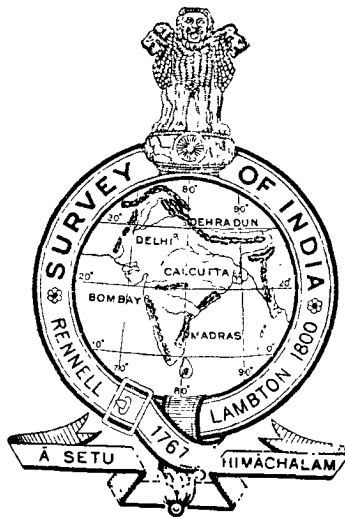


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Collected and compiled by
Colonel R. H. PHILLIMORE, C.I.E., D.S.O.,
(late Royal Engineers and Survey of India)



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CHAPTER VIII

SOUTH PENINSULA & NIZĀM'S DOMINIONS

Travancore & Cochin, 1816-21 — Dindigul, 1821 — Niljiri Hills, 1821-3 — Malabar, 1823-30 — Nizām's Dominions: Garling, 1816-20 — Hyderābād Survey; 1820-3 — Crisp, 1823-7 — Webb & Morland, 1827-30 — Professional Reviews 1824-30.

WE now come to the surveys of two of the most competent of these Madras surveyors, James Garling and Benjamin Ward. Troyer had selected Garling from the first class of the Military Institution to be his assistant instructor, and at the end of 1810 sent him in charge of a party of officers to survey Goa [II, 127]. When the survey passed to the control of the Surveyor General, the young officers were replaced by sub-assistants [II, 156], and on its close Garling was selected for the Nizām's dominions.

Ward was of British stock and the most successful of the country-born pupils of the observatory surveying school. He came under Mackenzie's personal care and training on the Mysore survey, and then spent more than a year in the Ceded Districts [II, 153-4]. After getting a commission and doing a few months military duty, he held charge of the drawing office at Madras during Mackenzie's absence in Java, and after his return was selected for the survey of Travancore. Arthur's survey which had carried on intermittently between 1807 and 1811 [II, 130-2] had been deliberate, but patchy and incomplete, and the Resident had for some time pressed for its completion, which Mackenzie now provided for ;

As the survey of Travancore has been long in contemplation, this measure is more than necessary now ; it was...suspended in 1810...with a view of resuming it at a favourable period. At present I conceive every motive of utility and economy favours the resumption. To avoid the former errors or avert interruption from climate or casualties, I would recommend that this party be made up to six assistants, which can be well spared from Dindigul¹ [4].

As the survey of Dindigul had not been prospering, it was broken off in 1816, and the surveyors joined Ward for work in Travancore [110], Mackenzie reporting the arrival of Lieutenant Ward at Dindigul on 14th July. After making the necessary arrangements...there, he arrived on the 16th August with three assistant surveyors in the territory of Travancore.

Mr. Ward had a personal communication with the Resident of Travancore in his way thro' Tinnevely, and was enabled to commence his operations on the 20th of that month, and by his last report of the 1st instant [September], was employed on the detailed survey...in the neighbourhood of Cape Comorin. One of the assistants was disabled from duty by a return of fever which, with the high westerly winds usually prevailing at that season, will retard the operations till the fair season commences.

The following are extracts from Mackenzie's instructions² ;

As no information exists in this office of the internal divisions of the Travancore territory, altho' I presume it is subdivided in a similar manner to other countries under a Hindoo administration, and as the nature of the country and of its climate...bear a considerable resemblance to that of Malabar and Canara, ... apply early to the Resident for an authentic list of the provincial divisions of the country, and for orders to the provincial officers to supply you with lists of the villages, etc., in like manner as was furnished in Mysore and in the Ceded Districts. You should also consult the Resident as to the most expedient to be first taken up...of the Divisions. ...

¹ from SG., 14-12-15 ; MPC. 12-1-16. ² from SG., 18-4-16 ; ib. 10-5-16.

After obtaining every necessary local information, commence your operations, and distribute the parties of surveyors in such manner as...promise to be most advantageous. ... I...recommend you to have the exterior boundary...with the Company's territories well surveyed. ... I understand there are tracts there isolated...which will require particular attention. ...

The roads will, as usual, be a special object of attention. ... The great road from the entry of the southern barrier wall of Travancore, till it reaches Cochin, should be completed in a series of road sheets in the usual form; the other roads may be added in like manner.

The back-waters, as they are called in Travancore (the inland navigation), form a peculiar feature. ... Ascertain their communications throughout...and the depth of the water by sounding at different times of the year, when the waters are high and low, as surveys of waters cannot be of much use without a knowledge of the soundings and depths.

The maps of districts are to be laid down on the scale already adopted for the other surveys, of one mile to an inch. ...

I enclose a list of stationery and instruments now made up for completing the equipment for your party. ... As the instruments are not always procurable here, and are at all times attended with a considerable expense to Government. ... warn the assistant surveyors to be attentive to their preservation.

Having every confidence in your zeal and knowledge. ... already evinced in those works you have so satisfactorily conducted, any further explanations of the general plan of this work are scarcely necessary¹.

The six assistants—Turnbull, Pereira, Keyes, MacMahon, Aikin, and Bird—had from 5 to 18 years experience on district surveys. Ward based his triangulation on Lambton's triangles, writing from Anjengo on 1st April 1817;

I have during the past month extended a series of triangles from Trivandrum² to this place and in the interior, taking up the points originally fixed by Lieutenant Stewart [II, 132, 443]. It is my intention during the present month to extend a series over the tract of the northern part of this district, and of that of Kolarcurray, to the great range of mountains, to enable the surveyors...to lay in the features of the country³.

The following extracts from his journal⁴ give a picture of his daily work;

Thursday, 13th June 1816. Left Madras at 11 p.m., and proceeded by Triploor⁵ to Manvillypoor; ... arrived...at 8 p.m. and proceeded to Colonel Mackenzie's tents, pitched on the beach near an ancient pagoda. ...

Arrived at Pondicherry at 10 a.m. on the 15th inst. ... Left Pondicherry 28th. ...

July 3rd. to 9th. Trichinopoly. ... 11th to 17th. Dindigul. ... 18th to 26th, Madura. ... 31st. Courtallum⁶. Reported my arrival to Colonel Munro [II, 106 n.4; III, 111 n.4], the Resident in Travancore. ...

