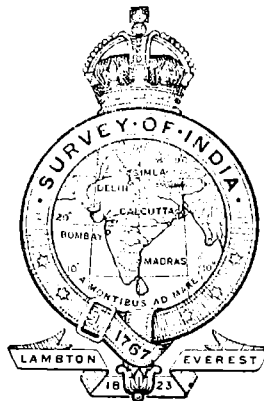


HISTORICAL RECORDS OF THE SURVEY OF INDIA

<https://ia800206.us.archive.org/4/items/HistoricalRecordsOfSurveyOfIndiaVol1ByColRHPhillimore/Historical%20Records%20of%20Survey%20of%20India%20Vol%201%20by%20Col%20%20R%20H%20Phillimore.pdf>

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Plate 3



by Gerard Mercator, 1612.

Reduced from Plate on p. 342 of *Mercator's Atlas*. Amsterdam, 1612.

Gerardus Mercator was latinized name of Gerhard Kremer (1512-94), mathematician and geographer, who devised the map projection which bears his name, and published maps of all parts of the world. [*Ency Brit.*]

Longitudes from the Pope's line [pl. 10. n.]

Notable features of this early geography are :

The river *Ganga* flowing north-east from the Deccan to an exit adjacent to the Ganges delta, first challenged by Orme, and not shown in Rennell's *Map of Hindoostan* [45, 209, 212, pls. 1, 11, 12, 13, 16].

Lake *Chiamai*, in the north-east, a fabulous source of the great rivers beyond the Ganges, and identified with the *Brahmakund*, reputed source of the *Brahmaputra*. This was first abandoned by D'Anville [78, 84, 211, pls. 11, 16].



PERSIA
PARSA

INDIA
EXTRA
GAN

INDIA
INTRA
GAN

GUZARATE

GANGE

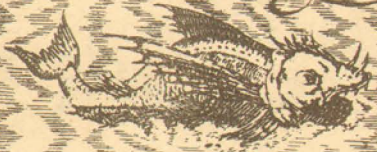
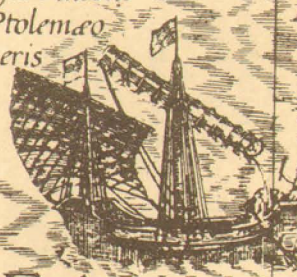
GOLFO
DE BENGALA
olim Gangeticus
et Ptolemaeo SINUS

MARE
ARABICUM
Rubrum
et
INDICUM

ORIENTALIS OCEANUS

Zeilam insula
Tenarism incolis
dicta Ptolemaeo
Nanigeris

Hispanice Leuce	17	35	52	70	87	105
Milliaria German	15	30	45	60	75	90



CHAPTER VI

MADRAS SURVEYS TO 1788

Early Surveys to 1765 — Barnard's Survey of the Jāgīr, 1767-74 — Military Surveys in the South, 1765-75 — Northern Circārs, 1767-76 — Fort St. George & Madras — Pringle & the Guides, 1777-88 — Kelly and Other Surveyors, 1778-88.

ALTHOUGH the Company had established a factory at Masulipatam so early as 1611 and that at Madraspatam in 1639, over fifty years before the founding of Calcutta, it was not until 1763, that the Nawāb of Arcot¹ ceded the district of Chingleput, which henceforth became known as the Jāgīr.

From the earliest days the English had been regarded as the guests of the Nawāb, and during the long struggle with the French from 1745 to 1761, when each side sought the favour of rival princes, it was the support of English arms that enabled Muhammad Ali to establish his succession.

As Nawāb of the Carnatic he was suzerain of practically² the whole country "below the Ghauts", from the Kistna to Cape Comorin, and it was part of the price of his friendship, that he expected, and got, the help of the Company's troops in the maintenance of authority over refractory chiefs and subjects.

The war against the French closed with the English in complete supremacy, having warded off the siege of Madras of 1758-9 [98], and followed up with Eyre Coote's decisive victory at Wandiwāsh in January 1760, and the capture of Pondicherry a year later.

Geographical knowledge of the Carnatic was greatly advanced during this long period of war, but not in time to help D'Anville with his map of 1753 [239].

He took his coast-line from the work of Aprés de Mannevillette and other sailors, but did not speak highly of the Portuguese maps of the west coast; he quoted Fathers Vincent-Maria and Noel as authorities for the Malabar coast, and took parts south of Calicut

from a particular map, for which we are indebted to some bare-footed Carmelites, sent to the Christians of St. Thomas, under the pontificate of Alexander VII³.

He had already made use of the work sent home in 1719 by Father Bouchet for the inland areas of Madura and the extreme south [238], and writes, in French of course,

What we know of Maissur we owe to the Jesuits, whose missions have extended hitherto; ... the representation thereof... is drawn from a particular draught sent me by Father du Halde. In a letter from Father Calmette... the latitude of Shinna-Ballabaram⁴ in this inland part of the Carnatic, is observed to be 13° 23'; ... it is of great consequence to be thus fixed in some point at so great a distance from the coast⁵ [170].

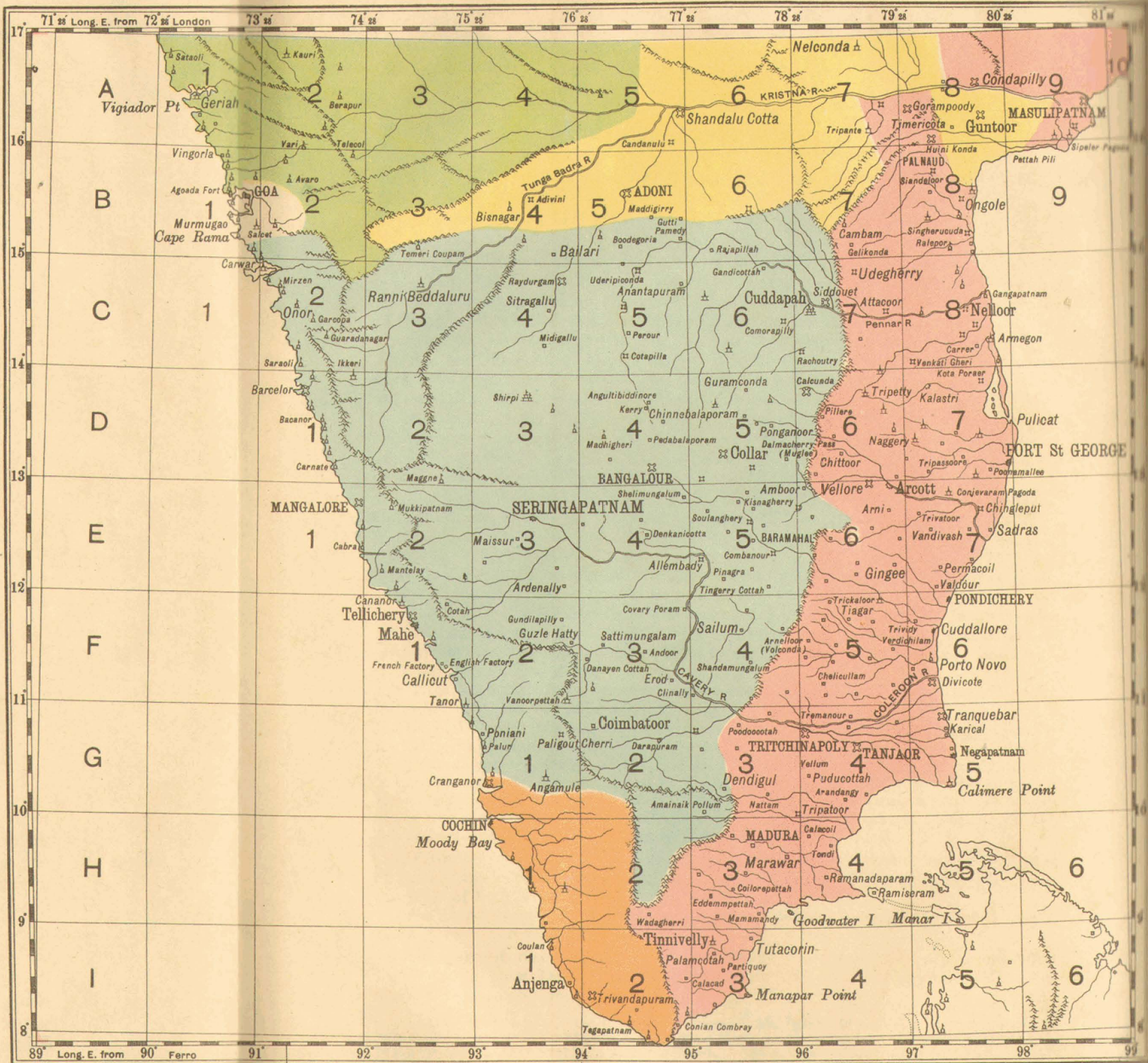
D'Anville found that the Carnatic was so much better known than other parts of India, that he issued his separate map of the Coast of Coromandel on four times the scale of his *Carte de l'Inde*, and observes,

We might mention different parts of Europe, in which geography is less informed, than of many places in Coromandel⁶.

The earliest record of survey by a servant of the Company is of "a measured line" drawn from Devicottai⁷ to Trichinopoly "by way of Tanjore by Mr. John Barker⁸", at some time before 1751.

¹Also called Nawāb of the Carnatic; Muhammad Ali, from 1749 till death in 1795; resided in "Chepank" a mile S. of Ft. St. George. ²Guntūr Circār remained the jāgīr of Basālat Jang till ceded to the Company in 1784 [111]. ³Herbert (46-9). ⁴Near Chik Ballapur, 57 G/11. ⁵ib. (56-61). ⁶ib. (56). ⁷Devicote, pl. 9: A fort at mouth of Coleroon R. 58 M/15. now washed away; captured by English in 1748, & granted to Company by Rāja of Tanjore; *Imp. Gaz. Mad.* II (167). ⁸*Memoir*, 1783 (23).

The SOUTH PENINSULA
from Kelly, 1782.



Reg. No. 92 M.D.1939

Redrawn and reduced from Robert Kelly's *Index Map* to the Atlas submitted to the Governor General and Supreme Council in 1782 [240-2].

The Political Divisions as shewn by Kelly are thus distinguished :

Maharattas ...	Green	Hyder Ally ...	Blue
Nizam & Bazla-jung ...	Yellow	English ...	Red
Travancore ...	Buff		

Though Kelly shows the whole Carnatic as English, full possession was not obtained till 1801 [107 n.6].

Names shown in brackets are taken from map published by R. Bowyer, Pall Mall, 1-2-94, published with *Select Views in Mysore* by Mr. Home.

Published at S.I.O. Dehra Dún.

From this time onward many surveys were made by military officers with the armies in the south. There is an undated French route survey, from Palamcottah through the "Royaume de Madura" to Trichinopoly, on the scale of about 3 miles to an inch, in colours¹. It may belong to the same period as several beautifully drawn plans, showing actions against the French round Trichinopoly during 1753 and 1754², made by George Erbb, "Sergt. d'Artillerie au service de l'hon. Co. des Indes Englaisses", then serving in the army of Major Stringer Lawrence³. In 1755 William Jennings, also of the Artillery, made surveys round Madura of the marches of Colonel Heron, who was sent "to collect the Revenues in Madura & Tinnivelly" on behalf of the Nawāb of Arcot⁴.

Orme gives many large-scale maps of this period in the third volume of his history, mostly elaborate ones of forts or battlefields, and amongst MS. maps at Calcutta is one by Robert Barker of the capture of Kārikāl⁵ in April 1760, and one of Pondicherry showing positions of guns, redoubts, &c., at the time of the English attack "in January [1761] in a great storm"⁶; both of which are reproduced by Orme, with some changes⁷.

Many of the maps and surveys of this time are signed by John Call, mostly in his capacity as Chief Engineer, as in the case of a chart of the Madura and Tinnivelly Provinces and part of the adjacent countries, surveyed by the Engineers employed on the expedition against Usoff Cawn in the year 1764, under the direction of John Call, Chief Engineer. 5 miles to an inch⁸.

One of these engineers was probably William Stevens who was deputed the following year to carry out a survey of the straits⁹ between India and Ceylon, with the following instructions;

The communication with our Garrison at Palamcottah & with the Troops in the Tinnivelly Country being very tedious by Land, ... and it being of great Importance to have a more easy and frequent communication by Sea between this Country and that of Malabar than the usual Passage round Ceylon, ... we are desirous to obtain a certain knowledge whether there is, or is not, a Passage for vessels of 300 tons burthen or more... thro' the bank of sands which is commonly called Adam's Bridge. ...

We have therefore chosen you to go in search of this Channel; ... you are... to proceed towards Ramisseram¹⁰ continuing your soundings from the Station where Mr. Rennell, in the Neptune Snow [47 n. 1] (whose Chart you are furnished with) left off¹¹. If you can get through any Channel to the South of Adam's Bridge, you are to continue your soundings & Navigation to Coilpatnam¹² or Purnicale & note in going thither all Rocks & shoals. ...

You will be particularly careful not to give Offence to the People of Ramisseram or any of the blacks You meet, & You must also avoid giving any Jealousy or cause of Complaint to the Dutch, and for this we recommend that you keep at a Distance from the Coast of Ceylon¹³.

Stevens carried out his survey in February and March 1765 "without being able to discover any passage for vessels of any considerable Burthen"¹⁴.

The Directors commended this enterprise;

We much approve of your sending Mr. Stevens... to survey the passage between Ramisseram and the Main. We would have you also avail yourselves of the influence you have in the Country whilst Peace & Tranquility subsist, to obtain as perfect a knowledge of every part as possible, and if it were practicable to have exact surveys made of the whole Province of Arcot, it would be a good & useful work; and if such an undertaking should prove agreeable to the Nabob, he might probably be willing to bear the Charge; but as this is a delicate affair, we would have you act with circumspection that the Nabob may have no justification for taking offence¹⁵. [90-1].

Such a proposal had already been made ten years before, without any tangible result, the Madras Council having written home in 1755,

¹ *Imp. Lib. M & P*, 380. ² Grose, II (133-43). ³ BM. K. 115 (85, 1 & 2) & Addl. MSS. 15739 (12-14); engraved copy faces p. 15 of "Cambridge"; also Orme, III (Maps ref. to I, pp. 314, 346). ⁴ BM. K. 115 (84, 67) & Addl. MSS. 15739 (11); engraved copy faces p. 83 of "Cambridge"; Orme, I (380-95). ⁵ 68 N/13; *Imp. Lib. M & P*, 366. ⁶ *ib.* 369. ⁷ Orme, III, last two maps. ⁸ MRO, Map, 149. ⁹ Named Palk Straits, after Robert Palk, Governor of Madras, 1763-7. ¹⁰ Rameswaram, 58 O/7. ¹¹ Rennell's chart, 1763-4, showing "Palk's Streights, with soundings", Orme MSS. 333 (1). ¹² Koyalpatnam, 58 L/2. ¹³ MS & M. 13-2-65. ¹⁴ M to CD. 14-10-65 (55); chart pub. by Dalrymple 20-7-81: IO. Maps II AC. 36 (25). ¹⁵ CD to M. 24-12-65 (11).

It might be of great Use hereafter cou'd we obtain an accurate Survey of the whole Arcot Province; and, if possible, we propose to have it done¹.

BARNARD'S SURVEY OF THE *Jāgīr*, 1767-74

In reply to the Directors' further order for the early survey of the lands ceded in 1763 [86] the Council wrote,

What you are pleased to recommend regarding Surveys to be made of the whole Province shall be complied with as soon as proper people can be found for that purpose, and the Engineer is preparing a Draught of the Company's Jagueer, which shall be sent you as soon as completed²...

and two months later,

Your Chief Engineer has sent Mr. Thos. Barnard, his assistant, to make an exact survey of the Company's Territorial Possessions round Madras; it is a work which will require much time and labour, but we have that confidence in Mr. Barnard's abilities that we doubt not but his greatest Diligence & Attention will be exerted on this occasion³.

This survey proved to be a long job, especially as Barnard, without any assistants, was expected to combine with his topographical survey a detailed survey and report for revenue purposes, and experienced many interruptions [141-2]. He eventually finished the field work in 1773, and submitted his maps and reports in November 1774, together with a copy of the instructions given him at the start, with the following comments;

It will scarcely...be expected...that they could in any shape be executed through an extent of Country 110 miles in length and 50 in Breadth, by any one person; even tho' he had not the extremities of an Eastern Climate to contend with...the task was much above the powers of a single man to accomplish. ...

The survey commenced in February 1767; in the course of that and the two succeeding years, I was kept from it near a year superintending the repairs of Poonamalee⁴ Fort; the war not permitting me to continue it. In 1770 and 1771 another year was lost when I was ordered to attend Mr. Dawson. ... In 1772 I had finished the Survey in part, but not the fair drawings of them⁵ [3].

