 1892

explained to the Masai of the Rift Valley and Nairobi the principle of inoculation. Numbers of them voluntarily submitted to the rude prophylactic measure, and went through, as a result, a mild form of smallpox, which, however, in some cases ended fatally.⁴⁹

In 1890 Stuhlmann learned in Buganda that the Ganda practised inoculation on the forehead and forearm.⁵⁰ If true, however, this was probably a recent innovation, and it does not seem to have persisted. Felkin had vaccinated the Ganda king Mutesa in 1878 and the two men discussed medicine and anatomy at some length, yet Felkin does not refer to any pre-existing tradition of inoculation.⁵¹ And at the turn of the century Dr Albert Cook, founder of Mengo hospital, Kampala, believed that 'no native remedy touched' smallpox.⁵²

South of Lake Victoria, inoculation was carried into the interior by Arab traders in the mid-nineteenth century, though they were evidently little more successful in stemming the disease than their counterparts in the southern Sudan. In describing the diseases of East Africa, Burton observed:

The most dangerous epidemic is . . . the small-pox, which, propagated without contact or fomites, sweeps at times like a storm over the land. For years it has not left the Arab colony at Kازه [Tabora], and, shortly before the arrival of the Expedition [in 1857], in a single month fifty-two slaves died out of a total of eight hundred. The ravages of this disease amongst the half-starved and overworked gangs of caravan porters have already been described; as many as a score of these wretches have been seen at a time in a single caravan; men staggering along blinded and almost insensible, jostling and stumbling against every one in their way; and mothers carrying babies both parent and progeny in the virulent stage of the fell disease. The Arabs have partially introduced the practice of inoculating, anciently known in South Africa; the pus is introduced into an incision in the forehead between the eyebrows. The people have no remedy for smallpox: they trust entirely to the vis medicatrix.⁵³

In the early 1890s, Stuhlmann reported that inoculation was practised on

⁴⁹ H. H. Johnston, *The Uganda Protectorate* (London, 1902), 829.

⁵⁰ F. Stuhlmann, *Mit Emin Pascha ins Herz von Afrika* (Berlin, 1894), 181. Stuhlmann claims that inoculation was practised among a number of other East African peoples in addition to the Ganda and Somali, specifically the Nyamwezi and Zanzibari, but his reference to 'Diese "Impfung"' in a footnote may or may not imply some reservations about whether it was true inoculation: 85, 573 n. Klebs probably exaggerates the prevalence of inoculation in the Upper Nile-Lake Victoria region: Arnold C. Klebs, *Die Variolation im 18. Jahrhundert* (Giessen, 1914), 8; see also idem, 'The Historical Evolution of Variolation', *The Johns Hopkins Hospital Bulletin*, xxix (1913), 45.

⁵¹ Wilson and Felkin, *Uganda*, II, 15, 48.

⁵² A. R. Cook, *Uganda Memories* (Kampala, 1945), 52.

⁵³ R. F. Burton, *The Lake Regions of Central Africa*, II (London, 1860), 318. For Burton's descriptions of the havoc caused by smallpox, see *ibid.* I, 166, 179-80, 184, 432; cf. also idem, *Zanzibar: City, Island and Coast* (London, 1872), I, 195.

the east coast by introducing pus into the forehead.⁵⁴ At the same period, a British doctor reported that Muslims and 'Manyema' in the eastern Congo had learned from Arabs to inoculate against smallpox.⁵⁵ The knowledge may have spread from there to the Yeke in Katanga: by 1900, these Nyamwezi colonists were said to have introduced arm-to-arm inoculation to the indigenous peoples.⁵⁶ Inoculation among the Lamba (Zambia), directly south of Katanga, may also have been an offshoot of Arab trade with the eastern Congo.⁵⁷

Burton's passing remark that inoculation was 'anciently known in South Africa' is borne out by several pieces of evidence. Burton himself could have learned this fact from the reports of two missionaries among the southern Tswana peoples earlier in the nineteenth century. In 1820, John Campbell observed of the Rolong people at Masweu:

When the small-pox comes among them, they select the person who seems to have the most favourable kind, and from him they take the matter and inoculate other people. The disease is thereby rendered more lenient.⁵⁸

Further east, at Kaditshwane, the Hurutshe capital, 'The children as well as the aged had all been inoculated for the smallpox between the eye-brows.'⁵⁹ Campbell was further persuaded that the Tswana did indeed inoculate when he took four Tswana to Cape Town and had them vaccinated; three of them failed to respond.⁶⁰ Some twenty years later, David Livingstone worked among the Kwena, northern neighbours of the Hurutshe. Writing in 1857 of the Kwena, he reported:

Small-pox and measles passed through the country about twenty years ago, and committed great ravages; but, though the former has since broken out on the coast repeatedly, neither disease has since travelled inland. For small-pox, the natives employed in some parts, inoculation in the forehead with some animal deposit; in other parts, they employed the matter of the small-pox itself; and in one village they seem to have selected a virulent case for the matter used in the operation, for nearly all the village was swept off by the disease in a malignant

⁵⁴ Stuhlmann, *Mit Emin Pascha*, 573 n.

⁵⁵ S. L. Hinde, *The Fall of the Congo Arabs* (London, 1897), 177.

⁵⁶ G. E. Tilsley, *Dan Crawford: Missionary and Pioneer in Central Africa* (London, 1929), 491. In 1900, Crawford was compelled by lack of vaccine to use arm-to-arm inoculation during an epidemic in eastern Katanga (*ibid.*). Fifteen years earlier, during an epidemic on the Mpala region of the eastern Congo in 1885, one of the White Fathers was driven by desperation and the lack of vaccine to inoculate hundreds of people on the banks of Lake Tanganyika with pus taken from smallpox victims: none died and the epidemic was checked. René-Jules Cornet, *Médecine et Exploration* (Brussels, 1970), 72. Such stop-gap measures may have been the origin of the practice observed by Rosenwald (1951) in epidemic situations in Tanganyika when vaccination was impossible: see Imperato, 'Variolation among the Songhai', 869.

⁵⁷ Henry and Walter E. Masters, *In Wild Rhodesia* (London, 1920), 134.

⁵⁸ John Campbell, *Travels in South Africa . . . 1820*, 1 (London, 1822), 307.

⁵⁹ *Ibid.* 1, 236. Monica Wilson wrongly refers to inoculation at Kaditshwane as 'vaccination': M. Wilson, 'The Sotho, Venda and Tsonga', in M. Wilson and L. M. Thompson (eds.), *The Oxford History of South Africa*, 1 (Oxford, 1969), 150. But she would seem to be correct in taking it as evidence of 'some contact with the coast'; see below, p. 557.

⁶⁰ Campbell, *Travels*, 1, 236 n.

confluent form. Where the idea came from I cannot conceive. It was practised by the Bakwains [Kwena] at a time when they had no intercourse, direct or indirect, with the southern missionaries. They all adopt readily the use of vaccine virus when it is brought within their reach.⁶¹

In 1862, during the great smallpox epidemic which spread from the Cape to the Zambezi, another missionary, John Mackenzie, noted that the Ngwato, north of the Kwena, inoculated either on the forehead or, more commonly, on the leg, just above the knee.⁶²

Inoculation was also practised by the Pedi and Lovedu in the eastern Transvaal. Early in this century, a district surgeon on tour in Pokwane sub-district met an elderly 'Basuto' (more precisely, Pedi) chief who failed to respond to vaccination. The old man then displayed the mark of an inoculation which he claimed had been performed more than fifty years earlier. Several other people in the same area bore the same inoculation marks: the males on the leg, above the left patella, the females on the right shoulder. The chief, Takgudi, and a headman, Likapele, gave the following account of the process:

Inoculation was, they thought, not now used, but it had for very many years previously been customary among the Basuto, and amongst those people only, when it was known that Sekholopane or Small Pox was 'in the country,' but still a good way off, to send a responsible head man to the scene of the epidemic to procure material to enable them to protect their kraals against the more virulent sickness. If on arrival he was satisfied that it was true Sekholopane he procured a piece of dry wood, removed the bark, and flattened one end and pricking the pustules of one of the affected people smeared the pus over the flat end of the stick and afterwards dried it in the sun. Returning to his kraal with as little delay as possible a healthy boy, of about ten years of age, was selected to produce the protecting lymph; in his leg a small incision was then made just above the left patella and the pus smeared stick was well rubbed on to it, smallpox resulting 'bye-and-bye'. As soon as the spots appeared they were most carefully watched, and when fluid ('water') appeared in them it was taken and used fresh to inoculate every individual in the kraal. The necessity for taking the 'water' at once was emphasized; 'only on the first day must it be taken,' they told me, then only sickness will be produced in those inoculated; but if, 'as some do who do not know better,' the water is taken later an eruption is sure to accompany the sickness, true Sekholopane even being produced if it is taken too late, from which sufferers may die.⁶³

The neighbouring Thonga followed an analogous procedure during the 1918 epidemic, but Junod's description unfortunately dwells more on the

⁶¹ D. Livingstone, *Missionary Travels and Researches in South Africa* (New York, 1858), 142; The French translation used by R. Mauny is inaccurate: 'Ancienneté de la vario-lisation en Afrique', *Présence Africaine*, no. 36 (1961), 128-9; in the English edition of *Présence Africaine*, the passage is simply retranslated from the French edition of Livingstone. Mauny's article is largely a review of G. Miller, *Inoculation*, and her references to African inoculation.

⁶² J. Mackenzie, *Ten Years North of the Orange River* (Edinburgh, 1871), 250-3.

⁶³ H. A. Spencer, 'Inoculation of Small Pox among the Basuto:Kotchlabale or "Suto Ent"', *Transvaal Medical Journal*, VI (1910), 241-2.

ritual aspects than on the details of the operation.⁶⁴ Among the Lovedu, neighbours of both the Pedi and Thonga, the Kriges observed a variant form:

Matter from the pustules of affected persons, mixed with other medicines, is inoculated to introduce the disease in a mild form. It is done on the dorsal side of the wrist or on the forehead . . .⁶⁵

In Central Africa, inoculation has been reliably reported from two regions, though not before the turn of the century. The medical record of a particularly severe outbreak of smallpox in southern Nyasaland in 1900 noted that in some outlying villages 'they were inoculating one another with the matter taken from pustules of the least severe cases'.⁶⁶ This was some four years before systematic vaccination was begun in the region. At about the same time, a medical missionary near Fort Jameson, just across the border in North-Eastern Rhodesia,

considered that a number of children lost their lives every year through being injected with material from smallpox pustules by their own Africans and developed smallpox as a result.⁶⁷

More recently, Gelfand, in Southern Rhodesia, reported the practice of inoculation against smallpox by a group or groups of unidentified 'Shona'. They did not isolate victims of smallpox, but

the African must have had at least a fleeting thought about the speed of the disease by contact for we see amongst them, as in Europe, the interesting practice of variolation in which material from the pustules is rubbed into the scarified skin of a non-sufferer. Thus they must have observed that the contact might contract a mild form of the disease (though not always) and so develop an immunity.⁶⁸

What, then, are we to make of this highly irregular and undoubtedly incomplete pattern? First of all, it seems likely that the indigenous practice of inoculation in Africa, at least as a last resort during smallpox epidemics, was probably more widespread than the literature implies. Imperato is certainly correct in coming to this conclusion, and his own work shows what can be unearthed by a trained investigator who knows a region intimately and takes the trouble to find out what is really going on and has gone on in the past.

The lack of references before the eighteenth century should probably not surprise us unduly. Early contacts were mostly superficial and confined to the coastal regions where, it seems, inoculation was virtually unknown

⁶⁴ H. A. Junod, *The Life of a South African Tribe*, (2nd ed., London, 1927), II, 463.