August 5th to 14th. Palamcotta⁷. ...

18th. Prepared the instruments for service; directed Bird and MacMahon to make survey of the country east and south of the line. ... 23rd. Directed Bird and MacMahon to survey the roads from Poonagoody and Comorin to Nagacoil⁸. ...

28th. Ascended and took a station on Murtawa hill. ...

31st. Took a station on Myladdy hill. ...

September 15th. Made a circuit on the eastern limit common to Ternevelly [Tinnevelly District], and proceeded to Arumbullay [II, 242-3]. ...

Oct. 3rd. Oodagerry. Reported my arrival to the Officer Commanding and moved to the neighbourhood of Paupanaveram, to avail myself of the convenience of a bungalow to bring up all arrears of the survey; the assistants, Aiken, Bird, and MacMahon, having arrived at this station some days previous. ...

From the 5th to 22nd of October, employed within doors with the assistants, protracting the field work and drawing; procuring registers of villages, and entering the situations of such as have already been ascertained.

The assistants Aiken and MacMahon employed in making a minute survey of the forts and environs, the latter generally employed on this duty, the former on the survey of the roads from this place to Trivataur. ... Bird inserting the situation of villages in the registers, and protracting and colouring the routes surveyed to this place.

On the 7th inst. took a station at the flagstaff on Oodagerry Hill; on the 10th on the redoubts to the north of Paupanaveram, to fix them as stations for the bases of the survey of the environs.

¹ from SG., 13-4-16; MPC. 10-5-16. ² Capital of Travancore, 58 D/15. ³ M Rev Bd., 26-6-17.

⁴ *Memoir of the Survey of Travancore and Cochin*. Madras Govt. Press, 1891. ⁵ Tirupporur, 66 D/2. ⁶ Kuttalam, famous waterfall [II, 144]; 58 H/5. ⁷ Palamcottah, 3 m. E. of Tinnevelly. ⁸ Nagercoil, in Travancore, 58 H/8.

25th Oct. Having directed the three assistants to survey what remained of the southern district of Cocolum¹, proceeded...to commence a series of triangles for the surveys of the Coolatoray and Neattengerry² districts. ...

3rd November. ... Assistants Turnbull and Perara reported their arrival from Dindigul.

4th. Commenced the calculation of the triangles to the westward, and drew up letters and reports for transmission to the Surveyor General's office. ... 5th. Continued the calculation of the triangles. Assistant Keyes reported his arrival this day. ... 11th. Despatched the three assistants just arrived to survey the districts...to the westward. ...

Dec. 1st. The assistants Aiken and MacMahon returned from survey; the former and William Bird being indisposed with a fever were directed to proceed and place themselves under the...surgeon at Trivandrum. ...

5th. Proceeded to Tambercolum to execute an agricultural survey of its lands, being in conformity to instructions received from the Surveyor General. ...

6th, 7th, 8th. Investigating into the nature of the tenures and statistical accounts connected with the village and its lands. MacMahon employed on the survey since the 4th inst³.

Survey was by no means straightforward or easy;

I have now seen a specimen of the Travancore country, and do assure you, My Good Sir, the difficulties we will have to encounter will be much greater than anything experienced in Canara, in consequence of the woody and mountainous tracts, which extend for many hundred square miles, and without a single habitation save those of a few hill people. ...

Plains in this country are only the bottom of deep ravines, which are cultivated and shut in with immense woods & hills. To see even a village or field it is necessary to be on the spot, & tho' the mountains are lofty & at hand, the greatest difficulty must be gone over before [one] can get a sight of the stations. The only method...is to survey from village to village with the wheel & compass, & the tract laid down in this manner will in some respects be erroneous, which...may be corrected when an observation can be obtained. ...

It is my intention in a few days to run over the country between this place, Trivandrum, and the sea, to settle as many secondary stations as may be possible, on which tract, when Turnbull joins, I propose dividing the young men...to allot each a separate district, & when they are employed will at my leisure take an active part towards the mountains. ...

Bird & MacMahon are now well acquainted with the manner of keeping the field book, & they will be able to show the others how it is to be done. ...

We have gone over the whole tract...surveyed by Captn. Blair [II, 131, 382]. ... It seems in every respect to be a very accurate production; the situations of the villages are laid down minutely, tho' their names I found much corrupted, & I do suppose that the whole has been laid down from trigonometrical observations, or otherwise error would appear in some parts. Attention has not been paid in laying down the extent of the hills to their base, which is the only difference I have observed.

Again, on 4th November;

Constant heavy rains...with short interval of fair weather. ... I have carried on...triangles as well as the uneven & wooded nature of the country would admit, which will be of great assistance to the young men, but...a great part can only be surveyed with the wheel & compass. Another obstacle to the westward is the immense cocoanut topes, which keep rising from the bottom of glens almost to the summit of the heights, the tops of which are again crowned with lofty wood. ...

I also met with two Tesildars, who are of the Nair caste, & very civil & polite. They have, they said, in consequence of instructions sent to them beforehand, prepared registers of villages. ... Some villages have one name in the circar list, [and] are called by another by the natives, which often occasions great confusion⁴.

In May 1817 Ward was deputed to survey the boundaries of Travancore with Tinnevely and Dindigul under the direction of commissioners who had been appointed to settle them⁵. This was the sort of interruption to the steady progress of survey that made Mackenzie so angry, but against which he could make no official protest. "This survey of the limits of Travancore is a subject that I had no notice of & I know not who the commissioners are at this moment⁶".

Ward suffered the trials common to all boundary commissions;

May 23rd. Received a letter by post this morning from the Surveyor General, directing me

¹Kalculum, 58 H/7. ²Nayyattinkara, 58 H/3. ³MRIO. M. 106; 137 (7); scale 4 inches to a mile. ⁴to SG., DDn. 156 (176, 181-3). ⁵The Cochin-Malabar boundary had been surveyed by Arthur 1815-6. MRIO. M. 107. ⁶DDn. 156 (125), 27-5-17.

to proceed and comply with the requisitions of the Commissioners about to be appointed for the purpose of deciding the disputed lands between Travancore, Dindigul, and Tennevelly. ...

The commissioners are Captain Blacker for Travancore & a Mr. Drury, assistant to Mr. Petrie, [I, 175 n.5 II, 265], on the part of Government.