The survey was laid down in 16 sheets on the scale of two inches to a mile, and covered 2,436 square miles⁶. It was reduced later to the 4-inch scale in the Chief Engineer's office, and the reduction was sent home to the Directors and engraved and published by Dalrymple in 1778⁷.

MILITARY SURVEYS IN THE SOUTH, 1765-75

Surveys were continually required for a variety of military purposes. During 1765 and 1766 there was much trouble along the frontiers between the Carnatic and Mysore⁸, and in July 1765, Government wrote to the officer commanding at Trichinopoly;

Whilst the exact Boundaries of the Country belonging to the Nabob & the Mysorians remains undetermined, We must always expect Disputes & Troubles in those Parts, & if we are on all occasions obliged to send out such considerable detachments as that with Capt. Bonjour, the revenues of the Country will not support the expence. We therefore desire You will procure what information You can with regard to the exact limits and advise us thereof⁹.

He replied;

I have people examining the Bounds of Carour¹⁰, Manapar, and Trichinopoly Countries, &c, and when it is done I shall be able to transmit a Plan...of the Nabob's possessions which will enable you to judge of the just rights between him and the Mysorians. In the

¹M to CD. 10-3-55. ²M to CD. 22-1-67 (19). ³M to CD. 21-3-67 (33). ⁴66 C/4. ⁵MRC. 20-12-74. ⁶Report by Mackenzie, 29-11-1810; MEO. M. 60. ⁷MRO. Map 10, also *Oriental Repertory* and Orme MSS. 65 (187). ⁸Haidar Ali had seized the Mysore throne in 1761, and was extending his dominions in every direction: *Imp. Gaz. Madras*, I (18). ⁹MS & M. 3-7-65. ¹⁰Karūr, 58 J/1.

meantime I...transmit you a sketch of Swamy & Moodu Naique's Countries, but as I have not yet been able to get the measure of them, therefore the scrawl cannot be perfect¹.

Some months later Bonjour was directed "to take a survey of the Passes leading into the Carnatic down the Ghauts"; he "visited all those under the Nabob of Arcot, but not those in the hands of the Mysorians", and reported,

If I have committed a mistake in applying to you for fresh orders, I beg you will attribute it to the different significations of the word SURVEY.

In order to report the Situation of the different Passes leading into the Nabob's dominions, ...I...present you a chart in which I have fixed their positions, and an account of each in particular, mentioning their distance one from the other, as well as from Arcot and other places of consideration. ...

Having used no Quadrant for the observation of the different Latitudes I have regulated myself as near as my remarks could permit, by Mr. Danwill's Geography².

Bonjour's survey is thus described by Rennell,

A curious MS...entitled *An Account of the Passes between the parallels of Udeghery³ and Sautgud*, and from which I have received great assistance, has the distances in computed miles from one pass to another, and often from some distant capital place also; but without bearings⁴.

In 1767 the Directors write out again,

As an accurate knowledge of every part of the Country may be very useful, We recommended to you last year, to encourage and promote the making of Surveys, with the Nabob's concurrence, of the whole Province; this may be too great a work to be undertaken at once,... therefore it would be well to encourage such of the young officers...as have any turn that way, to make Surveys and draw Plans of the Forts & Districts, where at any time they may happen to be quartered; these if taken with any accuracy, when collected together, may be united into a General Draft; we shall send you...an Instrument, called a Pentagraph, by the help of which the outlines of any Draft may be copied with great ease and dispatch, & with sufficient accuracy.

to which the Council reply,

We have omitted no opportunities of encouragement to obtain Charts and Surveys of the Countries through which our troops have marched, and we hope time and experience will render them compleat, and correct the very erroneous Charts now existing, particularly with regard to the Boundaries and Passes between Mysore Country and the Carnatic⁵.

None of the surveys of this period have been found, though Rennell writes,

A variety of MS. Maps of the country lying on the west of the Carnatic, and between it and Seringapatam, have appeared; most of them, I believe, the offspring of the War of 1767-68 with Hyder Ally. ...⁶

A map of the Barra-mahal.[113]. This map is in Mr. Dalrymple's collection, and has much the appearance of general accuracy; the number of Forts placed on rocky eminences... affording an easy means of determining the relative positions by triangles⁷.

One of the officers who took a large part in surveys of the Carnatic was Robert Kelly, who in 1778 thus describes his early efforts;

In the course of above ten years service in this country I could not help observing a variety of Distresses and Difficulties which Armies and Detachments have been led into, either by the Ignorance or Villany of Harcarras [95], and the vast Opportunities which were lost by want of knowledge of the face of the Country even two Miles of our Camp or of the Field of Battle. ... I therefore determined, in the year 1770, to put together the few Observations I had already made, and to continue Surveying every Road I should have occasion to march in future. ...

By the time I had Collected a Number of Observations and thrown them into some form, the Utility and importance of the Work struck me in so Forceable a light that I could not resist the impulse I felt of making it a matter of Public Concern. I consequently wrote a letter to Mr. Du Pré, then Governor⁸, ... enclosing him a few rough Sketches of the Roads I had surveyed, and requested to know whether I should continue the Work under the Auspices of Government. ... He laid my papers before the Board and his answer of the 10th of May 1770 conveyed to me the appreciation they had met with⁹ [240-1].

¹ MS & M. 16-7-85. ² A sad distortion of D'Anville's name; MS M & P. 5-5-86. ³ Udayagiri, 57 N:5, *Memoir*, 1783 (280-1). ⁴ M to CD. 4-11-67 (27). ⁵ *Memoir*, 1788 (189); account of 1st Mysore War, Bowring (49-58). ⁶ *ib.* (191). ⁷ Josias Du Pré, Governor of Madras, 1770-3. ⁸ MMC. 22-12-78.

The Governor later told the Board that when Capt. Kelly went to Trichinopoly he had desired him to take an exact Survey of the Roads & Country in his Journey, and at the same time to consider how far it might be practicable with the assistance of any of the officers and Cadets in the service, who are capable of drawing, to have an exact and accurate Survey taken of the Carnatic. ...

The Board being very sensible of the great advantage & utility of such an Undertaking, it is agreed that the President...apply to the Nabob to obtain his consent to the Survey being taken, and that thereupon the proper Instruments &c. be procured¹.

At the next meeting the President acquaints the Board that he hath applied to the Nabob for his consent to the taking an exact Survey of the Carnatic, which he had readily granted, and that in consequence thereof, he had enquired of the Engineer regarding the Theodolites and other Instruments required by Capt. Kelly and finds there are none in the Garrison. ...

Resolved that enquiry be made by the Storekeeper, whether any can be procured out of the Europe ships, and if so that they be purchased² [203].

No immediate action was taken on these resolutions, and Kelly records that, I accordingly got together some young gentlemen who understood surveying and drawing, bought Mathematical Instruments and stationery, hired draughtsmen &c, and set seriously about the business.

After I had laboured upwards of a year, without receiving either the appointment or Assistance from Government which they had given me reason to expect, I grew weary and impatient of the task I had imposed upon myself and once more remonstrated to Mr. Dupré, how impossible it was for me to support the expence of so extensive a work, and prayed that I might at least be permitted to send in my bills of unavoidable expences, as the work I had undertaken was solely for the use of the Company.

To this I received a very polite answer, and many promises of service on some future day, but that day never came; though to do that Gentleman's memory justice, I know it was no fault of his that the work was not warmly patronised³ [241].

In 1771 and 1772, during operations to the southward which resulted in the capture of Rāmnād, Montresor, Pittman, and Dugood carried out surveys over a large part of Madura, Marawar and Trichinopoly⁴.

In May 1773 the Commander in Chief⁵ put forward a scheme for raising a corps of guides under a Quartermaster-General, whose main object must be to procure or form as accurate a Chart as possible of all the principal places in the Country, their situations & Bearings from each other, with the nature of the Roads between, and their distance; this he should form on a large scale...with all informations to form a compleat Military Chart⁶.

On this the Council reported home;

General Smith delivered in a minute, to show in what manner his scheme could be carried into execution without putting the Company to any additional expence. It was agreed to establish a Company of Guides, & to commence the Survey as soon as the necessary Preparations could be made.

As General Smith recommended Captain Montresor as an officer well qualified for this undertaking, he was accordingly appointed there to; but as to the appointment of a Quartermaster-General⁷ it was referred to your Honors. The Siege of Tanjore was soon after undertaken and the death of Captain Montresor...obliged us for some time to lay aside all thoughts of the Survey⁸.

A few months later the Council record that the country being at present in Tranquility, ...it is resolved that the Survey be commenced with all possible Expedition, and that the necessary orders be issued for establishing the Company of Guides at Vellore, from the several Sepoy Carnatick Battalions.

Lieut. Geils being strongly recommended by General Smith — ...resolved...that Lieut. Geils be appointed to the Command of the Company of Guides, and to execute the Survey.⁹ however at a later meeting,

The President reports that on his Application to the Nabob; ...he appeared much alarmed at the idea of Surveying his Country, and requested the undertaking might be set aside, asserting that there was no necessity for a Survey, as the country was abundantly well known. ... The Nabob enumerated many objections Such as that the Company of Guides

¹MMC. 4-6-70. ²ib. 11-6-70. ³BPC. 27-5-82. ⁴M to CD. 15-10-72 (48); MMC. 19-10-72, *et seq.*
⁵General Joseph Smith. ⁶MMC. 10-5-73. ⁷QMG. appd. 1778. ⁸M to CD. 6-2-74, (38). ⁹MMC. 11-4-74.

marching through his Country would be productive of many Disputes with the Inhabitants; that the Villagers would complain of the Sepoys, & the Sepoys would complain of his People for not supplying them with what they wanted; and he further added that the having his Country surveyed would lessen him exceedingly in the Eyes of the Country Powers, as they would immediately conceive that the next step would be to deprive him of his Country altogether¹.

Several efforts were made to break down the objections of the Nawâb, even to the point of offering to place Geils and the company of Guides under his control, but they were of no avail, and the scheme had to be abandoned².

NORTHERN CIRCĀRS, 1767-76

The Northern Circārs from Guntūr to Ganjam had long been tributary to the Nizām, and for many years there had been both French and English factories along the coast.

In 1753 Bussy [115] the French commander at Hyderābād obtained from the Nizām the grant of the revenues of four of the Circārs to meet the pay of his troops, and in 1756 he proceeded to establish French authority to the northern limits of Ganjam³. In July 1758 he was called down to the Coast⁴, and the same year, at the invitation of local chiefs, Clive sent down a force of Bengal troops under Colonel Forde, which defeated the French and re-established the English factories at Masulipatam and elsewhere.

Rennell notes various surveys made during this campaign;

Between Rajahmundry⁵ and Vizagapatam, the particulars of the inland parts have been taken chiefly from a large MS. map, in which Col. Ford's marches are described. Between Vizagapatam and Coopilly is taken from another MS. map, seemingly not very accurate⁶. ...

Between Vizagapatam and Jagarnaut⁷ Pagoda, an interval of 180 G. miles, the bearings by compass, and distance by a Perambulator, were taken by Major Polier in 1759 (on his return to Bengal with Col. Ford from the Masulipatam expedition)⁸.

In 1765 the Emperor of Delhi granted to the Company the *dewāni* of all these Circārs in addition to the provinces of Bengal and the Madras *Jāgir*, and the following year a treaty was signed with the Nizām for their occupation, with the exception of Guntūr [86 n.2].

The Directors were anxious to avoid further wars, and wrote out,

Respecting your negotiations with Nizam...for the Northern Circars, ...Military Expeditions are so expensive & ruinous and their consequences so indefinite, that we shall be better contented to enjoy what we already possess in Peace, than to risk the least part in new Engagements. ... We do not mean to prescribe such bounds as shall prevent you taking advantage of any circumstances which may tend to the Security or Enlargement of our Possessions & Revenues, provided you do not suffer yourselves to be borne away with the ideas of Conquest, which has indeed been too much the case latterly with our Servants in Bengal⁹.

However by the time this letter reached Madras General Caillaud had already advanced north of the Kistna into the Circārs¹⁰.

The occupation was not effected peacefully: in 1767 war broke out with Haidar Ali of Mysore [89], and the Nizām supporting Haidar Ali, Bengal troops under Colonel Peach were sent to the Circārs [26], and marched up through Ellore as far as Warangal¹¹ to threaten Hyderābād; in March 1768 the Council were able to report the signing of a new treaty by which the Nizām confirmed the cession of the Circārs¹². Peach's force was then employed "reducing and settling" Ganjam.

¹MMC 23-5-74. ²M to CD. 9-12-75. (22). ³Carmichael (172-5); Maltby (102-10). ⁴A term generally applied to the Coromandal Coast, Madras or Pondicherry in particular *Hobson-Jobson*. ⁵85 G/16. ⁶*Memoir*. 1783 (86-8). ⁷Puri. 74 E/13. ⁸ib. (31). ⁹CD to M. 24-12-65. ¹⁰M to CD. 1-4-66. ¹¹86 O/9. ¹²M to CD. 1-3-68.

Various surveyors were employed during these campaigns; Gardiner surveyed the route to Warangal¹, and Crilland the country round Chicacole², with "a very accurate survey of the Tickelly District"³.

Cotsford, sent up to Ganjam⁴ at the end of 1766 "to act both as Engineer and Resident", had to return owing to the unsettled state of the country, but was able to give the Chief Engineer a description of the country, with "a plan of Chicacole Circar" and a sketch of the "Town of Ganjam"⁵ [3].

In 1768 he was sent up again to establish a factory at Ganjam with the support of Peach's brigade, and in October sent in a plan of the district and promised to send a large and more exact Plan than I am now able, in which I will mark out the different Purgannas & Zemindaries⁶.

A year later he sent a small scale "Plan of the Itchapour⁷ District" [93].

In 1767 the Council at Masulipatam proposed to order Stevens, their engineer, to make a survey of the whole frontier towards the Nizām's territories⁸, and in 1771 they write that,

Before we determine on building new Forts, it is absolutely necessary that we should have a more accurate knowledge of the Geography of the Country, a Survey of which should be taken as soon as possible, in which should be ascertained the Limits of the Circars, the Bearings & distances of the several places, the most remarkable Passes, & the Roads leading to them⁹, and Government reply that the senior engineer, Major Mitchell, will either reside at Masulipatam to carry on the works there, or proceed to survey the several Forts in the Circars, or proceed to make a general survey of the Country as may appear most advisable¹⁰.

It was Stevens, however, who was more often on survey; and in 1773 he was selected for charge of the southern section of a survey of the Circars for which the Chief Engineer¹¹ made the following proposals;

As the Circars are very extensive & as the Survey of them which is now resolved on, is a great and useful undertaking, I think as many people as can be properly spared, should be employed on that service. ... For which purpose I would have the Surveyors formed in two divisions, under Captains Stevens & Pittman, with as many intelligent Assistants as can be procured.

As Capt. Stevens has already surveyed a considerable part of the most Southerly Circar¹², I recommend that he, with at least one Assistant, should be directed to finish them, compleating the most Southerly parts first, and then to work Northwards; that Capt. Pittman in like manner should begin to the Northward, where Mr. Cotsford has left off, and work towards the South, until he meets Capt. Stevens. Both these Gentleman should be directed to intersect the same stations, that their Surveys may correspond when closed.

They should be directed to ascertain the Company's Boundaries with Precision; the Courses of the Rivers, the direction of the Roads, together with the Inlets from the Country by which an Enemy can enter it. ...

The Engineers are from time to time to forward their Surveys to the Chief of the Settlement under which they may act, who will transmit them to the Board [196]¹³.

Detailed instructions to this effect were sent to Stevens and Pittman, and James Johnston was sent as assistant with Pittman. Suitable letters were written to the Chiefs at Masulipatam & Vizapatam, and the following to Cotsford at Ganjam,

You will be pleased to inform Mr. Stratton [at Vizagapatam] how far has been Surveyed to the Southward of Ganjam, that he may give the Necessary Direction to Capt. Pittman. We desire you will transmit to us Drafts of the Surveys which may have been made in your District¹⁴.

Pittman was instructed to begin in the Tickally country, and having compleated the same to go from thence to Jolmore & Kimmidy¹⁵, which are the Northernmost parts of the Chicacole Circar, on this side the Itchapore District¹⁶.

At the end of the year Cotsford handed over charge at Ganjam, and submitted his final maps, before proceeding on furlough:

¹ *Memoir*, 1793 (214). ² 65 N/15. ³ Tekkali, 74 B/2; *Memoir*, 1783 (68); Map, on $\frac{1}{4}$ " scale MRIO. 140 (1-6). ⁴ 74 E/3. ⁵ MMC. 25-5-87. ⁶ ib. 13-10-68. ⁷ Ichchapuram, 74 A/12. ⁸ ib. 2-11-68. ⁹ ib. 24-8-71. ¹⁰ Map by Mitchell, recorded in M. 339, ib. 3-4-71. ¹¹ Patriok Ross. ¹² Rennell acknowledges much information from these surveys by Stevens; *Memoir*, 1783 (*passim*). ¹³ MMC. 2-3-73. ¹⁴ ib. 30-3-73. ¹⁵ Jalmur, 74 B/2; Parlakimidi, 74 B/1. ¹⁶ ib. 19-7-73.