⁶⁵ E. J. and J. D. Krige, *The Realm of a Rain-Queen* (London, 1943), 214.

⁶⁶ M. Gelfand, *Lakeside Pioneers: a Socio-medical Study of Nyasaland (1875-1920)* (Oxford, 1964), 290.

⁶⁷ M. Gelfand, *Northern Rhodesia in the Days of the Charter* (Oxford, 1961), 17.

⁶⁸ M. Gelfand, *Medicine and Custom in Africa* (Edinburgh, 1964), 131-2. There is, however, no mention of inoculation in the discussion of smallpox in Gelfand's *Medicine and Magic among the Mashona* (Cape Town, 1956), 175.

until recent times. Perhaps also, as Colden said with telling candor, whites were not in the habit of listening to Africans (except of course on topics where they stood to gain). It is also possible that smallpox may have increased in severity and in geographical range in Africa just as it did in Europe and America during the seventeenth and eighteenth centuries. In South Africa, for example, it was apparently totally absent until introduced from India in 1713. It decimated the Hottentots with terrible swiftness, the survivors fleeing inland and carrying the disease with them.⁶⁹

As to the question of whether inoculation was an indigenous development in Africa or a borrowing from outside, any hypothesis must be very provisional at this early stage of investigation. Even where there is evidence for inoculation, the accounts are often frustratingly incomplete, omitting to describe precisely what is inoculated and into what part of the body or what further treatment was prescribed for smallpox, all of which could provide clues to origins and diffusion patterns as well as to the effectiveness of the procedure. Furthermore, later inoculation practices are more than likely to have been influenced both by vaccination and by the welter of cross-cultural exchanges in recent decades; thus, for example, Imperato notes that the Songhai (and probably the Bambara, Bozo and Bela) choice of the deltoid area of the arm reflects familiarity with western vaccination.

The pattern of inoculation as shown on the map indicates a heavy concentration in the Sudan. This might suggest diffusion across the desert except for the fact that the method of inoculation which predominates south of the Sahara is not the same as that to the north. Variolation seems to have been well established on the 'Barbary Coast', at least from the early eighteenth century: the account of a Tripolitanian envoy was eagerly added to the compendious and exotic literature cited by proponents of inoculation in Europe.⁷⁰ To the dismay of French military and colonial doctors, the practice was so firmly entrenched in parts of Algeria that they had a battle on their hands substituting vaccination.⁷¹ But the extant accounts agree that the preferred site for inoculation was between the fingers, particularly between the thumb and forefinger. This is the classic Bedouin method but contrasts sharply with the Sudanic pattern of inoculating the arm, the method specifically described to Mather and Colden by their slave informants (see table).⁷²

⁶⁹ E. H. Burrows, *A History of Medicine in South Africa up to the End of the Nineteenth Century* (Cape Town, 1958), 64; Dixon, *Smallpox*, 207.

⁷⁰ G. Miller, *Inoculation*, 53. Browne noted that the Christians of Cairo 'are many of them in the habit of inoculating' in the 1790s, but that it was rarer among the Muslims: W. G. Browne, *Travels in Africa, Egypt and Syria* (2nd ed., London, 1806), 325. He does not describe the technique used.