Coortallum, 18th June. I arrived at this place on the 13th instant, having left Quilon on the 10th; five days have now elapsed & no commissioner has appeared. ... Mr. D. has arrived at Dindigul. ... Capt. Blacker is posting, and will be here in a day or two. ... We then proceed to Cummum in the Dindigul valley to decide the disputes in the Cardamum¹ Mountains &...return to Shencota in this neighbourhood. ... I have several documents...connected with the disputes. How this point will ultimately be decided I do not know, but the fatigue & labor attending it will be very great².

June 30th. Being given to understand by the Resident that the Commissioners will meet at Cumbum³ in the Dindigul valley, ... began to make preparations for proceeding.

July 5th. Induced to halt for a supply of cash from Palamcottah; the exchange of the Travancore fanams⁴ at 20% discount was a serious loss to the party. ...

12th. This morning the Commissioners arrived, accompanied by the Collector of Madura. ...

He writes to Mackenzie, 12th July;

I am impatient, and very anxious to commence on this duty. ... The weather is just now cool and pleasant, with rain at intervals, notwithstanding we have a few sick already.

The whole of the tract in dispute, which lies between the hills & the Perryaur river, ... is extremely wild and very intricate, and much infested by tygers & elephants, and...at times the whole day the fogs are so thick that they [the men] are obliged to grope their way thro' it at the hazard of their lives, & the rain continually pouring down in torrents will, I fear, impede our progress considerably⁵.

13th to 17th. The Commissioners, after some days discussions, came to a resolution to forward all the documents produced by both parties to Government for their decision, and ...expressed their wish to me that the tract in dispute...to be surveyed; I therefore held myself in readiness to execute this duty⁶.

He commenced survey of the disputed cardamom lands about 26th July, and have been labouring ever since, making every exertion to get over it, but to little effect, having to contend with not only the difficult nature of the country which is a composition of hills and narrow vallies & almost uninhabited, but the weather mostly [has] been a barrier to my proceedings.

It continually rains & causes such a damp in everything, that tho' it would be a satisfaction ...to enter upon the protraction of the work, yet...it is impossible. I then take up a book, lie in bed to pass the time. That too I find uncomfortable. We have fires made, and so long as they last it is all well, but when they go out we feel worse than ever.

I went up to one of the highest hills looking towards Dindigul valley one fine day, to take a station, & as soon as I reached the summit such a fog with rain commenced, the like I never witnessed before. On this lofty eminence did we remain for six long days & nights in a small hut made of leaves, in hopes of a fair day. ...

I am just now almost in the same predicament, tho' in more comfortable quarters, sheltered in a deep hollow where the wind is not so piercing, waiting for the fog to disperse. ... These continual disappointments, My Dear Sir, is very vexing, ... separated from my baggage &c., and obliged to go over every inch of ground on foot and, to crown the whole, ... I sent away about a month ago...articles of some value, my best clothes, &c. The party was attacked by a male elephant who spared nothing, destroying the whole, amounting to a considerable sum. How am I to be indemnified? ...

I have hopes by the end of November to bring it to a final close, when I proceed to Quilon⁷.

He had more trouble from elephants;

Aug. 16th. This evening as a party of coolies about 50 in number were coming up from Cumbum...they were attacked about a mile from this by a male elephant, which rushed upon them and struck a lad of about 18 with his proboscis, and instantly killed him on the spot; the remaining party endeavouring to get away, some fell and bruised themselves very much.

He escaped from the boundary survey in December; "I was enabled to quit that vile tract...about the 5th instant, notwithstanding the weather, which became favourable only late in November, ... I arrived here on the 16th instant". He was glad to get back to his surveyors, about whom he had been anxious;

¹ *Elettaria Cardamomum*, requires dense shade, plenty of water, and rich soil. ² to SG., DDn. 156 (214). ³ Kambam, 58 G'6. ⁴ 42 fanam = 1 pagoda [I, 278 n.7]. ⁵ to SG.; DDn. 156 (216). ⁶ Ward's Memoir. ⁷ to SG., 28-10-17; DDn. 156 (218); boundary survey, MRIO. Misc. 9-0-13.

12th July. Keys is again indisposed, and it is not unlikely he will keep away from the survey till I return. There are now two assistants on duty with Turnbull, & they...do little, on the plea that it continually rains. ...

28th October. I am concerned...that Turnbull & the other assistants do not at all give satisfaction. They have ever since the month of May been on the survey of the Kotarkerry district, and which is...still unfinished...from a want of zeal on their part. Was I on the spot, I am confident that survey would have terminated...early in August¹.

He now inspected their work "which, tho' it embraced but a small portion of country, appeared to be well executed". At Quilon he was glad to welcome Conner, who had brought his small party² down from Coorg to assist [97].

Mr. Conner arrived here a few days after me, having left Mysore a month ago. I was surprised to see him here so soon. ... We have...arranged it, previous to commencing survey again, to see the Resident. ... He is now on his tour in Cochin, & is expected to be back soon³.

Jan. 5th 1818. Left Quilon at 4 p.m. : proceeded in company with Lieut. Conner, and arrived at Aleppy at 9 a.m. on the 6th inst. ... Waited on Colonel Munro⁴ and, after a conference, returned to Cochin. ... 8th. This morning again waited on the Resident, and after a long conference, principally on subjects connected with the survey and assistance required [408], we took our leave and returned to Cochin.

Riddell reports that after seeing the Resident Ward seemed sanguine as to expectations of future assistance. One advantage has, he says, already arisen from the interview "in having an additional number of peons allotted to them, whose services will be essentially necessary in procuring aid to the assistants".

Lieutenant Ward has, during this quarter, completed the survey of the disputed tract between Travancore and Dindigull; and the assistants, having finished the Quilon District, have resumed the examination of the woody tracts of Kotarkerry District, discontinued from the difficulty of procuring assistance, and are making considerable progress in the districts of Humaboor and Umbalapilly⁵.

In short, ... the progress of the Travancore survey is as rapid as can be expected. All the country south of a line drawn east and west 12 miles north of Quilon has been finished. This comprises about a fourth of the kingdom, and, calculating on the progressive acceleration that will arise from the increased number of surveyors, we may look forward at no very remote period to the completion of that distant and unhealthy region⁶.