Accompanying this letter You have a general Plan of the Itchapoor District, which view serves to explain what I have written; a great Part of it is from an Actual Survey, but the state of the Country has hitherto prevented an exact Survey of the whole to be made, so that I have not been able to shew the separate Purgunnahs & Zemindaries in it¹ [92].

This map was afterwards published by Dalrymple, scale 2½ miles to an inch, and described by Rennell as "Mr. Cotsford's elegant map"² [3].

Stevens had not been more than six weeks on the survey before he was withdrawn to take a leading part in the siege of Tanjore, and Dugood was sent up to carry on, which he did with many interruptions till the end of 1775; much of his time was spent on the survey of a canal taking off from the Godāvāri River [105].

Pittman died in January 1775, and Johnston carried on till his health broke down at the end of the following year when he was transferred to other duties. During the latter part of the survey assistance was given by Charles Maxtone, of the civil service, an officer who made other useful surveys later on [143].

There is a very old undated map of the Ganjam District in the Madras Record Office, scale about 1½ miles to an inch, carried out in pictorial style, with trees, buildings, and hills in elevation, and a marvellous headpiece; it extends from Chicacole on the south to the hills on the north; it is said to have been one of 20 sections³. There is also a map entitled "Survey of part of Vizagapatam Circar, including the districts of Chicacole, Bomally, and Teckally", scale 6¼ miles to an inch, with a note "copied from a tracing on china paper, deposited in the Revenue Office, Madras, 1804"⁴. Both these maps are probably copied or reduced from the surveys of Pittman and Johnston⁵ [252-3].

FORT ST. GEORGE & MADRAS

The earliest known large-scale map of Madras is dated 1710 and inscribed, *Plan of the City of Madras*; actually surveyed by order of the late Governor Thos. Pitt Esq.; Engraven, Printed, and sold by Jn. Harris, Newgate St. ... Scale 140 yds. to an inch⁶.

This was followed by a map of Madras and its villages, showing village boundaries and names of some streets and gardens, drawn in 1733. The survey was made, and the map probably drawn, by Mr. John Hoxton to assist the repair of defence works⁷.

We then find a map shewing Madras at the time of its capture by the French in 1746; the names are shown in both French and English; a very neat map, with little pictures of French ships, inscribed,

A Plan of Madras & Fort St. George, taken by the French commanded by Monsieur Mahè de la Bourdonnais⁸ on Sept. 21st 1746. Published by John Rocque, cartographer to the late and present Prince of Wales, 1751. R. Benning, Sculp. ... The corner of Buckingham Street in the Strand⁹.

In the British Museum are,

Plan of Ft. St. George, according to Colonel Scott [51], drawn by Robert Barker. ... October 1753. Scale 300 feet to an inch, showing fortifications proposed by Scott¹⁰.

Plan of Ft. St. George and the Bounds of Madraspatnam. Surveyed and drawn by F.L. Conradi, 1755. Plotted to a scale of 60 yards to the inch¹¹.

Conradi's map was obviously the outcome of an order dated December 31st 1754, that,

A survey of the Company's Present Bounds of Madras and its Districts be made by Messrs. Hume and Saussure... under the direction of Mr. Brohier¹², ... the Directors being advised that,

We have directed a new Survey to be made of your Antient and present Bounds, and some of the Engineer's Assistants are now actually employed on that Business¹³.

Orme published two maps illustrating the siege by the French between December 12th 1758 and February 17th 1759 [86], one on the scale of 600 feet to an inch,

¹MMC. 15-1-74. ²DDn. 240 (125); *Memoir*, 1783 (68). ³MRO. Map 424. ⁴ib. 427. ⁵See also MRO. 137 (8, 26). ⁶Love, I (4). ⁷ib. II (253). ⁸The French Admiral. ⁹*Imp. Lib. M & P. 373*. ¹⁰Map. BM.K. 115 (75). ¹¹Map. BM.K. 115 (78). ¹²Engr. in charge, 1751-3; to Ft. William, as C.E. 1757; absconded 1760. Sandes I (115). Love, II (470). ¹³M to CD. 10-3-55.

and the larger one 300 yards to 3½ inches. Both are excellently drawn and show much detail¹.

In 1769 the Council approve the Chief Engineer's plan for fortifying the Black Town, and with regard to the manner of raising a sum for defraying the expence, propose making an Assessment on every House, Garden, and spot of Ground within the walls, according to the value thereof. ... Resolved that Mr. Marsden & Machlin... be instructed to take a regular Survey of each street, to number each house, garden, and spot of Ground, specifying the Name of the Proprietor, and the value thereof, and to affix a board at the corner of every street, with the name of such street wrote in English and Malabar², and at the end of the year Marsden lays a plan of the Survey before them, with valuation of property and numbers of each lot, and notes of encroachments³.

The "Book of the Survey" gave the contents of the gardens for each owner in square feet, with their values. Unfortunately a year later Marsden's plan could not be found and Pittman had to be ordered to make a new survey⁴. In September 1771 a civil servant, Eyles Irwin, was appointed to make a survey of all the ground lying within the walls of Blacktown, as many grounds "have been fraudulently obtained since the commencement of the Fortifications"; he was at the same time appointed "Superintendent of the Lands and Grounds belonging to the Town of Madras, St. Thomé, Chippauk and the Environs", and was allowed "20 Pagodas per month for the charges of an horse and Palanqueen for this service"⁵ [290].

In 1776 Irwin lays before the Board a Survey of the whole of Black Town; several sets of Books containing details of properties and waste lands, areas in square feet, and values⁶, however the Committee of Works reported that M. Irwin has made no report of the Grounds belonging to St. Thomé...nor fixed Landmarks between the Boundaries of Poonamalee & Madras. ... and the appointment was abolished⁷. The following year,

The many late encroachments on the Public Roads rendering it necessary that an Exact Survey should be had of them, Agreed that Lieut. Schouler be appointed on that service under the Chief Engineer⁸.

In 1778 Hugh Maxwell, a Civil Servant, was appointed to be "Superintendent of the Company's Grounds" with the same allowances as were given to Irwin⁹, and in 1783 Torriano was appointed to succeed Maxwell¹⁰. This post was still maintained in 1791 under the designation of "Superintendent of the Company's Lands and Roads" and carried the allowances of a Surveyor.

In 1771 Montresor and Pittman proposed a large scale survey;

Being desirous to render ourselves useful to the Honble Company by performing some Service that may merit their attention, We take the liberty of proposing a Survey of Fort St. George and its Environs of 10 miles in Circumference on a scale of 400 feet to an inch; the utility of such a work is too obvious to require a Detail of the many good Purposes it may assure.

It is an undertaking that will require great Perseverance and Fatigue on our Parts, and should the Proposal be approved of, we flatter ourselves We shall have the necessary assistance granted Us for carrying on so great a Work¹¹.

The Council approved the scheme, but revoked their approval at a later meeting on the grounds that it should have been made through the Chief Engineer.

In 1776 Dugood was employed on a survey of "the Home Farms", or suburban villages, "particularly describing the Level of the tanks and Water Courses"¹² [142-3].

No further record of town surveys of Madras has been found until 1798, when the Chief Engineer received the following orders;

The Governor in Council has been pleased to fix the limits and boundaries of the town of Madras in the following manner. ... I am therefore directed to desire that a map of the

¹Orms. III with refs. to vol. II (845, 460); MS. copy of the large-scale map, *Imp. Lib. M & P. 372*.
²MMC. 27-3-69. ³MPC. 18-1-70. ⁴MPC. 17-1-72. ⁵MPC. 20-9-71 *et seq.* ⁶MMC. 15-8-76. ⁷MPC. 10-12-76. ⁸MMC. 24-3-77. ⁹MGC. 23-1-76. ¹⁰*ib.* 12-9-82. William Harcourt Torriano. Writer 1768. ¹¹MMC. 18-3-71. ¹²Maok. MSS. MMC. 2-2-76.

whole of these lands may be prepared as soon as possible...and that the whole of the public lands paying revenue to the Company may be distinguished from the private lands, which have been granted to individuals; ...and as it is a matter of importance that the limits above described should be determined with accuracy the Governor in Council desires that careful persons may be employed on this duty¹.

The Chief Engineer supplied Government with three copies of this survey in January 1800; the limits shown are practically those of the Madras Municipality of later date; no street names were shown².

PRINGLE AND THE GUIDES

All attempts having failed to persuade the Nawāb to allow a regular survey to be made of the Carnatic [90-1], the army was entirely dependent for information about the country and its roads on the casual service of individual officers, or on the vague reports of Hircars, men who, we have too often experienced, may be not only ignorant of it themselves... but prove treacherous³ [89, 241].

No engineer officers could now be spared from their more legitimate duties, and though Kelly continued to carry on his route surveys as a private hobby, he had his duties as battalion commander. But another star now rises, and around John Pringle is built a new school of surveyors, the officers of the Madras Guides.

In March 1777 the Commander-in-Chief⁴ submitted to Government a "Book of Roads" prepared by Pringle:

As far as comes within my Observation, the Distances &c. are exact, and as I think it for the Benefit of the Service to encourage an Officer of Lt. Pringle's merit & Abilities, I request permission to employ Lt. Pringle in the Survey of some other Roads. ...

If upon further acquaintance I find Lt. Pringle practically Master of the Roads & Situations of the most remarkable places in the Carnatic, ...I intend to recommend him to be Captain of the Guides & Hircarrahs, according to the plan proposed by me some months ago. Government expressed "entire approbation" and "wish at all times to encourage merit"⁵.

Pringle was then ordered on a survey of the Tanjore anicut⁶ and the irrigation channels which it controlled. The river Cauvery had risen in heavy flood, and burst the bank which separated it from the Coleroon, and the Nawāb of the Carnatic refused to let the Rāja of Tanjore carry out the necessary repairs. Pringle's report and survey formed the basis of a satisfactory settlement⁷, and in forwarding his plans the Commander-in-Chief wrote from Tanjore,

Lieutenant Pringle has finished his survey of the Anacutta with great exactness; a separate plan is made of it upon a large scale⁸. He has likewise made a Survey...as far as its course extends, to near this place, so that it may be easily joined to Major Stevens's actual Survey for three miles round the Fort. ...⁹

I propose that Mr. Pringle shall attend me, for the Public Service, to make a Survey as exact as the time will permit, of the Road &c. by which I mean to return¹⁰.

Two months later he submitted a second Book of Roads by Lt. Pringle, measured during his late progress through the Carnatic. ...

After personal acquaintance & most minute investigation of Lieut. Pringle's Character & abilities, he is of opinion that the important Office of Captain of Guides to the Army cannot be conferred upon any officer who will perform the duties with more advantage to the Service than Mr. Pringle will do. ... With Mr. Pringle's Assistance he will shortly put the Department of Guides and Hircarrahs on such a footing, as to be ready for service at the shortest notice.

Lieut. Pringle has hitherto at his own expence measured & made his Remarks upon more than 600 miles of Roads, besides the actual Survey of the Annacutty, &c¹¹.

Government thereupon approved Pringle's appointment as Captain of Guides to the Army.

¹MPC. 2-11-98. ²Love, II (590). ³Gen. Joseph Smith [90], MMC. 10-5-73; the maps in Orme, III show how vague was the information then available. ⁴General Joseph Stuart. ⁵MMC. 24-3-77. ⁶A masonry dam; described, *Imp. Gaz. Mad.* I (177). ⁷M. to CD. 15-10-77 (11). ⁸Ten years later Byres (qv.) was sent to Seringham on a similar duty. ⁹Mack. MSS. LXIX, 15-5-87. ¹⁰MMC. 7-8-77. ¹¹ib. 6-8-77.

Throughout the various campaigns and expeditions of the following years Pringle was engaged on the duties of his appointment, which were those of Surveyor, Quartermaster, and Intelligence officer. One of his most interesting experiences was with Colonel Braithwaite's force, that marched from Trichinopoly at the end of 1778, through Travancore, to Anjengo¹ on the Malabar coast, and there embarked for Bombay for service against the Marāthas.

Pringle writes from Anjengo,

I proceeded to this place by way of Palamcotah, but my journey was so retarded in the beginning by the rivers and tanks which were full, and afterwards by a dangerous Complaint with which I was seized, that I did not arrive till yesterday morning.

Inclosed is a rout of the only Road I was permitted to see in the Travancore Country, and that by which the Raja intends to conduct any troops that may march this way. ... I am sorry I had it not in my power to make it more perfect, having been escorted by a Subadar & 20 Sepoys all the way through, who watched me so narrowly that I never had an opportunity of seeing more than 200 yards from the sea shore, along which the road goes, after my first day's journey².

In 1780 he put forward a scheme for giving the Corps of Guides a regular establishment;

The uncertainty of procuring people out of the Villages to conduct an Army through the Country, the inhabitants generally flying at the approach of a Body of Troops, whether Friends or Foes, renders the Establishment of a Corps of Guides or Hircarrabs of more importance here than perhaps in any other part of the World. ...

Accompanying this I send a Book of Roads I have measured, being the third of the kind I have had the honor of presenting to the Board.

The Commander-in-Chief then recommended that a corps of sepoy guides should be established with Pringle as Captain, and 3 native officers, 2 drummers, 1 *pakhāli* and 63 sepoy, three from each of the Carnatic battalions;

The Commanding Officers of the Seapoy Corps will be careful to send such men as they think best qualified for this kind of Duty.

The men were to assemble on June 1st 1780, "without their arms and accoutrements, at Nagore...a Central Place³". This corps was sanctioned and, with various fluctuations of establishment, did valuable work in peace and war for the next 25 years.

When Haidar Ali invaded the Carnatic in July 1780, Pringle was recalled from survey near Ongole, and joined the headquarter staff. During the three years war that followed he and his guides did yeoman service; as Rennell puts it,

Mr. Pringle, who surveyed the marches of the army under Sir Eyre Cootte during the war of 1780 has ascertained some interesting geographical positions...and by this means extended very considerably the dimensions of what may be called the *Surveyed tract*; ... By means also of Mr. Pringle's bearings, and measured routes the positions of Porto Novo, Sautgud, and Amboor⁴ are obtained; which last may be considered the most westerly point determined with accuracy, anywhere north of Trichinopoly⁵.

After the war Pringle compiled a plan and book of the routes of the Carnatic;

The Right Hon'ble the President having communicated to me the desire of the Hon'ble the Court of Directors to have a plan of the routes of the Army during the late War with Hyder Ali, I have the honor to lay one before you for your inspection, the accuracy of which I can with some degree of certainty pronounce, as it was my good fortune to possess such health as never to be one day absent from the Army throughout the War, and I never failed to measure the roads...of every mile it marched over. ... I have accompanied it with a book of upwards of 2000 miles of Roads measured by myself in the Carnatic⁶.

Several copies of the book are still preserved as well as of the map; they vary in their contents, having been made by hand at different dates. One copy of the map is entitled,

A Chart of the route of the Grand Army in the Carnatic under the commands of Major General Sir Hector Munro, K.B., Lieut. General Sir Eyre Cootte K.B. and Major General James Stuart from August 25th 1780 to June 7th 1783, with the different encampments and places

¹ 58 D/9 & 14; abandoned later as a Company's factory, Anjengo sank to a small fishing village. Wright (1).

² From Pringle 23-1-79; M. Sel. C. Misc. Book.

³ Nagari, 57 O/11; MMC. 18-3-80.

⁴ Ambar, 57 L/9.

⁵ Memoir, 1793 (204).

⁶ MMC. 8-2-85.

of action; the march of the detachment from Gomeripond under Lt.-Colonel Baillie, and place of its detention [40]. ... John Pringle, Captain of Guides to the Army on the Coast of Coromandel. Copied and drawn by J. Reichel 1787. Scale 1 inch = 2½ miles¹.

One copy of the book, beautifully got up, with a fine autograph of Pringle's on the title page, dated Feb. 8th 1785, has a note in Mackenzie's handwriting;

This Book was purchased with some other MS. & Charts at the Public Auction of Lt.-Col. De Meuron's effects at Seringapatam in Nov. 1804 by Mr. K--- for C. Mackenzie².

The title page reads,

A book containing upwards of 4000 miles of Roads in the Carnatic, with tables of the Principal Stages on the Grand Roads, shewing at one view their respective Distances from one another, the Bearings of places from many of the Hills, Forts & Pagodas, & the Latitudes & Longitudes of some of the most remarkable Cities & Places in the Carnatic.

There are notes that

the measurements were all made by Perambulators 20 & 22 feet in Circumference [199]. ... Includes Route to Calcutta of Pearse's Detachment [40-2], the only road not actually measured by the Author.