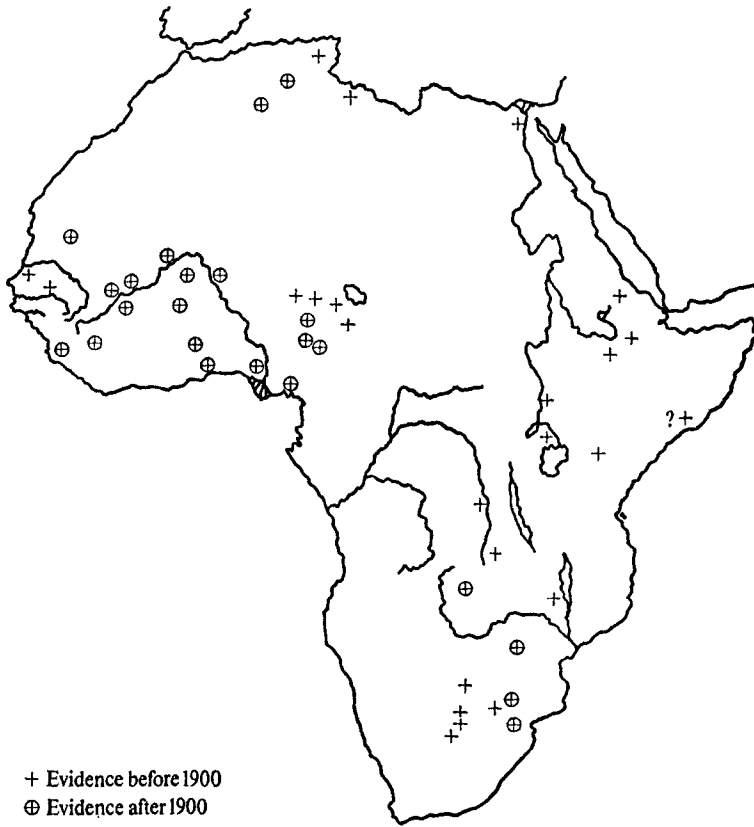
⁷¹ Hervieux, 'Variolisation ancienne et moderne', *Bull. Acad. Médecine* (Paris), XLV (1901), 276-8.

⁷² M. Chais, 'A Short Account of the Manner of Inoculating the Small Pox on the Coast of Barbary . . .', *Phil. Trans.*, LVIII (1768), 128-30; Patrick Russell, 'An Account of Inoculation in Arabia', *ibid.* 140-50; Hervieux, *loc. cit.* and *Bull. Acad. Médecine*, xxxiii (1895), 516; M. W. Hilton-Simpson, *Arab Medicine and Surgery. A Study of the Healing Art in Algeria* (London, 1922), 88; G. Miller, *Inoculation*, 52-3.

TABLE I—*continued*

Ethnic group or region	Material used			Inoculation site						
	Pus	Scabs	Other	Arm(s)	Leg(s)	Forehead	Dorsal hand, wrist	Thumb/ Fingers	Other	Not specified
Arabs (Burton)	×					×				
Coast (Stuhlmann)	×					×				
Somali										×
Masai										×
Ganda (Stuhlmann)				×		×				
Manyema				×						
Nyamwezi	×					×				
Yeke										×
CENTRAL AND SOUTH AFRICA										
Fort Jameson	×									×
'Shona'	×									×
Rolong	×									×
Hurutshe						×				
Kwena	×					×				
Ngwato					×	×				
Lovedu	×				×	×	×			
Pedi					×				×	
Thonga	×									×
Lamba	×									
NORTH AFRICA										
Tripoli-Tunis										
Algeria										
(Kassem Aga)										×
(Chais)			×					×		
(Hervieux)	×							×		
(Shaw)	×							×		
(Hilton-Simpson)	×							×		
Egypt										×
MIDDLE EAST AND LEVANT										
Greeks	×	(×)	×	(×)	(×)					×
{ Constantinople										
{ Adrianople										
Bedouins	×						×	(×)		

¹ Umbilicus² Milky juice of tree³ Mixed with clay and herbs⁴ No incision⁵ Mixed with honey or butter⁶ Left breast⁷ Or animal deposit⁸ Mixed with medicines⁹ Males¹⁰ Females¹¹ Mixed with animal deposit¹² Whole pustules¹³ Breast



Conversely, the Sudanic and Ethiopian patterns are closest to that reported from Constantinople by European travellers early in the eighteenth century. However, the so-called Turkish method seems to have been a refinement of Greek folk medicine, practised by elderly women, which hopped all over the body for pseudo-religious reasons. As Lady Mary Wortley Montagu described it in 1717:

The Grecians have commonly the superstition of opening one [vein] in the middle of the forehead, one in each arm, and one on the breast, to mark the sign of the cross; but this has a very ill effect, all these wounds leaving little scars, and is not done by those that are not superstitious, who choose to have them in the legs, or that part of the arm that is concealed.⁷³

Other accounts suggest that scabs were sometimes used instead of pus.⁷⁴

The most glaring departure from the standard format in West Africa is the Bambara (Bamana) predilection (shared by neighbouring peoples) for preparing the arm not with a knife, razor, thorn or other sharp instrument

⁷³ Quoted in Dixon, *Smallpox*, 219.