In addition to the straightforward one-inch survey of the country, large scale surveys were made of the town and environs of Quilon⁷, and of various cardamom gardens. Field work was closed for the monsoon, and resumed on 1st September :

June 1st 1818. This being the commencement of the heavy rains on this coast, I directed the whole party into Quilon, to bring up the indoors work of the survey since its commencement in August 1816, having had no leisure since that period to bring up arrears, of which now much was to be done. A convenient bungalow as an office was built at my own expense, and the assistants...were directed to attend, stated hours being fixed for doing the indoors work.

Lieut. Conner and his party came in about the 18th inst. ...

July 20th. This evening died the assistant Perera, who came into Quilon with a fever contracted in the hilly tracts to the eastward. ... He has left a young widow whom he married in December last year. ... 21st. Early this morning attended the interment of the remains of the assistant Perera at the burial ground at Neendacurra; left Quilon at 7 a.m.

26th. Lieut. Conner who accompanied me from Quilon went on this day to Shencottah⁸ for the purpose of commencing on the survey of that district. ...

31st. Arrived at the cantonment of Quilon.

The whole of the month of August within doors, examining and revising papers connected with the survey to the southward, and on the calculations of the triangles. During the greater part of the month weather stormy and rainy, and the assistants often in consequence prevented from attending office; also the papers being so very damp that they could not be meddled with without sustaining some injury.

As work went on, most of the scattered areas surveyed before 1811 were connected up and by the end of 1820 the survey was closed down. Conner was transferred to Hyderābād, and took with him all the plans and documents which he finished off at Madras, and handed in during February 1821;

¹ to SG., DDn. 156 (216, 218). ² Sub-assistants Long and Ficker. ³ to SG., DDn. 156 (222), 12-12-17. ⁴ John Munro (1775-1858) Mad. Inf.; QMG. 1808 (II, 471); Resident, Travancore 1817-8 [106], m., Madras, 1808, Charlotte, sister to Valentine Blacker. ⁵ Ambalapulai, 58 C/7. ⁶ Report of 6-3-18; MMC. March 1818. ⁷ MRIO. 189 (16); part of Quilon Dist., ib. 135 (22). ⁸ 58 H/1.

A General Map of both principalities [Travancore and Cochin]...six sheets. The northern section, including much of Cochin and four districts of the collectorate of South Malabar, has alone...been left incomplete; the insertion of the names, together with some trifling details, is all that remains necessary to perfect it.

The memoirs, registers, and routes, of each particular district will be found to accord in every particular with the instructions. ... Geographical and statistical information...will be found in the document entitled Memoir of the Travancore Survey, in which also are given some general and hasty notices as to the production, resources, population, etc., of the country. ...

Having long anticipated with anxiety the completion, ... it is difficult to repress...the solicitude we shall feel to learn the sentiments of the Surveyor General as to the manner in which the duties...have been accomplished. ... I have spoken in the plural, but in doing so will not derogate in the slightest measure from the high consideration due to Lieut. Ward. The principality of Cochin; the districts of South Malabar; part of Travancore; and the memoir of those tracts were undertaken and completed by Lieutenant Ward and myself as a joint labour¹.

In apologising for the time taken over this survey, Ward suggests that in taking into consideration the variety of impediments presented by the mountainous and woody tracts of the east, and the dense palm groves and detailed character of the country to the west, together with the heavy rains and the climate. ... it will not appear so disproportionate².

Montgomerie rated the quality of the work very high :

The survey depends on Col. Lambton's triangulation, from which a minor triangulation was conducted by the Superintendent, and the points determined thereby furnished to the Assistant Surveyors. The detail was mostly taken up by means of the plain table; circumferentors, perambulator, & field books were also used [206].

This was an excellent geographical, topographical, and statistical survey, and the admirable manner in which it has been executed, and that too under no ordinary difficulties from the wild nature of the country, reflects great credit³.

The original planetable sections of Conner's survey of Cochin are still preserved, though in fragile condition. The twelve sections are beautifully drawn, in great detail, with green forest symbols, stump-shaded hills, and clearly marked trigonometrical stations⁴.

DINDIGUL, 1821

The resurvey of Dindigul had been taken up in 1815 by six assistant revenue surveyors under Turnbull⁵, but progress was slow and much interrupted by sickness [II, 140]. Under his new organization Mackenzie decided to put this party under Benjamin Ward for the survey of Travancore. By the beginning of the rains of 1816, the greater part of the rich cultivated valley of Dindigul had been surveyed but "the great mass of mountains that divided the country from Travancore" remained, and Mackenzie preferred to leave this till Travancore had been completed. With the exception of Chamarett the whole party moved to Travancore between July and December, and Mackenzie reports on 26th September that Mr. Turnbull has transmitted the map of the survey of Dindigul, which...conveys a very satisfactory specimen of these surveys, and an interesting addition to our knowledge of that part of the peninsula [II, pl. 13]. The talook of Outampallam and two small pollams are left unsurveyed which, with part of the mountainous tract may be taken up on the close of the Travancore survey. ... The danger of sacrificing the lives of the party by persevering further in a debilitated state of health in an unhealthy country will be admitted as a sufficient reason for calling them off to another duty.

The memoirs, plans, and sections of the separate districts had been interrupted by the repeated sickness of $\frac{2}{3}$ of the assistants. Mr. Turnbull, by persevering in bringing up this work, with a zeal highly commendable, has...transmitted 6 memoirs descriptive of the...districts and zamindari of Dindigul, with statistic tables of their population, cattle, etc., together with translations by himself, and by others of the assistants, of the historical accounts of the poligars of that district⁶.

¹ DDn. 226 (61), 21-2-21. ² Memoirs, M. 106. ³ DDn. 226 (51). ⁴ MRIO. 4-PT-19; Cochin-British Boundary, ib. 131 (1). ⁵ *IO Cat.* (415), Travancore, central & north; 25 sheets, one-inch scale; Conner & Ward; Govt. Litho. Press, Madras, 1871. ⁶ Aikin, Pereira, Keyes, MacMahon, Chamarett, Bird. ⁶ MPC. 11-11-16.

On the completion of the Travancore survey Ward moved his party¹ up to Dindigul early in February 1821 and, in spite of interruptions by cholera, completed one thousand square miles of survey in six months.

The series of triangles which were carried over the whole, preparatory to the survey of the details, were...extended...from bases determined by Colonel Lambton in Travancore, and the details inserted on sections, each containing 27 square miles [II, 128].