In a letter dated April 9th 1785, Pringle asked that whilst peace lasted, he might be employed in exploring all roads throughout the Carnatic, and making a general military survey of the Country, mentioning particularly that the Palnaud country [110] and many parts of the Ongole and South West parts of the Nellore countries are but little known, and may probably become scenes of importance, and that as the Hon'ble the Court of Directors in their letter of the 6th March 1783 have desired to be furnished with the road from Madras to Masulipatam, I might make a plan of it. ...

In the course of the investigation a great part of the country adjacent to the roads may be laid down, and should be expressed, not only in Plan, but by a full description in writing of all the villages, tanks, courses of Rivers, Watercourses, ... Passes, Hills, ... Forts and Pagodas, with Topes, Brushwoods, or jungles of every kind, ... and particularly ... the best situations ... of encampments, with every remark that can be of any use to the Commander in Chief of an army; ... to which may be added as an embellishment, and for the benefit of Geography in general, the exact longitude and latitude of the most remarkable cities and places, mouths of rivers &c, for the ascertaining of which, as well as for surveying I am already in possession of every instrument requisite³.

This was approved, and Pringle has left a later book of "Roads in the Carnatic, ... 1786-87"⁴.

In 1786 an establishment of three officers was sanctioned for the Corps of Guides, and Beatson and Allan were posted to serve under Pringle, on whose death in 1788 Beatson succeeded to the command.

KELLY & OTHER SURVEYORS, 1778-88

In 1778 Kelly [89] put forward proposals for a regular Survey department, with himself as "Geographer"; after some consideration the Council decided to refer the scheme to the Directors, giving Kelly permission in the meantime to continue his survey, with a small extra allowance⁵ [241]. He had spent about a year away from his battalion when, in October 1780, after Haidar Ali's first successes near Conjeeveram, he was ordered to rejoin his corps. In 1782 he obtained leave to visit Calcutta, and there laid before the Governor General the atlas which he had now put into shape from his work of many years [240], and repeated his request to be appointed *Geographer*. His application was warmly recommended to the Directors;

Lieut Col. Kelly...has lately made us tender of a most valuable collection of Charts and surveys of the Carnatic. ... We understand they have already proved a serviceable guide to General Sir Eyre Coote in regulating the motions of his army; we have therefore...resolved to make him a gratuity, and to recommend him to you for the appointment of *Geographer*

¹Map, MRIO. 150 (9) of 150 (8) & (42-45). ²MRIO. M. 144; cf. M. 74, M. 148. ³MMC. 26-4-85, ⁴MRIO. M. 147. ⁵M Sel. C. 23-10-79.

to the Company in the Carnatic; in the meantime we have requested that he will continue to furnish us with such further additions...as he may be able to obtain without prejudice or hindrance to his military duty¹.

The continued fighting in the Carnatic gave Kelly little further opportunity for survey until July 1783, when he joined Fullarton's army, and surveyed its marches from the east coast through Madura to Palghat² and Coimbatore.

As a diversion...to draw Tippu's attention away from Mangalore, ...Colonel Fullarton, in command of a force of 1700 Europeans and 17 battalions of sepoy, which had been organised by Mr. Sullivan, the Resident of Tanjore [243], to operate in Mysore, pushed westward from Dindigul...towards Palghat. ... The vaguest ideas regarding the topography of the country prevailed, and Mangalore was found to be too distant to be reached by the force, but the seizure of Palghat...appeared...an operation of the greatest importance³.

Palghat was captured on November 15th, and Fullarton then captured Coimbatore, and was preparing to advance northwards towards Seringapatam, when he was recalled by the Peace Commissioners. Kelly himself writes;

On the cessation of Arms with the French at Cudalore I obtained permission to join the Southern Army, and went prepared with Astronomical and other Instruments, in order to ascertain as correctly as possible the Latitudes, longitudes, bearings and distances of every place my duty should call me to, or to which I could, with any degree of safety, send any Surveyors. Happily the enterprising genius of Colonel Fullarton gave me an opportunity of succeeding beyond my most sanguine expectations, as the routes on the accompanying Map will evince.

Considering Nagapatnam⁴ as a given point, the longitude of which has been well determined by its bearing and distance from Madras, and its latitude by my own observations, I have here commenced my reckoning. ... The road from hence to Madura, by way of... Trichinopoly, Dindigul, ... has been carefully measured; ... in like manner both the routes from Madura back to Trichinopoly have been surveyed by way of Nattum, as well as Tripator⁵, and a new route explored through the Tondiman's country⁶ to Tanjore. And all these surveys further corrected by Astronomical observations made at Negapatam, Tanjore, Trichinopoly, Dindigul⁷ and Madura. In this way the whole map Westward hath been compared as the marches of the Army or Detachments of it would permit.

He points out that many of the routes surveyed were never explored before by any European Army or Detachment, ... some not even by Hyder Ali's Native Troops, who had always considered them as quite impracticable with cannon; even those which had been traversed before we found very different from the accounts given of them in the journals of officers from whom we thought we might have expected more accuracy. ...

My former map of the Coimbatore Country, when compared with that which I now have the honor of transmitting⁸, will...show the utility of a regular survey.

Kelly then points out many instances of his disagreement with the maps of Montresor and Rennell⁹ [179].

Of his assistants on this survey we only know of Werssebe and Byres, the latter of whom writes to the Chief Engineer,

I also made an actual Survey of the Routes of the Southern Army while I was with it¹⁰, for which, though out of the line of my duty, I never received one Fanam [278 n. 7]. I also made an actual Survey of the Walls of Madura. ... I had a Perambulator totally spoiled and a graphometer very much injured in our marches¹¹.

In acknowledging these and other surveys Rennell writes,

Madura and Tinivelly are chiefly from Col. Call's old map, with many additions from Kelly and Werssebe. ... Nor is this the only new matter afforded us by Col. Fullarton's march during the late war into the southern provinces, the geography of which now wears an entirely new face. The intention of this expedition was to open a communication between the coasts of Coromandel and Malabar; and at the same time to deprive Hyder Ally of the use of the valuable province of Coimbatore; and if necessary to open a ready way into that of Mysore¹². We learn from him...of there being a break in the continuity of the...ghauts...about 16 miles wide¹³.

¹B to CD. 15-7-82 (22). ²58 B/9. ³Logan (443). ⁴Negapatam, 58 N/14. ⁵Tirrupattur, 58 J/12. ⁶Pudukkottai, 58 J. ⁷58 F/15. ⁸cf. MRO. Map 108 & Frontispiece. Fullarton. ⁹BPC. 20-6-84. ¹⁰Map. MRO. 150 (25); DDn. 248 (143). ¹¹Mack. MSS. LXVIII, 6-7-85. ¹²cf. Fullarton, & Roberts (199). ¹³Memoir, 1793 (276).

Connection to the west coast was made by Humberstone's¹ march of October 1782, of which Rennell writes,

Of the route of Col. Humberstone from Tanore² to Palicaud, I have seen no less than 5 different plans; some of them differing 6' in longitude...where the whole space did not exceed 57 miles. One alone among these had the author's name to it, and therefore demanded the preference: it was by Lieut. D'Auvergne. I am yet to learn whether the distance was measured or not³.

Wersebe was an officer of the Hanoverian Corps⁴ who did useful survey between 1783 and 1785, and compiled a map of Tanjore which Mackenzie says was published, though it has not been found⁵ [243]. There is, however, in the British Museum a MS. map⁶ by Charles Schlegel, an other officer of the Hanoverians, who, from the following notes, appears to have made some original survey himself:

Map of Part of the Carnatic, collected on official Travels, by command and under the direction of Lieut. General Sir John Dalling, Bart...when Commander in Chief in the Carnatic.

Vandivash⁷, fixed from Mr. Barnard's Survey. Pondicherry, from Bourzet's map.

Bearings taken from the hills in the Plains, and all of these have been laid down by Triangles, and as little use made of perambulator measurements of routes as possible, it having been observed that such routes measured near the sea coast differ too much from those measured on a Rocky ground near the West mountains, that it is almost impossible to make allowances with a sufficient degree of certainty.

The north part of this map [Tripety and Chittoor⁸] has been made on a Tour with Major O. Great helps have been received by Major Pringle and the late Capt. Wersebe and Capt. du Plat.

Rennell further notes about his *Map of Hindoostan* that "the road from Seringapatam to Calicut is from Col. Humberstone's report", and

Sir George Staunton's journey across the peninsula, from Madras to Mangalore in 1783, as one of the commissioners for negotiating a treaty of peace with Tippoo Sultan, furnished a list of stages, and the estimated bearings and distances between them the whole way⁹; whilst a "Map of the Peninsula of India", published in 1843 by Wyld, of London, bears the note,

The road across the Peninsula...followed by the British Prisoners from Condapoor to Madras on their release in March 1784. ... The course of the Cauvery and the route of the prisoners is upon the authority of Capt. Wheeler.

Rennell laments the want of any sustained or continuous survey of the Carnatic, which, as we have seen [90-1], had been prevented by the Nawāb's opposition;

The determination of the positions in that part of the southern Carnatic beyond the extent of Mr. Pringle's measured lines, was what interested me particularly;...accuracy was not to be attained; for no position was determined mathematically, in the line between Trichinopoly & Velore¹⁰; nor even a single line measured from the sea to the hills, to determine the breadth of the Carnatic; nor even a series of triangles, although such a succession of tempting marks occur, throughout this whole space. The only particular that presented itself, in the shape of actual measurement, was Mr. Pringle's route from Trichinopoly to Velore; but this was without bearings, save from the top of Tiagar Hill¹¹.

and again,

When we return to the north of the parallel of Madras, the subject appears to be more barren of matter, of every kind, than in the south; and among the little that does appear, there is a still smaller proportion of actual survey; ...the further we recede from the coast, the more scanty are the materials, and the less to be depended on¹² [170].

He mentions however a sketch of Guntūr Circār by Samuel Davis, from which he took the position of "Condavir"¹³ and places marked on "his circuitous route

¹ Thomas Frederick Mackenzie Humberstone, Comdg. HM.'s 100th Foot, 2nd cousin to Kenneth Mackenzie, 7th Earl of Seaforth; For his march to Pulghāt, v. *Late War in Asia*, I (458-83) & Cadoll (101-2). ² Tanūr. 49 M/16; *Memoir*, 1793 (25). ³ *Memoir*, 1793 (25). ⁴ Two regiments employed by E.I.C. for nearly 10 years; arrd. Madras 1782-3, HMS. 84 (798) & Wylly (429). ⁵ *Memoir*, 1793 (273-5). ⁶ BM. K. 115 (70). ⁷ Wandiwāsh, 57 P/10. ⁸ Tirapatti, 57 O/6; Chittoor, 57 O/4. ⁹ *ib.* (269); Rennell's error: the journey to Mangalore in 1783 was by sea; the return land journey 1784, after conclusion of peace. Staunton was secretary to Lord Macartney, Governor of Madras 1780-5. ¹⁰ Vellore, 57 P/1. ¹¹ Tyāgādurgam, 58 M/2; *Memoir*, 1793 (272). ¹² *ib.* (280). ¹³ Kondavid, 65 D/4; *Imp. Gas. Mad.* I (336), *ib.* (254, 288).

from Ongole to Timerycotta"¹. This survey must have been made between 1779 and 1782, the period of Davis's stay on the Madras establishment.

We are indebted to Dalrymple for an account by Walter Lennon of a survey made by him of the country between Ongole and Cuddapah²;

The accompanying sketch was made in the year 1783, when I attended the Detachment under General Jones, which was designed against Cudapah and Sidout. ... From the Hill of Ongole I took bearings...with an Azimuth Compass. ... The bearings of each day's march laid down from the former, the distances measured by a perambulator...to within sight of Bodewall³ but could not with safety venture further. ... From Pornamella⁴ the two routes to Cudapah and Sidout are taken from the concurring reports of Black People, sent out for the purpose; I believe them to be tolerably exact, for when shown to the Rajah of Cotacotah he immediately named the places as they were represented. ... Roads by the Dornal pass I collected from the reports of those who escaped by these roads from Bodewall to Nellore. ... The road from Nellore to Colway...I have from Lt. Robinson⁵, who explored these places in person [185-6]. ...

The detachment remained a considerable time at Cameral, from whence I was sent to destroy the Fort of Cotacotah, and thence to Dupaud⁶; these roads are all laid down by Compass and perambulator. ... Before I had quite finished my work at Dupaud, the enemy's horse...poured in from the Westward, and I was obliged to take refuge at Courchier. From this hill I took bearings. ... Having caught a violent fever here, from the ill treatment of the Rajah, who had a design of delivering me up to the enemy, I was incapable of measuring the distances to Ongole, where I was permitted, at last, to go for my recovery.

Lennon later continued his survey in the direction of Cumbum⁷, tracing all the roads and rivers;

I was sorry that I could not take the latitudes and longitudes of the principal places in this sketch, but had no other instruments with me than a compass and Perambulator, From the circumstance of my having been attacked with the Hill-fever in 1786, when attempting a survey of the river Godavery, [105] ...and being obliged to go to China for my recovery, I lost almost all my papers⁸.

Reference is made elsewhere to the share taken by civil officers in the survey of the Presidency, and in 1783 the Chief Engineer, Ross, remarks,

Some of the Gentlemen in the Civil Branch of the service who had turned their thoughts to surveying were occasionally employed in different parts of the country making detached plans, as the Knowledge of any particular spot might at the Moment be required. Some of them were compleated...some were not, and a considerable Expence was incurred without gaining one essential step towards the great End proposed⁹.

¹Timerycotta, pls. 9 & 21. ²86 A/2; 57 J/11. DDn. 246 (142). ³Badvel, 57 N/2. ⁴Pornamamilla, 57 I/18. ⁵Probably Alexander Robertson (qv.). ⁶Dupadu, 57 M/5. ⁷57 M/3. ⁸*Oriental Repository*, I, 53. ⁹MPC. 28-10-83.

CHAPTER VII

MADRAS SURVEYS, 1786 to 1800

Coromandel Coast — Kistna—Godāvāri Irrigation Surveys — Tank Repairs — The Corps of Guides — Colin Mackenzie — Third Mysore War, 1790-2 — District Surveys — Nizām's Dominions — Fourth Mysore War, 1799.

THE Coromandel coast¹, stretching from Point Calimere to Orissa, was ever a dangerous beat for the Company's ships. It was fully exposed to the monsoon weather for seven months of the year, and there was no safe anchorage in all its length.

Though the sea-passage from Calcutta to Madras occupied but seven days between December and April, yet for the rest of the year the same passage took from 20 to 30 days; before 1780 even six weeks was considered a fair passage during the monsoon, and ships were frequently wrecked [45].

In 1772 the Directors wrote out to Madras,

It having been represented to us that Coringa Bay² is a proper place for our Europe Ships to put into during the Severity of the Monsoons on your Coast, We would have you cause the same to be surveyed, and report to us³; ...

and the Council replied,

We ordered Mr. Engineer Stevens from Masulipatam on this Service. He has finished his Survey & we have the pleasure to forward to you...a chart taken by him of the Bay & Harbour of Coringa⁴.

Five years later the Directors wrote out again;

We are much concerned at the disagreeable intelligence...respecting the Loss of the Ship Marquis of Rockingham upon your Coast, and as the Rock on which she struck is but little known, ... we direct you take the first opportunity of sending a Vessel with a proper Surveyor, to take a survey of the Rock's distance from the Shore, together with its extent, and the soundings within and without it, also the bearings from the most remarkable Land or Pagoda thereabouts⁵.

No action was taken on this request, and five years later again the Court direct that you do order surveys to be made when practicable, of the Coasts and shoals from Madras to Masulipatam, of the Rock on which the Rockingham was lost, and of the coast and Banks to the Southward⁶.

This was referred to the Chief Engineer, who suggested that the survey may be undertaken when the monsoon breaks up, if proper People, proper Instruments, and Proper Vessels for the purpose are provided⁷.

This was more than the Council could manage, and they wrote off to Bengal,

Having understood that you had employed Mr. Ritchie upon a similar service in Bengal, ... should Mr. Ritchie be judged by you properly qualified for such an undertaking, he may be directed to make the surveys required, as we have not been able to find any person here who is capable of executing the Hon'ble Court's orders in a satisfactory manner⁸.

As might be expected, Ritchie could not be spared, and it was not until the end of 1786 that a suitable surveyor was found in the person of Michael Topping, of whom the Governor⁹ wrote on March 2nd 1787,

In the month of November last, Mr. Michael Topping, a person of very considerable Mathematical and Geographical knowledge, had at his request ascertained the Latitudes and Longitudes of many of the principal stations between Masulipatam and Bengal, ... which...