⁷⁴ G. Miller, *Inoculation*, 50-1.

but with a hot poker or iron. No doubt this is a reflection of the paramount importance of the blacksmith as a repository of practical and ritual knowledge among the peoples of the Middle Niger.

The evidence points more clearly to an Arab introduction of inoculation on the Swahili Coast and into the interior via Arab-led caravans.⁷⁵ In the same way, it would seem reasonable to attribute inoculation among the peoples of central and southern Africa to contact with the Portuguese. Portuguese settlements on the lower Zambezi could well have been a primary source.⁷⁶ And there is very good reason to suspect that the Portuguese at Delagoa Bay communicated the practice to their hinterland: a common line of transmission across the southern interior is strongly suggested by the incidence of inoculation among the Tswana—the Rolong, Hurutshe, Kwena and Ngwato; the Pedi; and the Lovedu and Thonga. Moreover, this line approximates to one of the main directions in which trade was developed between the coast and the far interior. In 1820 Campbell was told by the Rolong that they

obtained the knowledge of inoculation from the Wanketzens [Ngwaketsi], who got it from the Seketay, and the Seketay obtained it from the Mahhalatseeley.⁷⁷

The last-named lived near the sea and traded in beads.⁷⁸ Campbell specifically noted that the Hurutshe not only practised inoculation but exported ivory to the east.⁷⁹ This probably brought them into contact with the Pedi who were trading indirectly with the Portuguese at Delagoa Bay by the early nineteenth century.⁸⁰ We may thus accept as probable the claim of Spencer's elderly Pedi informant in the early 1900s that his people had gained their knowledge of inoculation from the north, before they knew of white settlement at the Cape.⁸¹

The likelihood of a common source of diffusion in the South African interior is perhaps strengthened by the fact that among four groups at least—the Hurutshe, Kwena, Ngwato and Lovedu—the forehead was the site of inoculation,⁸² just as it seems to have been in Arab-influenced East

⁷⁵ See above, pp. 549, 550; also H. M. Stanley, *Through the Dark Continent* (London, 1878), II, 176-7; H. Waller (ed.), *The Last Journals of David Livingstone*, I (London, 1874), 330.

⁷⁶ Members of a Portuguese expedition were inoculated when smallpox broke out at the court of the Lunda King Kazembe, in north-eastern Zambia, in 1832: A. C. P. Gamitto (tr. Ian Cunnison), *King Kazembe*, II (Lisbon, 1960), 94.

⁷⁷ Campbell, *Travels*, I, 307.

⁷⁸ *Ibid.* I, 240-1 and cf. I, 256-7.

⁷⁹ *Ibid.* I, 240-1.

⁸⁰ M. Legassick, 'The Sotho-Tswana Peoples before 1800' in L. M. Thompson (ed.), *African Societies in Southern Africa* (London, 1969), 108-9; cf. Alan Smith, 'Delagoa Bay and the Trade of South-Eastern Africa' in R. Gray and D. Birmingham (eds.), *Pre-Colonial African Trade* (London, 1970), 284-5.

⁸¹ Spencer, 'Inoculation', 242.

⁸² The Kriges argue that the Lovedu use of the wrist or forehead for inoculation 'supports the claim that it was known prior to the advent of the European; moreover, the ingredients of the serum used by Europeans are not known' (*Realm*, 214). But here they

Africa. But in both regions this preference seems to fly in the face of what we would expect if the practice was borrowed from the Portuguese and Arabs respectively. Perhaps the procedure was adapted to African concepts of pathology and well-being and the properties ascribed to various parts of the body; perhaps there are simply other factors involved of which we are ignorant. The Pedi preference for the leg or shoulder, an exception to the regional pattern, is also an apparent anomaly that underscores the need for further investigation.