The survey commenced in the vicinity of Periacolum², and was prosecuted in three different directions down the valley...embracing the valley of Wursanad³ bordering on the Tinivelly province, and brought to a termination in the latter end of April.

The exploring of the Vurrhagerry mountains was the next and grand object in view, the survey of which commenced in the latter end of May by penetrating into them by three different passes, and with great exertion the whole of this mass of mountains was surveyed by the beginning of August, when the parties retired to Pulnay in the plains to the north...for...finishing and connecting the sections of the survey, and also to draw up such documents as will be necessary. ... This duty will occupy me within doors to the latter end of September, when I hope to transmit the whole of the materials, ... together with some original surveys ...executed by the assistant surveyors in 1815-6, received from the assistant surveyor Turnbull⁴. ...

I have been induced to embrace a large tract of interesting mountainous country dependent on Coimbatore, hitherto never explored. ... I had it in contemplation to have extended the survey over the mass of the mountains of Dhullee...as it would complete the survey of the mountains from Cape Comorin to the Poonany River, but the excessive bad weather prevailing on those mountains...induced me to recede to the plains⁵.

Montgomerie had nothing but praise for the final maps ; "The excellence of the material...renders it one of the most perfect of any of the maps of the southern provinces which have been issued from this office [120-1]"⁶.

Ward had been seriously unwell all the time on this survey of the mountains, but after a month's leave moved his party to south Coimbatore in November, with the prospect of work in the Nilgiri mountains.

NILGIRI HILLS, 1821-3

The first surveyors to explore the Nilgiri Hills were Keyes and MacMahon, who visited them from Coimbatore in 1812 [II, 147-9]. They were followed in 1818 by two of the Collector's assistants who reported a fertile and healthy country at a height of eight to ten thousand feet above the sea⁷, and on the strength of this report the Collector, John Sullivan⁸, asked for a rough survey, ... as "the inhabitants are extremely anxious to have their lands measured, under an idea that they are paying more than they ought to do". He obtained Rs. 300 to make the path to the hills more accessible, observing that if this were not done, the revenue ...would in a short time waste to nothing⁹. ... The formation of the road was entrusted to Mr. Macpherson [II, 428], in command of a party of pioneers, and to the same officer the survey of the lands. The road was reported as completed on 23rd May 1823. This was the old Srimugai Pass, which preceded the Kotagiri¹⁰ pass. ...

Captain Ward, originally one of Colonel Mackenzie's assistants, surveyed the hills, and completed the valuable memoir which...was not submitted to Government till July 1826¹¹.

Macpherson testifies, 12th June 1820, to the salubrity of the climate ;

My residence in these mountains has been since the 14th of March (now about three months), and probably the hottest season of the year¹². ... So long back as 1815, I suffered an attack of the Ganjam epidemic, which appears to be an intermittent [fever] in its most malignant form, since which period...I have been subjected to occasional attacks of fever. At Madras, in December last, ... I had two attacks of ague ; in the February following at Coimbatore I was nearly brought to the brink of the grave by the same disorder.

¹except Turnbull and the interpreter who went to Tinnevely (II, 146). ²Periykulam, 58 F/12. ³Varushanad, 58 G/9. ⁴Journal, MRIO. M 28 : triangles, M 25 ; maps, ib. 133 (23-5) 146 (15) 3-PT-15. ⁵Journal, 15-8-21 ; DDn. 185 ; to Mountford, 13-8-21, DDn. 192 (220). ⁶DDn. 220 (201), 2-8-25. ⁷from Collector to M Rev Bd., 31-7-19. Price. ⁸John Sullivan (1783-1855) writer, 1804 ; Collector Coimbatore 1815-30 ; ret. 1841. ⁹Collector to M Rev Bd., 6-3-19. ¹⁰10 m. E. of Ootacamund. ¹¹Grigg (280-5). ¹²He appends a record of daily temperatures.

In March I ascended the Neelgherry, weak and debilitated ; in a few days my appetite was restored, and I soon recovered health and strength, since which period I have not had a single day's sickness¹.

Sullivan, pushed the development of this new health resort, and wrote to Mountford in November 1819 ;

Instructions have been issued to you to prepare a map of Coimbatore for the use of the revenue department in that province ; ... the survey of the southern...division, made under the orders of the Surveyor General in 1812, was extremely imperfect, and...no reliance can be placed in the map which is framed from it [II, 149].

The resurvey of it appears desirable, and I am anxious...to ascertain from you whether that branch of the survey department which is now employed in Travancore could, with convenience to the public service, be employed for a few months in Coimbatore before it finally leaves the southern and western provinces².

Mountford replied that the Collector's old map

was not executed under the orders of the Surveyor General, but so far back as 1801-2 and 3. From the records of the office it appears to have been executed by young lads sent from the surveying school, and upon a much smaller scale than it has been thought necessary to adopt in surveys of a more recent date³ [II, 147-8].

I perfectly concur with you that resurvey...appears desirable, ... its being so much inferior to other district surveys, particularly to the northern part of the Coimbatore, executed since the establishment of the survey department⁴. The only objection...appears to be the delay which it will occasion in the completion of the survey of the Northern Circars [102]⁵.

Pending completion of the Travancore survey, Macpherson was called on to make a survey, but though he indented for instruments and received professional instructions he produced nothing of value. On completion of Ward's survey of Dindigul, Mountford recommended his move to Coimbatore and the Nilgiris ;

The survey of the southern part of Coimbatore was executed by a few inexperienced young lads sent from the surveying school in 1801. The result of their work is in a general map in this office, and it exhibits little more than a mere sketch. On trying the work with Colonel Lambton's trigonometrically determined stations (whose operations had not been commenced at the date of the survey), its defects became sufficiently apparent.

With respect to the survey of the Nilgerry mountains, it is evident from the field books... [II, 149], that the assistants (who had suffered much from fever) were induced to hurry over the work ; the climate at that time being considered extremely inimical to the European constitution. I am of opinion that...the work should be revised at the same time with the southern part of the district, especially as it ought not to occupy the party more than two months⁶.

Ward started the survey of south Coimbatore in November 1821, and moved up to the mountains in March, completing field work by July 1822. He carried out the triangulation himself, whilst Keyes and MacMahon filled in the detail by planetable, thus having the satisfaction of rectifying their hasty work of 1812. An important part of the operations was the determination of the height of the plateau and the peaks, and, writes Mountford,

An area of 660 square miles has been surveyed in the south-western quarter of this district. Lieutenant Ward intended, after bringing up...indoor work, to explore the lofty mountains on the southern frontier, and about the beginning of March to ascend the Nilgherrie mountains.