¹"Chora Mandalum", or "the Kingdom of Choren", a famous Malabar King. Jefferys (4).
²85 L/5. ³CD to M. 25-3-73 (6). ⁴M to CD. 29-1-73 (10) ⁵CD to M. 45-3-78 (3). ⁶CD to M. 15-1-83 (43). ⁷MPC. 28-10-83. ⁸BPC. 22-12-83. ⁹Maj Gen. Sir Archibald Campbell, KB, HM's. Engrs.: CE. Bengal 1768-72; Governor of Madras 1786-9; d. 1791; bur. Westminster Abbey, DNB.

will prove of very essential advantage in correcting many errors which have been observed in the charts of this coast. He has now the pleasure to bring Mr. Topping's journal before the Board, and his observations and remarks appear to him not only ingenious and scientifick, but likewise of utility to Government, from the accuracy with which he seems to have laid down the bearings and distances of the principal stations in the Circars. ... [170-1].

From the laudable anxiety expressed by the Court of Directors, ... Sir Archibald begs leave to recommend...that Mr. Topping be instructed to prosecute his observations along the coast to the Southward¹.

Later in the year the following instructions were issued to Topping;

This Board have come to the resolution of having an accurate survey taken of the sea coast from Madras to the Southmost extremity of the peninsula, with a view not only to ascertain...the *actual line of the Sea Coast*, but...of obtaining a complete Survey of those parts of the Peninsula of India which belong to the Company and to their allies. ...

As soon as the season will permit, you will accordingly lose no time in proceeding upon your survey. ... You will be particularly attentive to ascertain the exact position...of any remarkable town, Pagoda, Point of Land, or Hill; ... you will observe the depth of water, and direction, of the different rivers through which you pass, where they empty themselves into the sea, the depth of water on the bars, and...you will communicate...any remarks about the possibility of making the entrance more accessible to vessels of considerable burthen. ...

If you have it in your power to ascertain the bearings of any remarkable point of land or shoal sea-ward, with the soundings to a certain distance from the shore...by means of any small vessel that you may be able to procure for this occasional purpose, Government will defray the extra expence, ... relying on your prudence to put the Company to as little expence as possible. ...

You will pay particular attention to lay down with the utmost accuracy possible the position, extent, and depth of water upon the Armegon Shoal to the Northward of Pulicat [104 n.2], for although this is not within the limits of the line...for your survey, yet...it is pretty certain that this shoal is very erroneously laid down, in consequence of which some of the Company's ships have been in the most imminent danger of being lost [104]. ...

You can then proceed to survey the rock or shoal where the *Rockingham* Indianian was lost; ... the shoal of Devicotah [86 n.7]...will also require your attention.

Although it is the intention of the Board that the survey shall be carried on through the Straits of Manar² and along the coast of Marawar³ and Tinnively districts to the Southmost point of the Peninsula of India, ...you are for the present to consider these instructions as only extending from the Armegon shoal to the Southmost Termination of this coast... opposite to the Island of Rameswaram⁴; the survey of that Island, as far as the Bramins of these pagodas will permit; from thence round the point of the Peninsula to Koilcarre⁵.

Early in January 1788 Topping reported that he had "taken every necessary measure" for his survey, and arranged for correspondent astronomical observations at Mr. Petrie's private observatory [171]. No ship was forthcoming, so the survey was carried out by land, and was the first Indian survey of any extent to have been based on triangulation [191].

Topping sent home an account of this triangulation and a base-line measured at Porto Novo⁶ to a friend in London, who read it before the Royal Society on February 16th 1792⁷ [191 n. 2] and in a letter to Government in 1791 he wrote,

Totally unaided—except by lascars—I conducted a series of Triangles near three hundred miles in length (besides measuring a Base line of six miles and a half) through a country in which I had to elevate myself for each observation above the tops of the highest trees, to go through the fatigue of travelling some thousands of miles, to endure the rigors of the hottest season, besides the mental labor of taking and computing innumerable astronomical observations⁸ [290].

Having carried his triangulation from Madras to Adirāmpatnam⁹ on the northern shore of Palk Strait, and surveyed the coast line southwards from Pondicherry¹⁰, Topping returned to Madras in December, expecting to return shortly to complete the survey to Cape Comorin, which however he was never given the opportunity of doing.

¹MPC. 11-9-87. ²58 O/12. ³Rāmnād, 58 K. ⁴58 O/7. ⁵Kilakarai, 58 K/16; MPC. 30-11-87. ⁶58 M/16. ⁷Phil. Trans. LXXXII (89). ⁸MPC. 27-12-91. ⁹58 N/7. ¹⁰His survey was sent home in 1790. and returned to India many years later; MEO. 133 (9-11) is possibly part of it.

Goldingham made use of this survey in compiling a map of Negapatam districts, and part of those dependent on Nagore¹, laid down chiefly from surveys by Mr. G. I. Hoissard in 1791. Corrected by Mr. Topping's survey of the coast. July 25th 1797. Scale 6 miles to an inch².

An application to the Governor General for the loan of a "Bombay Cruiser" for Topping's use was not successful, and on his return he looked for a suitable vessel at Madras;

Having...used every endeavour...to procure a small vessel for the marine part of my survey, ... my enquiries, till very lately, have been wholly unsuccessful but...two days ago I very fortunately met with a small well-built cutter of about 30 tons burthen... suited to the purpose. This vessel is quite new, having been launched about three months ago at Pegu, where she was constructed of the very best teak timber...after an English model³.

He asked permission to purchase it for 1200 pagodas⁴, and to spend "the trifling" extra cost of providing copper sheathing to her bottom and a small boat to attend her. As he further assured Governement that she would be in every way suited to the purpose wanted, and particularly for exploring the passages situated between the Coast of India and Ceylon, her purchase was sanctioned. Topping indented on the Paymaster for two *candies* of sheet copper for the use of the *Mary*, but, after much fruitless trouble and vexation, not being able to procure the sort I wanted from the Company's stores, I was compelled to purchase the necessary quantity from a Merchant in the Black Town⁵.

In the meantime the Directors had written out welcoming Topping's appointment, and ordering that his first task should be to re-examine the coast for a safe harbour;

It would be of the utmost consequence to have a Port of Shelter for large ships within our own territories on the Coast of Choromandel, and a doubt having been suggested, on attention to Major Stevens's plan of Coringa, whether there be such a passage for a large ship into the river Godavery; but the late dreadful calamity at Coringa⁶ may have made essential alterations since Major Stevens's survey was taken [101]; we therefore direct that Mr. Topping be employed as soon as possible in making a survey of the mouth of the river Godavery. ... Possibly planting the mud banks of the mouth of the Godavery with Mangroves might tend to deepen the channel. It will be proper to survey also the road of Coringa to ascertain what shelter it can afford. If...neither the river Godavery nor Coringa can afford safe shelter for large ships we think the Bay of Pettapolly⁷ ought to be carefully examined⁸.

As Topping estimated that it would take eight months to finish his survey to the south, the Council decided that he should first carry out the survey at the mouth of the Godāvāri.

He commenced his survey of the Bay of Coringa in August 1789 and made a thorough survey with soundings, besides taking systematic observations of the tides⁹ [191-2]. In his report submitted in February 1790 he pointed out the inaccuracy of former charts, apparently including that of Stevens, made in 1772;

This led the Hon. Court of Directors to expect that a passage for their shipping into the Godavery might be found, ... a matter as will now appear of utter impossibility. ... I have determined to submit the materials with which I have constructed my Chart to their inspection, being of opinion that were the *means* by which all maps and Charts are made exposed to the test of examinations, much fewer impositions would be attempted than are at present practiced, with too frequent success, by persons who depend more on the operations of their own fancy than on their knowledge of things requisite for the construction of geographical documents [184].

Though the passage of ships into the Godavery was quite impracticable, he described the safe harbourage and convenience of the Road of Coringa at every season of the year, and, alluding to a rumour that the object of the Directors was to make Coringa the place of rendezvous for their Bengal shipping, in order to avoid the dangerous, and too often fatal, navigation of the Ganges,

¹Negapatam & Nagore, Dutch Settlements annexed by EIC. in 1781. 68 N/13. ²MRO. Map 322.
³MPC. 8-12-88. ⁴About £ 500. ⁵The northern quarter of Madras, MPC. 16-6-89. ⁶Tidal wave, 1787; *Imp. Gas. Mad.* I (295). ⁷66 A/8 (see pl. 9). ⁸CD to M. 20-8-88 (10). ⁹MRO. Map. 108.

added that "no place can be fitter for these purposes¹".

During 1790 and 1791 Topping was employed on arrangements for building the observatory at Madras [172-3], and he wrote in December 1791,

Being at present occupied...in erecting an Astronomical Observatory at this Presidency, it will not be possible for me to proceed on any *distant* service; ... the late heavy monsoon must have impeded not only that, but every other outdoor operation that I might have been engaged in; ... as however the Rivers will probably subside in a few days, I think I may venture to promise that the observatory shall be completed within three months from the setting in of the fair weather. ...

Although my present occupations will not admit of my immediately commencing my service *Southward*, yet, if the Hon'ble Board approve of my entering upon an examination and survey of the Pullicate and Arnegon Shoals² *during the present favorable season*, and will allow me the assistance of Mr. Goldingham, I can, as those dangers are not very distant from Madras, arrange to conduct that service. ...

The investigation of these dangerous shoals make a part of my instructions; ... the uncertainty of their true situation and extent has long been an evil very justly complained of; and, if I am rightly informed, the *Vestal Frigate*, with the Right Hon'ble the Governor General on board, had lately a narrow escape of being wrecked or one or the other of them³.

This was approved, and in the following October Topping reported,

The survey of the Pulicate shoals have been completed some time but, ... before Mr. Goldingham could accomplish his examination of the Arnegon and other Banks to the northward, ... he had the misfortune to lose the cutter's mast and, ... notwithstanding I have searched everywhere for a spare to replace it, I have not yet succeeded in finding one.

In consequence of this disaster I have ordered the lascars to be discharged and the vessel to be secured in Pulicate River, directing at the same time Mr. Goldingham to proceed with his survey *on shore* to beyond the Arnegon, in order that by a connected series of observations, in addition to that formerly made by myself, we may at length obtain a true figure of the whole peninsula⁴ [178].

In December he reported that the Survey of the sea coast northward by Mr. Goldingham is going on, and will extend to Point Devy⁵ including Pettypolly Bay very shortly.

In March 1793 he submitted Mr. John Goldingham's survey of the sea coast from Madras to the Kistna, together with a very particular investigation of the Pulicate Reefs⁶. ... As the work will speak for itself, I shall only observe that the method adopted was recommended by myself, and that the execution of it discovers great zeal, application, and ingenuity in Mr. Goldingham⁷.

In acknowledging this survey and Topping's letter that accompanied it, the Directors write,

We recommend that the *Mary* be fitted as a Schooner, and the survey of the Bay of Pettipollee and the Soundings on the other parts of the Coast be completed by Mr. Goldingham as soon as opportunity will allow. ...

Although correspondent observations at the observatory are very desirable, yet that consideration cannot be admitted as a competent excuse for postponing the *actual surveys*. ...

Without deprecating the *extreme precision* with which Mr. Topping and his Assistant seem so meritoriously to have executed the survey of the sea Line, and which we wish to have continued, yet there are surveys of more general importance, but none which merit more attention than that of the *Godavary and Kistnah*, as they affect the cultivation of the countries adjacent⁸ [105-7].

These surveys of the coast were compiled by Goldingham into a map⁹ which bears the following note [192];

The coast from Adiapatnam to Fort St. George (a distance of about 240 miles)...was surveyed by means of a continued series of large triangles, formed with high signals. ... The same method was adopted in the survey of the coast from the Western mouth of the Kistna River to Masulipatam, a distance of about 47 miles. Both these surveys were executed solely by...Mr. Michael Topping.

The coast from Fort St. George to the Western mouth of the Kistna (an extent of 250 miles) was surveyed by means of high signals ranged along the coast at intervals of 9 or 10 miles, the relative bearings and distances of these having been found by Astronomical

¹To Dalrymple, 10-7-90, *Mad. Sel.* XIX. 1855 (2,22). ²6 m. from shore, off present lighthouse Monapalem, 66 C1; *Imp. Gaz. Mad. L* (365). ³MPC. 27-12-91. ⁴MPC. 16-10-92. ⁵Divi Point, 66 E/1; False Divi Point, 66 A/13. ⁶MBO. Map 44, engraved by J. Walker; pub. 1-5-1821. ⁷MPC. 19-4-92. ⁸CD to M. 23-4-94 (61-64). ⁹MRIO. 137 (53) & MRO. Map 125.

observations, and smaller curves ascertained by theodolite and perambulator. The Pulicate Shoals were surveyed by the help of signals ranged on shore. Both these surveys were executed by myself. ...

The coast from Masulipatam to Point Gardewar¹ (about 106 miles) was surveyed by Bearings and distances with the Theodolite and perambulator, by Lt. Caldwell of the Engineers, when Assistant...in the Survey of the Kistna and Godavari Rivers [106].

The Bay of Coringa was laid down from an accurate survey by the late Marine Surveyor.

KISTNA-GODĀVARI IRRIGATION SURVEYS

The first recorded survey carried out for irrigation purposes³ was one by Dugood on the Godāvāri River in 1775 [93];

33 sheets of a sketch showing the Zully Brooke and its environs, from its leaving the Godavary to its joining the Colere. Done to a scale of 8 inches to a mile; ... done large for the purpose of distinguishing minutely the Dams &c.

The canals had been constructed by the local people to make the Country about them produce Paddy; ... the purpose of tracing the canal was to improve it by deepening, widening, &c, and improve the passage of water; and with his survey Dugood estimated "the cost of taking away and re-making the dams"⁴.

Dalrymple has published an account⁴ of a survey of the Godāvāri by Walter Lennon in 1786 with a view to the "improvement of cultivation";

Mr. Lennon in 1786 went in a boat up the Godavary & Shevery Rivers, about 180 miles above Rajahmundry⁵, and reported on the various tributaries, and that he found no cataracts.

In 1788 Lennon represented to the Governor,

That he had, in 1786, at his own expence, undertaken to make a Survey of the Godavary, upon a scale of one inch to a mile, distinguishing the different districts upon its Bank; ... that his intentions were to begin near Rajahmundry, and to go as far North and West as he should be permitted; he surveyed in this manner about 9 miles of the river. ... What he did was merely for trial of the practicability of the Work.

He now proposed to make an exact Survey of the River Godavary, on a scale of an inch to a mile, and also of the Rivers Shevery & Sheelain...and offered to compleat the whole at his own expence, the only assistance desired, a few lascars; and the only Emolument expected, was the privilege of sending down Teak Timbers, ... secure...from the exactions & plunder of the Zemindars [144].

Dalrymple also reproduces a report from Dr. Roxburgh⁶, the botanist, dated October 17th 1792, with

a sketch of the Colar⁷, with those parts of the little Rivers that supplied it with water, taken from a manuscript Map, which he believed to be exact, but of this Map no copy is come to England, & Dr. Roxburgh has not an exact idea of the Channel from the Godavary, which was surveyed very minutely by Capt. Dugood.

In 1792 the Directors wrote out,

We recommend that Mr. Topping...may be employed in Surveying the Circars, particularly the Rajahmundry Circar. ... Such a Survey would at once shew, not only the position and nature of the Lands at present in cultivation, and with what cultivated, but... what Improvements might be made⁸.

One consideration of much moment is, the easy communication with the Sea or Water carriage. ... The Inland Navigation of the Rajahmundry Circar is not known to us; it would therefore be of the utmost consequence to Survey Branches of the Godavary River as well as of the Kistna, ... One very great object is floating down Teak, which...might thus be brought by Water to the Sea⁹.

The Council passed this letter to Topping and at the same time consulted Beatson, the Governor noting that,

¹Godāvāri Point, 65 L/6. ²But see 3rd & 4th Instructions to Barnard [142]. ³Mack, MSS, LXVIII, 27-4-76. ⁴*Oriental Repository*, II; *Watering the Circars*, Dalrymple, 1793, with map. ⁵65 G/18. ⁶William Roxburgh, Asst. Surg. Mad. 28-5-78; succeeded to charge Botanical Gardens, Sibpur, 1793. ⁷Colar Lake, 65 H/2. ⁸See proposals made by Lennon [144]. ⁹CD to M. 16-5-92 (11-13).

The late famine in that quarter has again naturally turned the public attention to the practicability of securing water, in future, by means of the two rivers, ... appropriating the waters to the purposes of cultivation, as a point of the first public importance.

Beatson was strongly in favour of an aqueduct judiciously constructed; ... in forming an aqueduct, there would be no unnecessary slope of descent...which ought not to exceed five inches in a mile, whereby the water would be retained at a high level and would flow so gently as to run no risk of Injuring the work. ...

But as to the probable expence of such a work, it is impossible to form any Judgement, without a Minute Examination of this part of the River; ... in my humble opinion, the Expence cannot be put in competition with the great advantages which would accrue from the accomplishment of such Work.

He further recommended that levels should be taken along the rivers, and Surveys of the Ground, for a mile or two on each side of these levels, to be made, and all original observations of the Surveys & Levellings to be arranged in a clear & distinct manner, so that from them the results may be computed by those who are competent in business of this nature¹.