Engrossing as the search for diffusion patterns may be, it is assuredly more important in the long run to examine such procedures as inoculation in the wider context of African medicine and its demographic impact. Whatever the particular ideas of the etiology of smallpox, inoculation was an empirical rather than a religious or magical intervention, although it might have ritual aspects as among the Thonga. It was used at moments of great peril when isolation of victims and other measures had failed to halt the spread of the disease.

How effective was it? P. E. Razzell has argued the controversial thesis that inoculation may well have been the first medical discovery to have had a significant impact on human mortality and that it is the only plausible explanation as yet for the dramatic increase in the English population between 1750 and 1800. Others have countered that its possible benefits to those inoculated were offset by the fact that it spread the disease, thereby adding to the ultimate toll, both from the disease itself and from secondary infections resulting from the practice.⁸³

In truth the success of the treatment seems to have depended on a number of factors, wherever it was employed. It had to be done before the individual was infected naturally (always a problem during epidemics—the only time it was resorted to in Africa because of the impossibility of preserving variola for use at a safer time). There was much less chance of a severe case of smallpox and of secondary infection if the matter was inserted through a superficial scratch than a deep incision. And the best technique of all was to use variola from an inoculation site rather than from a natural smallpox eruption. This last refinement seems to have been part of the Pedi routine, but it is not at all clear whether it was appreciated by other African peoples or even by Europeans at large. Razzell claims, with some support, that this method so attenuates the virus that there is no danger of spreading the disease from the inoculated to the uninoculated.

seem to be referring to European vaccination rather than inoculation. They proceed to speculate that the Lovedu method was borrowed from the Arabs. In any event, the Lovedu continued to use their own method as late as the 1938 epidemic, 'for, though it was realized that it "called" the disease instead of curing it, people noted that, despite European vaccination, there was still much illness'.

⁸³ P. E. Razzell, 'Population Change in Eighteenth Century England: a Reinterpretation', *Economic History Review*, XVIII (1965), 312-32, and idem, 'Edward Jenner: The History of a Medical Myth', *Medical History*, IX (1965), 216-29, as well as the rebuttals in the same and succeeding issues. I am grateful to Dr Paul Slack for bringing Razzell's work to my attention.

The great advantage of even the crudest form of inoculation, however—if one survived the operation at all—was that it conferred long-term, perhaps lifetime immunity; small wonder that vaccinators encountered resistance in some areas where inoculation was firmly entrenched, given the unreliability of vaccines in the tropics (before the development of dried vaccine in 1957)⁸⁴ and the shorter term protection even a successful vaccination provided.

It is, then, impossible for the present to assess the demographic impact of inoculation in Africa with any certainty. Even where the rare investigator has assembled statistics, their evaluation is always complicated by the probability that many of those variolated may have already contracted the disease naturally.⁸⁵ Nevertheless we may with some confidence infer that it was adopted and retained because it proved itself an effectual component of what Junod grudgingly referred to as the African 'ars medica'.⁸⁶

SUMMARY

Inoculation for smallpox, the forerunner of vaccination, has had a long and variegated history. The earliest known descriptions of the practice in sub-Saharan Africa were given by African slaves in colonial America in the early and mid-eighteenth century. Subsequently it is mentioned in accounts from widely scattered parts of the continent. It seems to have been most extensively used in the Western and Central Sudan, Ethiopia and Southern Africa. Local diffusion patterns emerge from the evidence available at this time, but broader questions of origin must await further investigation. Similarly it is as yet impossible to assess its demographic impact in Africa although it clearly provided some defence against smallpox in spite of the risks involved.

⁸⁴ Cf. above, n. 56, and also T. H. Parke, *My Personal Experiences in Equatorial Africa* (London, 1889), 28–9.

⁸⁵ Imperato, 'The Practice of Variolation among the Songhai', 871–2.

⁸⁶ Junod, *Life*, II, 465.