As the state of the atmosphere may...prevent Lieut. Ward...determining trigonometrically the elevation of the principal peaks of that interesting tract⁷, it appears advisable that he should have the means of doing so by approximation. I have an Englefield's mountain barometer (my own) disposable for that purpose, and have applied to Government for permission to purchase another from the shops, by means of which the corresponding elevations of the mercury in the plains below may be registered.

In taking this precaution, however, I shall not lose sight of the greater dependence to be placed in the results to be obtained from the former method, if it can be obtained without undue interruption to the survey⁸.

He was authorised to purchase as many mountain barometers as he could find.

¹Grigg (Appx. lv.).

²DDn. 148 (224), 27-11-19.

³No record found of this early survey.

⁴Triangles, DDn. 181 M. 91.

⁵DDn. 148 (225), 29-11-19.

⁶DDn. 192 (191), 16-7-21.

⁷Highest

point, Doddabetta, 8640 ft.

⁸DDn. 194 (31), 28-2-22.

In July Ward reported that he had completed the survey and withdrawn to Coimbatore for mapping¹ ;

I have...taken...elevations and depressions for determining the heights of some of the eminences on that extensive mountain, but it will require some time before I can report on them. ... On descending the mountains I revisited several of my stations for the purpose of revising the angles taken in the months of March and April, the weather at that period being very unfavourable...on account of the very hazy state of the atmosphere prevailing all over...the low country².

During the working season of 1822-3, he completed the remaining part of Coimbatore to the east³, and then took up survey of the Kundan hills, on the Malabar border, 15 miles south-west of Ootacamund :

In the map of the Malabar Province by the Bombay surveyors, surveyed from 1792 to 1799 [I, 131-2], the situation of these mountains forms a perfect blank and, as they resemble the Neelgherries in their prominent features. ... forming a part of that mass of mountains...and, as their western frontier forms a part of the great line of gauts, permission was obtained for their survey. Ward carried this out himself, leaving Keyes and MacMahon to finish off south Coimbatore. In November 1823 he took three months leave owing to "the precarious state of his health", and the assistants also were given leave to the Presidency.

A reduced copy of Ward's map faces page 5 of Price's *History of Ootacamund*, and his *Geographical and Statistical Memoir* forms an appendix to Grigg's *Manual of the Nilgiri District*.

MALABAR, 1823-30

The survey of Malabar between 1793 and 1800 by Emmitt, Johnson, and Moncrieff had been carried out by radiating and intersecting route surveys, held together by a few astronomical observations for latitude. These routes had been arranged mainly for fixing the more important boundaries and communications, and in no way provided a complete or reliable map of the country [I, 131-2].

The French territory at Mahé had been occupied by the British during the war with France, and was, like Pondicherry, handed back during 1817 [97-8]. Maps were prepared from a survey made by Monier Williams in 1802 [II, 456] and older French maps⁴, about which Mackenzie writes in 1816 ;

There is scarcely any difference between the English and French maps as to extent of ground. Our people then seem to have puzzled themselves & others...without any ground. In a matter, however, that may involve the national interests of two European powers at some future period, I should apprehend an accurate survey of the whole tract, including Koringotte, should not take but a few days. It is scarcely 4 or 5 square miles.

Whilst the survey of Coimbatore was still in progress, there was some discussion as to whether Ward's next task should be Ganjam, the most northerly of the Circars, or Malabar ;

The general geography of the peninsula would undoubtedly be best promoted by employing Captain Ward and his assistants, as originally intended, in the Ganjam District. Coimbatore in all its details will not be finally completed before December, so that it would be April... before they could possibly reach the field of their future labours. ...

Experience has...shewn that a change from the southern part of the Malabar to the other extremity of the Coromandel Coast is generally attended with more or less sickness. This, however, is an inconvenience which may be felt at all times, and I...only advert to it here in reference to the smallness of the party, and to Captain Ward's precarious state of health.

By undertaking the survey of Malabar now, the party will have the whole of the next fair season from November (when the climate becomes least inimical) before them, and a very considerable portion of that district must be accomplished by the time that they could reach Ganjam. ... In a military as well as a geographical point of view our knowledge would

¹ Map of Ootacamund & plateau, 1-inch scale, 1822 ; MRIO. 136 (1) ; MRO. 253, 260 ; memoir, M 78.

² Triangles, MRIO. M 20. DDn. 194 (105), 8-7-22. ³ Map, MRIO. 133 (1, 2) ; memoir, DDn. 195, M 537.

⁴ Maps by Williams, MRIO. Misc. 2-O-91 ; French map made by order of Marshal Belcombe, ib. 1-O-1778.

be much improved by the proposed measure, the present map being both extremely defective and inaccurate¹.

Ward therefore took up the survey of Malabar with his two assistants, in June 1824, but in August was granted twelve months leave to the Cape on medical certificate. George Arthur was transferred from the Hyderābād survey to take charge during his absence, but his health was poor, and most of the work, even triangulation, fell on Keyes and MacMahon. Arthur was granted sick leave to Europe in April 1825, and it was not till December that another officer, Horatio Noble, was found to take his place. Keyes died and was replaced by Malcolm. On Ward's return² Montgomerie writes to him :

It will be an object of your first care to examine and revise the triangulation on which assistant surveyors MacMahon and Malcolm have lately been employed, and you will take an early opportunity of minutely examining whatever has been executed by the last-named assistant, as there is but too much reason to doubt his accuracy. ...

The Collector of Malabar lately complained of inaccuracy as to the names of villages in a map furnished to him from this office, which was compiled from materials...connected with the survey of the Cochin State [110]. ... It will be necessary that you immediately call...for correct lists of the whole of the villages...of Malabar.

The survey...has hitherto met with so much interruption as to render its successful progress now an object of great solicitude³.

To the Surveyor General he reported that

Captain Ward, having found accomodation for his family at Tellicherry⁴, resumed charge of the survey...which I hope will now be prosecuted with more vigour than has hitherto been the case, for the little progress made by the assistants during the last quarter is in my opinion too strong a proof of want of activity and zeal, for although...the assistant Malcolm had at intervals been unwell, such was not the case with the senior assistant, and I do not think that...is sufficiently accounted for in the...want of assistance on the part of the inhabitants⁵.