The necessary instructions were then passed to Topping, who first went down to Tanjore to see the anicut [95 n.6] and study the irrigation system taking off from the Cauvery and Coleroon rivers; he then left Madras in March 1793 for Masulipatam, taking James Caldwell with him as assistant. He made a survey of the Kistna from Masulipatam to Bezwāda, taking a series of Levels on its northern bank; ... The Godavari River was executed in like manner by Lieut. Caldwell².

An account of his levelling operations is given in a report dated February 14th 1794 [192-3], and a year later he wrote, apparently in a mood of depression,

But to particularise a service in which I have laboured these two seasons past, and indeed that on which I indulge Warm hopes of support and encouragement from the Hon'ble Company — Namely *my exertions in the Northern Circars*. In despite of illiberal opposition, and an almost total want of proper assistance, In despite of the rigors of a climate (perhaps the hottest and most unhealthy in the habitable world) I have conducted a series of levels near two hundred miles in length; and a minute survey of the Kistnah, with its several branches, to near a hundred miles from the sea; and I purpose to do the same by the Godavery and its adjacent territory, if life and health permit.

Much has been said, and much written, on this important subject, *The Watering of the Circars*; It will however appear from the delineations already laid before Government, and more fully from those which I shall shortly submit...that nothing can be more wild and extravagant than the idea of those who recommend undertakings of this kind to be blindly commenced...without method, nay, without first ascertaining the practicability of the scheme, a work of great (but indispensable) labour; ... and. ... supposing the proposed work has...been found practicable, a second survey and series of levels, more minute than those previously accomplished, must also be undertaken, in order to mark out...the ground over which the intended canals are to be carried, to determine their proper dimensions, their figure and slope &c., all of which will require ample assistance and a Band of practical surveyors, well instructed, and capable of enduring the climate³.

His chart of the "Lower Division of the Kistna", and chart of levels, was sent home to the Directors later in the year, the Council noting that,

This work completes the Kistna from its several entrances to beyond Amuktala, a distance of near 110 miles from the sea, and furnishes determinations of the levels of the adjacent country to that furthest inland point.

Mr. Topping, from want of sufficient materials is still...[anxious] to suspend his judgement upon the practicability of the ultimate object we have in view⁴.

After Topping's death in January 1796 the Directors ordered that Beatson should complete the survey, which was now widened in character so as to cover all means by which the irrigation of the cultivated lands in the Circars could be improved. Beatson came out from home for this special purpose, and left Madras in March 1798, taking with him

a Map of the countries between the Kistna and Gaudavery rivers, with a survey of those rivers by the late Mr. Topping and Captain Caldwell, their lines of levels at every 10th

¹MRC. 4-12-92. ²Note on map, MEIO. 187 (53); see also MEIO. 181 (21, 22). ³MRC. 7-2-95. ⁴M to CD. 2-10-95 (117, 118).

station being marked thereon and also profiles of the levels taken...up the Kistna and across the adjacent country to the Godavery¹.

He travelled up to Ellore through Calastray...Ongole...Chintapilly²; ... throughout this tract the objects I have constantly kept in view, were to ascertain the various modes of watering and cultivation—the nature and situation of the best tanks—the different methods of constructing...sluices, and to discover every means of improvement that might be successfully introduced in the Circars.

At Chintapilly, I examined that narrow part of the Kistnah, about a mile above the fort, where the waters are confined between two rocks, in a space of little more than 300 yards; afterwards I proceeded to explore the face of the country on each side of the river, from Chintapilly to Ibrampatam, which...appears to me totally ineligible, and I may add impracticable, for canals or aqueducts, however favourable the levels might have been found.

On his march to Ellore Beatson had employed several intelligent Bramins of the Corps of Guides, ... in different parts, to ascertain some points connected with the investigation, and they brought in surveys of the more important rivers flowing through the Guntūr and Ellore Circārs. He goes on to say that,

During this investigation I have often had reason to regret that so small a portion of these districts has as yet undergone an actual survey, and that there is no map of the interior of the circars which could afford me any material assistance. To the late Mr. Topping's and Captain Caldwell's accurate surveys of the Kistnah and Godavery I am indeed much indebted, and to Captain Dugood's of the Wayairoo; but excepting these the rest of the map of the Masulipatam circar is extremely imperfect, being a *Moochy* map, constructed many years ago in the Engineer's office at Masulipatam³.

Beatson suggested that a similar survey should be carried out in Guntūr Circār to that which he had made some years before in Palnād [110],

At the same time that this Survey is carrying on, I beg leave to recommend that a similar Survey of the rivers in the Guntur Circar (including 2 miles on each side of them, representing principal watercourses from these rivers, villages, and Tanks) be made upon the same scale; this survey with the Routes already surveyed by Captain Mackenzie and myself will form an useful map of that Circār⁴.

He was not able to accomplish much, for war clouds were gathering, and in July 1798, the very next month, he was called away to join the Governor General's staff and act as adviser on the geography and local conditions of the Mysore frontier [118]. Topping's scheme was not pursued further;

The first idea of the Godavery Anicut originated with Mr. Michael Topping, who reported how desirable it would be to throw a dam across the Godavery, so as to raise the water, and make it available for irrigation. The project was permitted to slumber for half a century and was revived in 1844⁵ [by the great engineer Arthur Cotton].

TANK REPAIRS

The Company having assumed the administration of several of the Carnatic districts from the beginning of the war of 1790⁶, and suggestions being made by district officers for the improvement of the revenues from cultivation, the Directors wrote out in 1793,

The Letter from Mr. Andrews of the 16th August 1790, has stated in such forcible terms the advantages which are likely to accrue from cutting a Channel for supplying the Devicotah District with Water from the Coleroon, that we trust no time has been lost in making the necessary previous examination and Survey, and in commencing the Work, if the Report shall have been in favor of the project. ...

We observe by the Letter from the Board of Revenue, ... that from the present ruinous state of the Water Courses and Tanks, it is to be apprehended, that without the aid of

¹ MPC. May 1798. ² Kālahasti, 57 O/10; Ongole, 66 A:2; Chintapalle, 65 D/2. ³ MRC. 27-7-98, ⁴ Mack. MSS. LIX, 10-6-98. "A Collection of papers illustrative of the different Waterworks in the Carnatic". ⁵ Moria (109). ⁶ In 1781 the Nawāb of the Carnatic assigned to the Company the revenue of his districts to provide for their defence; this was not confirmed by the Directors, but a treaty of 1786 provided for such assignment in the event of another war, and this was put into force in 1790. v. M. Pol. to CD, 16-9-90 (162). At the close of the war administration of certain districts remained with the Company, and complete transfer followed in 1801 [pl. 1].

Government...no effectual repair will be made by the Renters. ... We authorize you, if the state of your finances shall admit of it, to disburse the Sum...necessary for giving a thorough repair to the Water Courses and Tanks¹, a measure which, ...if effected by skilful Persons, could not fail to induce Proposals for an increased Rent...ultimately attended with a proportionate increase of Revenue².

The matter was referred to Topping whose recommendations were eminently practical; he wrote to the Board of Revenue on January 5th 1794;

Your resolution...to recommend a thorough repair of the reservoirs in the Company's Districts, was doubtless a necessary one. Before, however, so extensive a work can with propriety be undertaken, a particular survey of each reservoir, natural or Artificial, should be made, or the Company will certainly be obliged to pay double the money bonafide expended on them.

To effect this salutary purpose, a regular Surveyor General's office should be instituted ... [264].

In the execution itself of the work, ten or twelve *practitioner Surveyors* will be wanted, to act under the Surveyor General and his Assistants; These should, in my opinion, be formed into a regular body, and established in the fixed pay and service of the Company.

The Board of Revenue endorsed this proposal,

We beg leave to recommend that a Surveyor General's office be instituted at Madras, with the authority and the number of assistants, both European and Native, pointed out by Mr. Topping. ...

As you have consented to the repair of the Tanks &c in the Jaghire, and as it would appear that the Hon'ble Court of Directors...intend to extend such improvements throughout the districts under this presidency; we conceive an establishment of this nature to be of the utmost importance, not only to effect the necessary survey of the state of the Tanks, the repairs they require, and where others may with advantage be constructed, but afterwards to Superintend the execution of the works³.

Government accepted these recommendations so far as the establishment in 1794 of a Surveying School [284], and the following year resolved that,

Being convinced of the necessity of appointing a scientific person to superintend the repair of tanks and watercourses, it is agreed that Mr. Topping be nominated to that duty under the designation of "Superintendent of Tank Repair & Watercourses".

As the execution of the orders which have been received...upon this important subject will necessarily involve the Company in a very heavy expence, and as great responsibility consequently attached to the person employed in the work, resolved that Mr. Topping be allowed...400 pagodas per month in the Revenue Department from the date of his appointment⁴.

On Topping's death in 1796 Caldwell succeeded him in charge of the "Department of Tank Repairs", the first regular department of Public Works to be established in India.

Early in 1794 John Norris was deputed "to survey the Devicotta District [86 n. 7] and report on the scheme put forward for its Irrigation". He reported that he considered a survey necessary of all the watercourses, tanks, and communications with the Coleroon River, but he does not appear to have done much towards such survey, for a year later Government told the Chief Engineer that further employment of Captain Norris at Devicotah is useless and unnecessary. He is to be recalled, and to submit...such materials or information as he may have procured relative to the Survey, upon which he was ordered so far back as January 1794⁵.

In his place Caldwell was sent down in 1795 from Masulipatam, "to examine how far the waters of the Coleroon could be applied to water the lands of Devycotah⁶", and in pursuance of his report, the first two boys passing out from the surveying school were sent down to survey the district. The following letter shows that the survey was in the nature of a "Revenue Survey", but as time went on the Department of Tank Repairs developed its own type of survey, and produced district maps for its special purposes which were of considerable topographical value;

In Captain Caldwell's last letter he wrote me that we must make a survey of all the Paddy grounds which are cultivated, and which are not cultivated, and to find the contents of them, and for that, Sir, we want about 50 or 60 bamboos for flags, ... and we do want also a

¹of. 5th Instruction to Barnard [142].

²CD to M. Rev. 25-8-93 (3, 36).

³MRC. 10-1-94.

⁴MBC. 7-2-95. ⁵Mack. MSS. LXIX, 24-5-95.

⁶CD to M. 9-5-97 (52).

person out of the village to shew us the boundary of them, and also to shew us properly which are cultivated, and which are not cultivated. ... We have orders to make a survey of all the salt-water Rivers; for that, Sir, we must have a Boat, to be for our Survey; if Captain Caldwell was here we would have them by his orders, but he, being so distant from us, it is with much difficulty to receive one of his letters in a month, and therefore I have mentioned it to you, Sir. We have not persons enough to cut the jungle as it is so thick between the boundary of Devicottah and also at the Salt-water Rivers. ... We are going on with the nullahs from the Yarry {reservoir}; at present we have rain here most days in the week; Allan desires to be remembered to you, Sir; I hope all our friends are well¹ [195].

On this Goldingham wrote to the Board of Revenue,

It is absolutely necessary for the person these lads are placed immediately under to be on the spot, ready to give them the requisite assistance, and to support them through the opposition they are likely to meet with from persons interested in keeping from Government the information they are ordered to obtain, by which the real value of the country will be ascertained, as well as to give them due encouragement to persevere in the prosecution of a difficult and laborious duty.

Such troubles were of course the lot of all surveyors, though more particularly of those engaged in revenue surveys.

THE CORPS OF GUIDES

On Pringle's death in 1789 Beatson succeeded to the command of the company of Guides [97]. The establishment and composition of the company had been frequently changed; Pringle had left a scheme for 400 men, 100 to be employed north of the Kistna, 200 in the Carnatic, and 100 south of the Coleroon, but the Directors considered these numbers too high;

With reference...to Captain Pringle's proposal for establishing a numerous body of guides ...and the Commander in Chief's opinions of 1773 and 1775 [90] we are led to form an opinion in favour of the utility of some regular Establishment of this nature. ... We are inclined to think that the labours of Colonel Kelly and Captain Pringle have rendered the Establishment of Guides to so large an amount as 400 less necessary than formerly, and we desire to know whether you are in possession of the maps which were presented to the Governor General in Council by the former in 1782 [240]. If not, you must make application for them, and you must inform us whether you really think it necessary to keep up so large an establishment of Guides as Captain Pringle recommends².

The Chief Engineer then recommended an establishment one quarter of that suggested by Pringle, but Government only sanctioned 50 men, whom Allan was authorized to raise in time for the war of 1790. During peace time many of the guides had been employed as *harcarahs* under the Governor and the Commander-in-Chief³.

Both Beatson and Allan were enthusiastic surveyors and it is recorded that,

During the interval of peace, until the commencement of the war with Tippoo in 1790, Captain Beatson was indefatigable in surveying and exploring the whole face of the Carnatic. ... His surveys extended from the River Godavery to Cape Comorin; and by the routes he had selected, especially by the ranges separating the Carnatic from Travancore and Mysore, he had obtained a knowledge of every pass or defile, above 60 in number, which lead through that range⁴.

He embodied this work, together with much that must have been collected "from information", into a map of which Rennell writes;

Toom-buddra River, ... the remainder of its course, and its place of junction with the Kistnah⁵, is from Capt. Beatson's map of the Coromandel &c., drawn and transmitted to the Court of Directors of the East India Company in 1789. This valuable piece of geography... contains material for correcting a considerable portion of the course of the Kistnah river. ...

¹From Thomas Turnbull to Goldingham; MRev. Bd. 13-9-98. ²CD to M. 8-4-89 (25). ³Maack. MSS. LXIX. 30-1-80. ⁴EIMC. II (375). ⁵67 I/1.

Capt. Beatson's survey of the Palnaud district [shows the]...Kistnah...to a point more than 90 miles above Condapilly¹. Thence to Sooropour, or Solapour, is from authorities collected by Capt. Beatson. ...

Balhary² 27 G. miles to south-west of Adoni, Beatson's map of 1789. ...

Within those [boundaries] of the Nizam, on the side of Cuddapah and Gooty, the places are taken, chiefly, from Capt. Beatson's map; as are those also in the north Carnatic, Guntoor, and Palnaud³.

A map of Beatson's preserved at Calcutta is entitled *Countries between the Pennar and Godavari Rivers*, compiled for Sir Archibald Campbell (presumably during 1788-9) [101 n.9]. It is on the scale of 6 miles to an inch and carries the following notes;

The district of Palnaud, the principal points in the Guntoor Circar, and the routes expressed in double lines are from my own survey.—The Masulipatam Circar is chiefly from Major Stevens's map, and Nizampatam...from an original survey by Mr. Scott.—The interior parts, and the routes expressed by the single line, are from cursory surveys by Capt. Alexander Read, and from itineraries kept by Hircarrahs sent to explore the roads⁴.

Another map shows "the roads to Madras from Masulipatam drawn by Major Beatson from the report of Hircarrahs"⁵.

Beatson's *Military survey of the district of Palnaud*⁶ is preserved at Madras, a sketch made in 1787, apparently on a framework of measured roads. Beatson says that he finished in "in about three months, during which time I visited every village and every pass in the district"⁷ [193].

His invaluable surveys and reconnaissances made when commanding the Guides during the Mysore War of 1790-2 were sent home with the following note from the Council;

We send the third volume of Capt. Beatson's Geographical Observations in Mysore & the Baramahal⁸, with an examination of the Passes, ... to which we added some Military sketches of Hill Forts & of Seringapatam. Captain Beatson will lose no time in arranging the earlier materials into a first & second volume to be transmitted to England⁹.

The Directors replied.

The performances of Capt. Beatson, whether of General Geography, or of sketches meant to convey ideas of particular spots of ground for military purposes, ... appear to be executed with great judgement and accuracy. ... The map of Coromandel transmitted by the same dispatch is a monument of great industry, skill, and minute accuracy¹⁰.

Allan's surveys were hardly less valuable and include,

A Survey of the Sea Coast from Fort David¹¹ to Killay, and of the country in the neighbourhood of Porto Novo and Chillumbrum¹².—Several Surveys of Roads.—A military survey of the Provinces South of the River Coleroon¹³.—Fieldbooks and maps of the Marches of the Army under the command of General Medows, from May 1790 to January 1791.—A Field Book of the Marches of the Army under Command of Earl Cornwallis, from February 5th 1791 to May 1792¹⁴.

During 1790 General Medows had worked backwards and forwards along the southern frontiers of Mysore in a vain attempt to bring Tipu to decisive action, and it was in an effort to bring the war to some conclusion that the Governor General, Lord Cornwallis, assumed command of the army in February 1791, and by invading Mysore with a greatly larger force, was able to force Tipu to surrender before Seringapatam in March 1792¹⁵.

Allan gives the following account of his surveys,

Of the Military survey of the Provinces South of the Coleroon, it may be proper to remark that I commenced it in May 1789, and in December following, on the prospect of a war, it became incumbent on me to quit that service and proceed to...Trichinopoly for the purposes of raising a Corps of Guides and endeavouring to investigate...the nature of the country and roads in such parts of Tippoo's Dominions, as were likely...to become the theatre of the future operations of the Army.