In his report of May 3rd, Ward was

happy to state that...the progress made during the past quarter over a very wild tract of country, though not extensive, is very satisfactory. Lieut. Noble, who commenced operations about the middle of March, ... has been indisposed the greatest portion of last month. ... He has, however, gone over a surface of 18 square miles for the short time he has been in the field⁶.

Work now proceeded steadily. Wynād was surveyed during 1826-7, and connection made with the Nilgiri triangulation⁷. Noble resigned in November 1827, and was replaced by James Du Vernet, who did much useful work during the next twenty years. Field survey and mapping were all completed early in 1830⁸, when the party, strengthened by two apprentices, moved to Madura⁹ [4 : pl. 12].

NIZĀM'S DOMINIONS ; GARLING, 1816-20

The extensive dominions of the Nizām of Hyderābād had hitherto been mapped from route surveys that provided a mere skeleton of geographical information. For many years the sketches of Bussy's marches between 1751 and 1758 held the field alone [I, 115]. Then the enthusiasm of Mackenzie and Orr between 1792 and 1798 produced Mackenzie's maps of the Deccan [I, 116-7] : De Havilland and Blair had followed from 1806 to 1810 [II, 133-4], and further information came from officers of the Quartermaster General's staff.

The geography of the Deccan had long been Mackenzie's particular interest, and it was natural that it should claim his first thoughts on his return in 1815. He chose Garling, who had held successful charge in Goa, and sent him up to Hyderābād early in 1816 with three assistants¹⁰ to start a regular survey of the southern districts, through which Lambton had recently taken his main triangles [II, 249]. The survey was to follow the general plan developed in Mysore and

¹ Mountford to SG., 12-9-23, DDn. 200 (167). ² resumed charge, 16-1-26. ³ DDn. 202 (321), 12-12-25. ⁴ 49 M/10. ⁵ DDn. 218 (52), 18-2-26. ⁶ *ib.* (11), 3-5-26. ⁷ MRO. Map 253 ; *IO Cat.* (359).
⁸ 22 field sections, MRIO. 6-P-P-29 ; maps, MRO. 180 ; MRIO. 136 (38-47) ; 138 (12), memoir, M 14.
⁹ DDn. 237 (218), 4-3-30. ¹⁰ Howell, Hill, and Malcolm.

the Ceded Districts. Garling received his instructions on the 20th May 1816, and reached Hyderābād on 2nd July ;

After communication with the British Resident he was...to proceed to survey the *Dooab*, or country between the Toombodra¹ and Kistna, which is recommended by the Resident as more convenient. ... The districts, Pagtoor, Rachoor², &c., ... adjacent to our Ceded Districts on the Toombodra, ... coming appropriately in contact with our former surveys, and well adapted for...gradual extension³ [pls. 1, 24]. ...

The field work of the district of Alpoor⁴ was completed in the beginning of August, and on 1st September [Garling] had commenced with the Godaval⁵ purgannah, in which some progress had been made, tho' the increasing damp weather and other circumstances had occasioned delay. ... He expected to leave it for Rachore by the 15th of September. ... He has...experienced little difficulty, and much of an accomodating disposition in the authorities. I am hence encouraged to hope that these surveys may be with equal success attempted in the northern part of the Nizam's dominions, as soon as the completion of those in hand in the Company's districts leave a sufficient party at disposal⁶ [4-5].

Work was carried on through the war of 1816-8 with a few interruptions, Mackenzie reporting on 31st July 1817 ;

The movements of troops and the incursions of the freebooters (March 1816) thro' the whole extent of the Nizam's country have interrupted surveys [96, 223].

Lient. Garling, in charge of the party of 3 assistants in the Doab, reports...that he had commenced on the district of Rachoor by 9th November. The state of alarm of the country at that time...had induced him to call in the assistants, and...it was his intention...to remain for a time in the vicinity of the British posts on the Tombudra ; these alarms having subsided by the middle of January, he wrote on 3rd February that he had then resumed the survey. ...

Tho' the survey of the Dooab...adjacent to our own territory appears to proceed with all possible success, yet I consider the success of...more small parties of this kind very doubtful within the interior of the Nizam's Country, until it is more tranquillized [408-10]⁷.

Raichur Circār was completed by the end of 1817 and with the maps Garling submitted a complete memoir, signed at Bellary on 1st August⁸.

The field work of this survey was finished in December, and Captain Garling with the establishment retired, in consequence of the unsettled state of the country, to Bellary to bring up the details. In that portion of the Dooab which belongs to the Nizam there are only two Sircars, Rachore and part of Moodgul⁹ ; that of the Sugur, contrary to what was supposed, lying entirely north of the river. ...

Captain Garling, in addition, had been engaged on the requisition of Mr. Russell, Resident at Hyderabad, in preparing an "outline sketch of the Nizam's Territories between the Kistnah and Toongobudra, exhibiting their general divisions into purgunnahs, with a memoir illustrative of the same, and distinguishing the circar lands from those granted in jaghire"¹⁰.

Sagar Circār was completed between December 1818 and July 1819¹¹ but Mackenzie was indignant that Garling had taken the opportunity to extend survey into Bijāpur beyond the western frontier, even though this extension was to prove most helpful to the Bombay surveyors later on. Mountford had reported that, independently of the trigonometrical and detailed survey within the limits of the Suggur Circar, ... a series of permanently defined and accurate bases have been determined in the Beejapoor District, by which means the city of that name has been intersected, and thus its true geographical position determined¹² together with the figure and extent of the ruins of that once famous capital [II, 452].

These stations, together with those determined in Savanoor¹³ by Captain Garling, will very much facilitate the survey about to be undertaken of the Poonah territories¹⁴ [125].