¹Kondapalli. 65 D/10 [pl. 9]. ²Bellary. 57 A/16. ³Peninsula (4, 10, 13). ⁴MRIO. 136 (19). ⁵MRIO. 150 (14). ⁶W. of Guntur [pl. 9], MRO. Map 116. & MRIO. 147 (11), Revenues mortgaged to the Company from 24-2-87, *Kistna Manual* (153). ⁷MRC. 27-7-98. ⁸The billy tracer in the N. of Salem Dist. 57 L. ⁹M to CD. 31-7-92 (37). ¹⁰CD to M. 25-6-93 (44, 45). ¹¹58 M/14. ¹²Chidambaram, 58 M/11; probably MRIO. 133 (12). ¹³Fdbk. MRIO. M. 77. ¹⁴MMC. 1-3-93. ¹⁵Account of 3rd Mysore War, Bowring (145-173).

Some parts of the Map are...sketched in from information, and distinguished accordingly. ... In the Field Book of the Marches of the Army under Maj. General Medows, the distances of the Marches from September 14th to October 7th I received from the Officers of Engineers¹ by whom they were measured. After the distribution of the troops in August 1790, ... General Medows approved my making a more minute survey of the country from Caroor² to Coimbatoor than my official duties as Captain of Guides with the army had permitted me to do on the March.

One of his maps, entitled "a Map of the Marches of the British Armies in the Peninsula of India, during the Campaigns of 1790, 1791, and 1792" was prepared from a map published by Rennell in London early in 1792, to which Allan added his own later surveys. The map showed all the new boundaries fixed by treaty, the marches of the British and Mysore troops distinguished by different colours, every encampment with its date of occupation, and all the Forts captured during the war³. Rennell's map was compiled from maps sent home by Lord Cornwallis;

They consisted of 2 distinct maps, on very large and similar scales (9 inches to a degree); the one containing the campaign of General Medows in 1790; the other that of Lord Cornwallis in 1791. The 1st was compiled by Capt. Allan, who held the office of Capt. of Guides to the Army during the campaign of 1790; the other by Capt. Beatson who held a similar post during the succeeding campaign; and who had previously given very sufficient proofs of his ability as a geographer, by his surveys and remarks made in the N. E. of the Peninsula. Each of these maps possesses a very considerable share of merit, and collectively they describe a chain of positions fixed by cursory measurement, and angles taken from the distant hills⁴ [253].

After the conclusion of peace Beatson was appointed Town Major at the Presidency, whilst Allan was appointed to make "a complete military survey of the Baramahal and Salem districts", which had been ceded by Tipu [113]. In submitting the results of this survey, he writes,

I have the honor to lay before your Lordship in Council, several volumes of Geographical observations, made in the countries ceded by Tippoo [287].

The course of that part of the Cavery which forms the Western Boundary is ascertained, as also the nature of the several fords across that river, and the remainder of the Frontier line from the Cavery to Amboor is determined⁵.

Early in 1798 Allan resigned command of the Guides, and was relieved by Alexander Orr, who commanded them through the fourth Mysore war, and was in turn relieved by Thomas Sydenham, followed by James Colebrooke in October 1799; these officers upheld the tradition they inherited, and continued to add to the knowledge of the new territories ceded to the Company on the fall of Tipu.

COLIN MACKENZIE

Though he has himself noted that he made his first surveys as early as 1784⁶, probably when serving with his battalion in Coimbatore, the first survey made by Colin Mackenzie of which we have any particulars is a "Survey of Nellore and Seropilly with the roads between them...1787...scale 250 yards to an Inch", which the critical Montgomerie classed forty years later as "good"⁷. The following year he made an extensive survey of the roads of Guntūr.

Under the treaty with the Nizām of 1768 [91], the circār of Guntūr⁸, granted to the Company by the Emperor of Delhi, remained the *jāqir* of the Nizām's brother Basālat Jang for his life; Basālat died in 1781 but it was not until 1788 that the Company took possession, as Mackenzie writes,

Guntoor had been a subject of important Political discussion before my arrival in India, but no trace of any attempt to survey it existed in 1788 when the Detachment under Lieut. Colonel Ellington was sent to resume possession of it from the Nizam. At that time I was employed to survey the roads marched by the Detachment, and the principal Forts⁹.

¹Of whom one was Mackenzie [112]. ²Karūr, 68 J/1. ³MMC, 1-3-93. ⁴Rennell (Advertisement). ⁵MRIO, 138/49, *Sketch of the passes between Mugli [57 K/15] & Gahalati [58 E/2]* (showing country between Arcot & Seringapatam) by Allan; sd. Baramahal, 30-9-93; Ambar, 57 L/9. ⁶Letter of 19-1-1811; MMC, 8-2-1811. ⁷DDn, 246 (142). ⁸The Circār was a much smaller area than the present district [pl. 9]. ⁹MMC, 19-6-1817.

His detailed account of this survey, illustrated by a couple of maps, was published by Dalrymple [186]. He had commenced without any fixed appointment, from an opinion of the utility of the work, and which was approved by Government...on my presenting the work¹.

A year later,

A complete survey of the District appearing desirable to Government, in December 1789 I was appointed to survey Guntoor, but after preparing for that undertaking I was ordered to join the Army about to take the Field².

He was warned for field service in March 1790 and, joining General Meadows's army to the south, made survey of the routes of the army "in the Coimbatour Country", and also of the fort of "Palgautcherry"³.

During the campaigns of 1791 and 1792 he served as assistant to the Chief Engineer in Mysore, and on the conclusion of peace was posted as "Engineer and Surveyor with the Ellore Detachment" attached to the Nizām's service [115].

From 1792 to 1794 he surveyed the newly Ceded Districts of the Nizam, Cuddapah, Canoul, the wild mountains of Yermulla and Nalmulla⁴ etc. bounding the Carnatic as far as the Kistna...⁵

continuing his survey of the Penner River through Nellore to the sea [116] and being called away for a few months in June 1793 for the siege of Pondicherry⁶. In 1794 he moved up to Hyderābād, submitting to the Resident a plan, in four sheets, of the passes and roads on the frontier of the Carnatic, between the rivers "Pennar and Kistna" reduced from his surveys⁷.

His subsequent surveys north of the Kistna are described later [116-8]. On his journey back from Ceylon

in 1796, I was employed...to take a cursory inspection and view of the Fortresses and Military Posts in the tract between Ongole, Masulipatam and Condapilly⁸, including Guntoor. ... No detailed Provincial Map or survey of Guntoor, or of the adjacent Country existed at that time, and I had recourse for the necessary information to my own former Itinerary Surveys of the cross roads, and to Harcarrah routes and sketches supplied by the Collectors⁹.

THIRD MYSORE WAR, 1790-92

We have already noticed the surveys of Beatson, Allan and the Guides, and we now come to the work of the Bengal and Bombay surveyors during the third Mysore War.

In November 1790 the Governor General sent the Surveyor General, Alexander Kyd, in advance to Madras to collect information, especially regarding the approaches into Mysore. On his own arrival at Madras, he appointed Kyd as one of his ADC.'s, and during the rest of the war Kyd not only performed the duties of Surveyor General in the field, but also acted as personal adviser on engineering matters.

The chief surveying duty, apart from that carried out by the Guides, was entrusted to Robert Colebrooke who, leaving Madras at the end of January, carried a continuous survey, through Vellore¹⁰ where Lord Cornwallis took over command of the Grand Army, up into Mysore. He ran a series of triangles from Madras to Seringapatam¹¹, correcting it by numerous observations for latitude; but, though he took several observations for longitude, he did not take these into account, trusting more to the perambulator measurements of the route¹² [175].

His journals contain water-colour sketches and panoramas [187], and his map is very neatly drawn¹³. It is by no means a complete map of Mysore, for it only shows the country along the routes actually marched, crossing and re-crossing the south and east parts of Mysore, with the farther hill ranges sketched where visible.

¹DDn. 154 (86), 30-1-1817. ²MMC. 19-8-1817. ³Palghāt, 58 B/9. ⁴Mountain ranges. Erramala, 57 1/2; Nallamalai, 58 P/4 to 57 M/2. ⁵DDn. 195 (13). ⁶Surrendered 23-8-93. ⁷MMC. 28-12-94; MEO. Map 112. ⁸Kondapalli, 65 D/10. ⁹MMC. 19-8-1817. ¹⁰57 P/1. ¹¹57 D/11. ¹²Journals MEO. M. 120, 134, 142 etc. Map BM. Addl. MSS. 18109 (F). 4 miles to an inch, on one sheet, 28" by over 4 feet. ¹³Original plots, MEO. 138 (3) etc., 189 (1, 3).

After his return to Calcutta Colebrooke submitted his fair map, in part, the Result of my labours for two years; it represents, upon a scale of two miles to an inch, such parts of the Mysore country as were traversed...during the campaigns of 1791 and 1792, likewise a part of the country between Vellore and the Ghauts.

I thought it needless to join to this sheet the March of the Army through the Carnatic, as being only a single track, it would have added greatly to the length of the paper, without showing any considerable portion of the country; this part of my work has been projected upon separate sheets.

I shall be enabled likewise, from my journals and field Books, to lay down upon larger scales, plans of Bangalore, Seringapatam, and their environs, and to furnish routes or itineraries showing the distances as measured by the Perambulator...and containing written Descriptions of the Roads, passes, Grounds for encamping, and other particulars.

I have the honor to present with the Map a copy of the astronomical observations, and have ventured also to forward a few pages descriptive of the climate, topography, and History of the Mysore country¹.

In submitting a copy of Colebrooke's surveys for the Directors, Kyd also sent various other surveys and routes collected by him in the course of the war. Amongst these were his own survey made at the conclusion of the war from Seringapatam through Coorg to the sea, and then along the coast to Cochin²:—surveys by William Stewart, attached to the Nizām's army, of country round Bangalore and marches through Cuddapah [116];—surveys by Johnson of the Bombay establishment with the Bombay force from Cannanore to Seringapatam³:—surveys by Emmitt, also of Bombay, who accompanied the Marātha army [128–30].

By the treaty of Seringapatam signed on March 17th 1792, Tipu ceded to the Company the districts of Malabar, Dindigul, Salem and Bāramahāl [pl. 1 & 9].

DISTRICT SURVEYS

Administrative charge of the Salem and Bāramahāl districts was given to Alexander Read, who was specially commissioned to settle the revenues [144]. One of his first acts was to make a rapid survey which he did himself by planetable, covering the whole area in two months [193]. A copy is still preserved in the British Museum⁴;

Sketch of the Countries North & East of the Cauvery, ceded by Tippo Sultan in March 1792; inscribed to Marquis Cornwallis by Alexander Read. Scale about 3 inches to a mile.

Tabular Statement of Revenue, showing the totals for each Tahsildari—Table of Distances—Note on method of Survey—Tehsil Boundaries shown by dotted lines and areas distinguished by different colours.

The sketch, of which this is a copy, was done by the Superintendent...as particularly useful in the management of their civil affairs; ... it has taken only two months thanks to local knowledge, ... what by the usual mode of surveying would be a work for any one man of some years. ...

These considerations, the ease with which surveys of this kind are made, and the great use of which they are in Revenue affairs, may recommend the having similar ones made of all the Companies possessions in Coromandel; especially as with the help of the numerous situations ascertained by astronomical observations, and routes that have been surveyed with proper instruments, they might afterwards be laid down with sufficient exactness for everything in which assistance is derived from Geography.

Allan's "military survey" [111] was but a rough reconnaissance of the roads, so in 1794 Read engaged a civilian surveyor, John Mather, whose work he thus describes;

The first Geographical Survey of these districts was begun in January 1793, and in the August following Government and the Revenue Board of Fort St. George were presented with Maps of them. But as those were only Sketches, and inaccurate, from the slender means and haste with which they were executed, another was begun in August 1794 with

¹B Pol. C. 19-2-89. ²MEIO. 150/32-35. ³Wyld's map of 1843 shows Col. Hartley's route from Calicut through Coimbatore to Mysore. ⁴BM. Addl. MSS. 28102 (A).

proper instruments and upon a much larger scale. From its being impossible for the Superintendent of these districts to prosecute a business of that nature and pay due attention to the many other duties of his station, he could only propose to set it on foot, and employed Mr. Mather, a professional surveyor, to carry it on. This extensive undertaking is now finished.

The Superintendent proposes, if circumstances permit, to put the finishing hand to this work himself by performing another circuit of the districts, to examine all the principal points made use of in the survey, and determine their latitudes and longitudes by Astronomical observations. As exhibiting the aspect of the country in respect to Hills, Plains, Woods and Rivers, the true shape and extent of Districts, and as containing every village and tank, it will be one of the most particular surveys of the kind in India, and, relying on Mr. Mather's ability, the Superintendent supposes it will be one of the most correct¹.

This survey of Mather's was indeed the most thorough and complete survey of any district in India made since Barnard's survey of the Madras *jāgīr*; but it was of no value thirty years later, when Montgomerie reported,

The Records of the survey of the Baramahul and Salem Districts executed by Mr. Mather under the direction of Colonel Read, are in a tolerable state of preservation, although considerably wormeaten. The whole tract included in the survey is divided into 25 districts, or Talooks, each of which is laid down on a separate sheet, on a scale of one mile to an inch, accompanied by its statistical tables; there is attached to the memoirs a general map of the district, together with a map shewing the political divisions of the country² [194].

Mather says that his survey took 4 years and 3 months, and contained 6,300 and odd square miles, coming to 150 miles annually. His work was so well thought of that Mackenzie was very glad to obtain his services for the survey of Mysore which was commenced in 1800 [9, 119].

When authorizing an establishment of Assistant Surveyors for tank repairs [108], Government directed that they should, when fully trained, be sent out to the districts to make any surveys that might be useful to the district officer.

With this object Goldingham drew up detailed instructions, under which he divided the district survey into two parts, *General*, for topographical detail and *Particular*, for revenue information [145-6]. For the *General* part, he gave instructions for measuring a base—triangulating the whole district—and fixing the village sites [194-5]—and continued,

You will trace out the Principal Roads, and remark on all woods and inaccessible jungles; ascertain the course of all the Rivers and Watercourses; and, to assist the person who may be appointed to superintend the repairs &c. of Tanks, mark the places where Rivers may probably be branched off, so as to prove beneficial to the country by increasing its cultivation³ [146].

Three boys were sent out from the school to the Dindigul District⁴ in January 1797 at the urgent request of the Collector [146-7], and in December two others were sent to Devicottai to work for the Superintendent of Tank Repairs [108]. Others followed to other districts as they were declared fit for independent work, and in the course of a few years most of the districts had useful topographical maps prepared by these young surveyors.

Two of the boys sent to Dindigul succumbed to the climate within a couple of years [285], and were replaced by Turnbull and Allan from Devicottai, who seem to have been kept on surveys of a revenue nature, for in 1799 the Collector, Mr. Hurdis, tried to secure the services of De Havilland to make a complete geographical survey of his district, but, though he made a reconnaissance map covering the whole of Dindigul and Coimbatore, he could not be spared from his military duties for a more regular survey. Hurdis then tried to get the services of Mather, but he was wanted for the more urgent survey of Mysore, and, after trying in vain to get a young Engineer officer "to superintend the boys from the Surveying School", he had to be content with the map that these boys eventually completed by the end of 1801⁵.

In 1795 the Collector of Guntūr asked that some officer might be sent to make a complete survey of that *circār*, and pressed for the services first of Mackenzie

¹DDn. 12; Memoir (I). ²DDn. 202 (91) 22-3-1825. ³M Rev. Bd. 22-12-98. ⁴58 F. ⁵M Rev, Bd. 12-5-1800 & 14-4-1808.

and then of Orr¹, but neither of them could be spared, and though two boys were sent from the surveying school in 1798, they did not produce the complete survey which the Collector wanted [147].

NIZĀM'S DOMINIONS

In 1775 D'Anville acknowledged that he had received, too late of course for his *Carte de l'Inde* which left the whole of central India blank, *Une grande carte manuscrite, dressé sous les ordres de M. de Bussy, dans son commandement militaire au centre du Deccan*².

In 1751 Bussy [91] then a lieutenant-colonel, had been sent up in command of a French force to Hyderābād, where his influence had greatly forwarded French interests, though Rennell considered his geographical contributions of far greater importance than his political services;

M. Bussy's marches in the Deccan afford data for fixing the positions of many capital places there, particularly Hyderabad, Aurangabad, Bisnager, and Sanore³. But still there are plans of some of his marches wanting, which, could they be procured, would throw much light on the Geography of the Peninsula and the Deccan, such as that from Pondicherry to Cuddapah, Adoni & Hyderabad; that from Aurangabad to Nagpour, and the campaign towards Poonah⁴. ...

Had it not been for these marches of M. Bussy, the only remaining monument to the French nation of their former short-lived influence and power in the Deccan, the geography of these parts would have extremely imperfect; but, as they extend through more than four degrees of latitude, and more than five of longitude, they occupy...the principal part of the Deccan⁵. ...

Few Europeans, vagrant ones excepted, have visited these places since the time of M. Bussy, ...and it is a misfortune to geography that his marches between Arcot, Hyderabad, Adoni, Canoul, and Seringapatam, have not been recorded in the same intelligent manner as the rest of his marches have been. ... But, however I may repine as a Geographer, I ought perhaps, as a philosopher, to be satisfied that so much has been preserved⁶.

It is of course most unlikely that Bussy carried out any surveys in person, and it is reasonable to accept the evidence of Duperron that the map, and possibly most or all of the surveys, were the work of one of his officers, Jean-Baptiste St. Paul:

"Les Marches de M. de Bussy dans le *Deccan*"; vraisemblément ce sont celles que j'ai vues en 1758, entre les mains de M. de St. Paul...commandant le Détachement des Allemands, au pié de *Dollabad*⁷. Cet officier me dit alors que c'étoit lui-même qui les dressoit d'après les marches de l'armée. ...

Des gens de mérite citent en Angleterre *les Marches de M. de Bussy*, que je crois être les Cartes de M. de St. Paul⁸.

In 1778 Orme visited Paris and called on Bussy who gave him a copy of his map of the Deccan, which Orme published in 1782⁹; it covers the area 17° to 21° N. by 75° to 79° E.

Gardiner's survey to Warangal in 1767 [92], appears to have been the only survey of any part of the Nizām's territories by an officer of the Company, till Reynolds passed through in 1788 [128].

In 1790 Lord Cornwallis made treaties with the Peshwa and the Nizām to secure their assistance against Mysore during the campaigns of 1791-2. From the treaty of July 7th 1789, the Nizām had paid a monthly subsidy for two battalions of sepoys and 6 field-pieces, manned by Europeans, a force known as the Ellore, or Madras, Detachment¹⁰. This detachment marched with the Nizām's army in 1790, and joined the Grand Army under Lord Cornwallis in November 1791. Its marches from Koppal¹¹ along the north bank of the Tungabhadra to

¹M Rev Bd. 5-1-98. ²*Antiquité Géographique*, Preface. MS. map of these marches drawn by D'Anville in 1770 is indexed in BM. Addl. MSS. 15739, but was never received in BM. ³Savanūr. 48 N/5. ⁴*Memoir*, 1783 (viii). ⁵ib. 1793 (249). ⁶ib. (384). ⁷Daulatābād, 47 M/1; rocky fortress standing 600 ft. above the plain. ⁸Bernoulli, II (466-7) ⁹Robert Orme, I (2). ¹⁰HMS. 563 (128). ¹¹57 A'3.

Kurnool and south to Cuddapah¹ were surveyed by MacAlister, who also surveyed the return route to Hyderābād in the following year². Other routes to Hyderābād were surveyed in 1792 by Nuthall and Blunt. After spending the rains at Hyderābād Blunt continued his survey in company with Anburey northwards through Berār to the Jumna [43]. A line through Aurangābād and Bidar was surveyed by William Stewart in 1790 on transfer from Sindha's camp at Agra to join the Nizām's camp at Pāngal³; Stewart then accompanied the Nizām's army to Mysore as assistant to the Resident, who instructed him to survey the country, "and in so doing to act with caution so as not to excite jealousy"⁴ [127].

Reynolds also surveyed a line northwards from Mysore, through Hyderābād to Agra, during 1792-3 [132], and Rennell made use of his sketch for the "country between Adoni and Palnaud" south of the Kistna, and for "all places within the new boundaries of the Mahrattas, and of the Nizam, in the Dooab" between the Tungabhadra and Kistna⁵. Plates 1 and 9 show generally the extent of the Nizām's dominions south of the Kistna before the cession of this area to the Company in 1800 [119 n.3].

At the close of the war, Mackenzie was appointed to the Subsidiary Force, with directions to make a survey of the districts just ceded by Tipu to the Nizām⁶, and then to collect as much material as he could towards the geography of the Deccan, in such time as he could spare from his duties as Engineer:

Having been ordered in April to join the Detachment with the Nizam from the Grand Army as Surveyor and Engineer, and to survey the Routes and to make remarks on the Roads, Forts, Passes, ... I joined the detachment near Bangalore, surveyed with it from thence to Gundecotta⁷, & Kurpa⁸, from whence I afterwards extended the survey...through the Kurpa, Canoul⁹ & Cumbum¹⁰ Circar, examined the passes from these countries into the Carnatic, and, having laid down upwards of 700 miles, hitherto very imperfectly known to Geographers, have been only prevented from carrying it across the Kistna to Hyderabad by an illness contracted...in the Hills¹¹ [112].

He did not reach Hyderābād till 1794, and during his absence Alexander Orr, Quartermaster with the detachment, had opportunities of making surveys in several directions. Early in 1794 "a rebellion broke out in the districts of Eljundel and Warrangole¹²", and Orr accompanied the detachment which marched up to "Rungapore" and remained there during the rains¹³.

At the end of that year the Peshwa declared war against the Nizām who, owing to treaties between the Company and the Marāthas, was not permitted to employ the subsidiary force against them, and dismissed it in disgust; Mackenzie, however, accompanied the Resident with the Nizām's army and surveyed the route to Kharda, where the Nizām was defeated on March 11th 1795. As Emmitt, the Bombay surveyor with the Marātha army, was able to pay a visit to the Nizām's camp, a junction was effected between his survey and Mackenzie's, thereby giving a continuous route between Hyderābād and Poona¹⁴ [130]. On his return Mackenzie obtained special permission to stay in Hyderābād to work up his maps, instead of accompanying the "Madras detachment" on its march down country¹⁵. As it happened, however, the detachment was recalled in July to help the Nizām against another rebellion, and these marches and counter-marches gave Orr further opportunities to add to his surveys, which were extended in 1796 by an expedition which resulted in the capture of "Rachoor¹⁶" on April 8th, and return by "Gujinderggur", "Mudgull¹⁷" and Pagtoor to Hyderābād¹⁸. Mackenzie describes his first map thus;

All the surveys I had executed myself, with several other measured routes which have been obligingly communicated to me, have been laid down on one general plan connected by such observations as have been made, and connected with well ascertained points extending

¹ Kurnool, 57 I/1; Cuddapah, 57 J/15. ² MRIO. 150 (47) & Maok. MSS. LXIX, 9-9-91. ³ MBIO. 150/48; Pāngal, 56 L/3. ⁴ HMS. 614 (206), 12-2-91. ⁵ *Peninsula*, (4, 9, 13). ⁶ The greater part of Cuddapah & Kurnool: Aitchison, IX (214-5). ⁷ Gandikota, 57 J/5. ⁸ Old name for Cuddapah. ⁹ Old name for Kurnool. ¹⁰ Cumbum, 57 M/2. ¹¹ Mack. MSS. LXIX, 13-2-93. ¹² Elgandal; 56 N/3, Warrangal, 56 O/8. ¹³ HMS. 563 (85) & 614 (122). ¹⁴ HMS. 446 (19), 560 (108-204), 618 (427, 467). ¹⁵ MHC. 14-5-96. ¹⁶ Raichur, 56 H/8. ¹⁷ Machtal, 56 H/7. ¹⁸ Mack MSS. LX (71 etc.); for other marches surveyed by Orr, see fdbks. in MRIO. M. 163 and maps MRIO. 64 (26-30).

north from the parallel of Bangalore to Burhampore¹ about nine degrees of latitude, and extending west from the Sea Coast to Moore Ghaut, whose distance to Poona appears well ascertained. ... On this ground work I have laid down all the Cross-roads and information that could be depended on. ...

All the Chief points being thus laid down as accurately as could be expected...I have now to mark out the parts belonging to each Circar, which I shall be enabled to do with some precision, from the accounts of the Soubahs and Circars which you have been pleased to communicate to me².

In October 1795 Mackenzie was called down to command the engineers on the expedition to Colombo, not returning to Hyderābād till January 1797. He then made a survey westwards to Gulburga³, the ancient capital of the Deccan, but later in the year he was again called away for the abortive expedition to Manila, and whilst at Madras took the opportunity to submit a supplementary map shewing all the material he had been able to add to his earlier map of the Deccan [245]⁴. By this time the "Madras detachment" had been withdrawn, and in 1798 he marched up to Hyderābād once more, this time as Engineer with the "Bengal detachment" to which was entrusted the task of disbanding the French corps⁵ [175].

During his stay at Madras Mackenzie had obtained the services of a lad from the surveying school and a suitable staff of subordinates, and also an assistant engineer, Benjamin Sydenham, who took part in the surveys and astronomical observations both on the march up from the Masulipatam and after arrival in Hyderābād⁶ [175]. Mackenzie writes of his own surveys,

In the Nizam's country all that I have effected, exclusive of the measured routes of the Detachment, has been by availing myself of favourable circumstances as they occurred in the intervals of several years, sometimes yielding, then embracing the lucky moment, and frequently I have been obliged to suspend my operations altogether, as was the case last year when our troops were encamped close to Hyderabad, and performing the most important services to Government⁷.

The following extracts are taken from the memoir which he submitted with his map of 1796:

Memoir of the materials and construction of a Map of the Dominions of Nizam Ali Khan, Sobadar of the Decan, compiled and written in 1795 by Colin Mackenzie, Field Engineer & Surveyor to the Subsidiary Force with the Nizam.

The interior Provinces of that part of the Peninsula of India, distinguished by the general name of The Decan, are so imperfectly known to us, that it was imagined any attempt to give a most accurate definition of its extent, limits, internal divisions and natural productions would be acceptable; ...

Independent of these general motives, others more immediately interesting to our Military establishments suggest the propriety of acquiring an intimate knowledge of the roads, fortresses, rivers, passes and strong posts. ...

On the appointment of a Surveyor to the Nizam's Detachment in 1792, it had been recommended that every opportunity of improving our knowledge of the geography of the interior countries should be attended to, and surveys of particular parts of the frontier of the Company's possessions bordering on those of the Nizam were ordered and executed. The result of these and of the marches of the Detachment across the country, opened a wider field for extending them still further. ...

The progress made in this attempt (already interrupted by unavoidable circumstances) was threatened to be finally stopped by the Detachment's being sent back to the Carnatic in 1795; there appeared a danger that the whole would be rendered useless for want of being arranged and brought together, while the authorities on which it had been formed were known or within reach of enquiry.

The want of this precaution had rendered of little use "The Plans of Marches in the Dekan" by Mr. Bussy, and of our Armies in 1767 and 1768, which are become obscure and difficult to reconcile for want of the authorities on which they were constructed.

To prevent this by taking the opportunity of arranging the materials where many advantages of local information could be procured, the permission of the Government of Madras was...obtained for the compiler...to remain at Hyderabad for a limited time, during

¹Bangalore, 13° N.; Burhānpur, 21½° N. ²MMC, 17-8-95. ³56 C/15; Map, MRIO, 64 (33); Fdbk. BM. Addl. MSS. 13552 (19). ⁴MRIO, 68/8; See also BM. Addl. MSS. 13552. ⁵Remarks made on the survey in the Nizam's Dominions in 1797"; C.M. 5-9-98. ⁶Effected 22-10-98. ⁷Fdbks. MRIO. M 88 & M. 166. ⁸DDn. 41; to Resdt. Mysore, 6-12-99.

which the liberal assistance that was received from several quarters...contributed to enlarge the find of authentick documents. ... Though the actual surveys (containing 5710 English miles) may be relied on, and much of the countries adjacent to them are laid down from collateral information that must be tolerably correct, yet many parts are still obscure, particularly the Soubah of Berar which has scarcely any one assured line across it. ... 97,850 square geographical miles were included within the Nizam's boundary; ... the attempt to survey it is subject to many impediments unknwn elsewhere, ... the prejudices of the religion, political jealousy, and manners differing far from European, present difficulties scarcely to be surmounted¹.

In another place² Mackenzie describes his work thus,

In 1792, after the Peace of Seringapatam, I was sent, a Subaltern from the army in Mysore, by the desire of the late revered Lord Cornwallis, with the small detachment at first employed in the Nizam's dominions, for the purpose of acquiring some information of the Geography of these countries, and of the relative boundaries of the several States. ...

From 1792 to 1799 it were tedious to relate the difficulties, the accidents, and the discouragement, that impeded the progress of this design. The slender means allotted from the necessity of a rigid...economy; the doubts and the hindrance ever attendant on new attempts; difficulties arising from the nature of the climate of the country, of the Government; from conflicting interests, and passions and prejudices, difficult to contend with and unpleasant to recollect. ...

In returning to Hyderabad in 1798, for the third time, to resume the investigation of Deckan Geography, measures were proposed, and in part methodized, for analyzing the whole Deckan; and before 1799, considerable help was attained by obtaining a copy of the regular official Dufter of the Deckan...as well as certain MSS. of authority. ... The Deckan was in fact then a Terra-Incognita, of which no authentic evidence existed, excepting in some uncertain notices and mutilated Sketches of the marches of Bussy; and in the Travels of Tavernier and Thevenot³.

FOURTH MYSORE WAR, 1799

This last and conclusive war against Tipu gave little scope for survey operations; for the purposes of the rapid advance on Seringapatam, the surveys already collected were sufficient. Not-but-what Beatson, the most experienced surveyor of the Madras establishment, was selected to join the Governor General's staff, and appointed Surveyor General to the Grand Army, where he soon established himself as one of the most strong-minded and purposeful of the Commander-in-Chief's counsellors. His history of the campaign became a standard authority⁴. Allan was D.Q.M.G., and took a leading part in reconnaissance, and has left a most interesting account of the campaign⁵. Orr commanded the Guides.

From the survey point of view the most interesting feature of the campaign was the march of the Nizam's army from Hyderābād to join the Grand Army at Āmbūr⁶. A complete survey of the route was kept by Mackenzie and Sydenham, starting from Hyderābād on December 16th, and reaching Āmbūr on February 21st 1799⁷. The Nizam's force was then placed under the command of Lt. Colonel the Hon'ble Arthur Wellesley⁸, who brought his own regiment, the 33rd Foot, to stiffen it. Mackenzie remained as his Engineer, and constructed the northern batteries which effected breaches through which Seringapatam was successfully stormed on May 4th.

Johnson and Moncrieff brought up surveyed lines from various points of the west coast to Seringapatam with columns of the Bombay army.

After the capture of Seringapatam, Fraser, of the Engineers, made a survey of the island and its fortifications, whilst Thomas Sydenham, of the Guides, was deputed to survey the new south and east boundaries of Mysore, "but a violent illness obliged him to abandon this work" [194]. De Havilland, who was Engineer

¹ Mack MSS. LX (68 et seq.). ² Letter to Alexander Johnston, 1-2-1817; H. H. Wilson (Introduction). ³ *Relations de divers Voyages Curieux*. Melchizedek Thevenot. Paris. 1664; frequently quoted by D'Anville & Rennell. ⁴ Beatson. ⁵ Sinha. ⁶ 57 L/9. ⁷ MEIO. M. 83 & 166. ⁸ Afterwards the 1st Duke of Wellington.

with the column which took over the province of Coimbatore, "laid down a considerable part...as a voluntary act" though "not employed or paid as a surveyor¹" [114].

Mackenzie was deputed to attend the Commission which sat at Seringapatam to settle the affairs of the newly constituted government², and prepared maps to assist in the determination of the boundaries³. He writes that,

Few satisfactory materials could be there procured, and those of inferior merit, and disagreeing in their nature, and it appeared absolutely necessary to commence such a work from an entire new foundation, for...though the Central parts of the country had been repeatedly traversed by our armies in the Mysorean Wars, yet the limits and extent of the several Districts were not defined, nor were even any plans of the surveys...to be procured at this time, unless we except the results published so far back as 1792 by Major Rennell [111], and some manuscripts of detached parts in private hands⁴.

This state of affairs, whereby the work of earlier surveyors was so often lost or hidden away and thus of no avail when sadly needed in later years, was of course the direct result of the refusal of the Directors to establish a special survey department and surveyor general at Fort St. George, in spite of the frequent requests of the Governor and his Council.

The story of the survey of Mysore by Mackenzie will be told in a later volume. The charge could not have fallen in better hands; by his thorough professional methods and his wise organisation of the work, he set a sure foundation and high standard for the future topographical surveys of India.

¹ Mackenzie's *View of the measures to be taken to Survey the Mysore Country*. BM. Addl. MSS. 13659 (240), 1-5-1800. ² Beatson (221). ³ *v.* map facing Beatson (254); Mysore was now reduced to the limits which exist to this day. Coimbatore, Wynad, and Canara went to the Company, Bellary & Anantapur to the Nizam; in 1800 an agreement was settled by which the Nizam ceded the two latter districts, with Kurnool & Cuddapah to the Company in return for military support, and these became known as "The Ceded Districts" of Madras [pl. 1]. ⁴ DDn. 88 (21).