Mackenzie's reply was decidedly peevish ;

What business Capt. Garling has with the surveys in that quarter I cannot comprehend. I have early pointed out the survey of the Soubah of Hyderabad for that officer and, if the circumstances do not admit of his going on with that, it might be most proper to point out any other, if Government mean to continue their surveys. ... I recommend to you, Mountford, to be cautious regarding that survey. ... Captain Garling's survey should be conducted under the

¹ Tungabhadra R. joins Kistna 57 I/1. ² Raichur, 56 D, H ; 57 A, E. ³ from SG., 1-8-16 ; MPC. 28-9-16. ⁴ Alampur, 57 I/1. ⁵ Gadwal, 56 H/16. ⁶ from SG., 26-9-16 ; MPC. 11-11-16. ⁷ MRIO. M 561. ⁸ Memoir, ib. M 176, 181 ; maps, 67 (6, 7) ; 68 (3) ; 70 (74, 77). ⁹ Mudgul Circar, survd. 1817, copy from original sections, 2 m. to inch ; MRIO. 3-PT-17 ; memoir. ib. M 176 [pl. 13]. ¹⁰ from Riddell, 6-3-18 ; MMC. March 1818. ¹¹ Memoir, Nov. 1819, DDn. 104, M 185 ; map, MRIO. 70 (77). ¹² 47 P/9. ¹³ Savanur, 48 N/5. ¹⁴ DDn. 148 (52), 26-2-19.

regular system laid down, or not at all. ... He has no business with any part west of the Nizam's frontier that I know of, and if he has gone without orders, I shall not be the man to justify it.

Beware of anticipating orders on any pretext, however plausible, and refer to me when occasion requires it [132 n.4]. ... The survey can never go on if every surveyor is at liberty to go about as he pleases. The antiquity or former importance of Beejapore is no reason. ... If that country is now wanted, there are abundance of officers willing to undertake it¹.

Field work was interrupted by

the general sickness...which had induced the superintendent to withdraw to Bellary for the benefit of medical advice. ... The assistant surveyors have been sent out to complete the field work but, ... owing to the very weak and debilitated state of Captain Garling's health, the surgeon had recommended his remaining at Bellary for a short period. ... On the completion of field work, it is the intention...to assemble the establishment at Hyderabad for the purpose of bringing up the details during the monsoon, and to concert with the Resident arrangements for the further extension of the survey north of the Kistna².

Mackenzie did not like so much of Garling's concert with the Resident, and wrote to Mountford :

I have already cautioned you not to be too ready to take things on anticipation in that quarter. The proposition that he is to consult and receive orders from the Resident of Hyderabad as to surveying north of that city is also objectionable, and until he fulfils what I proposed of the districts south of it, I cannot agree. If he cannot survey the districts proposed in the Nizam's country, it would be best to employ the assistant surveyors in the Company's northern districts of Chicacole, Ganjam, etc. ; besides, I have my own plans in view for the rest of the Nizam's country, as soon as parties can be spared.

I beg, my dear Mountford, you will be careful not to go into plans thus obtruded against the proper authority of the department³.

Mackenzie was particularly jealous on this matter because of a request from Russell for several surveyors to push on the exploration of the northern territories [83-4]. During 1817-8 Riddell had compiled a special map at Russell's request, much to Mackenzie's wrath, and the Madras Government had specially asked that both Lambton and Garling should supply Russell with as much geographical material as they could : but, writes Lambton,

My proposal for filling up the intervals of my survey by employing young officers who are competent to act under your direction has been objected to, on the principle of its being contrary to the orders of the Court of Directors. ... Surely that Honorable body, so truly liberal in promoting everything...useful, never intended to prevent a Resident's obtaining geographical information respecting the territories in which he resides in the most expeditious way that he can : especially when such materials might be turned to account in the Surveyor General's Office. I ...hope that you will succeed with the Governor General in having as many useful hands attached to you as will give you a tolerable sketch of the Nizam's country in about four years [278]⁴.

Riddell also wrote to Mackenzie :

Hodge wrote to me about the scheme of surveying the Deckan under the local authorities. He had an offer from Russell of being employed and, now that the field survey branch of the Quarter Master General's Department has ceased [II, 321-2] is placed at the disposal of the Resident⁵.

Such proposals were, of course, infringements on the duties of the Surveyor General which Mackenzie could not tolerate ;

I can say nothing more regarding the Deckan map till I get copies of the correspondence ; I am sorry it went beyond its mark, as I conceive a bare copy of what was in the office was sufficient. This was the only point in which poor Riddell departed from my instructions, and he wrote me it was in consequence of a private letter from Mr. Russell⁶. ... It was a great error to think of compiling a map in the office in Madras which was not known in the primary office, and entirely contrary to the intention⁷. ...

The difficulties...at Madras, and also with the only surveyor in the Deckan under my orders originally, have of late increased, particularly that of Hyderabad, where the surveyor seems to be acting independently...and, I am concerned to add, by the authority of the Resident, who seems to have taken on himself the direction of this survey, a measure I should have officially remonstrated against...did my health permit me to go into so unpleasant a detail.

¹ DDn. 149 (51), 23-3-19. ² from Mountford, 18-6-19 ; DDn. 148 (19). ³ DDn. 149 (78), 4-9-19.
⁴ ib. 92 (43), 21-5-18. ⁵ ib. 151 (192), 10-6-18. ⁶ ib. 149 (19), 16-11-18. ⁷ to Mountford, DDn. 149, 2-1-19.

Be so good as to communicate this where it may be necessary ; ... I long ago stated my opinion of the consequence of the unusual application of Mr. Russell to have the surveyors put ...under his orders. ... The surveyor, who has been opposing my orders and instructions for a long time [has been] proposed by Mr. Russell to be sent to another quarter. The moment I am well enough I will officially remonstrate...and...propose the most obvious remedy for a surveyor disobeying the orders of his principal¹ [304].

Mackenzie's patience was completed exhausted when he heard that Garling had undertaken a survey of the western boundary on Russell's request². This stretched over 700 miles from Afzalpur on the Bhima River, northwards to Ahmadnagar, and occupied from October 1819 to June 1820. Garling himself ran a net of triangles along the whole line, whilst one of his assistants surveyed the boundary and the villages on either side of it. Some of the detail survey was effected by "a private draftsman", A. D'Houlbee, engaged by the Resident³.

Mackenzie writes indignantly to Metcalfe, who was shortly to succeed as Resident, complaining of

the removal of Capt. Garling from the quarter recommended by me...to a survey of limit, which might have been defined in a very short time by any competent officer of the troops employed in that quarter. I know that country, & I know positively that there was no necessity for removing Capt. Garling to that duty. ...

Capt. Garling has followed this by plans entirely opposite to mine, ... a deliberate attempt to perplex & retard what I had submitted in 1816. ... I wish to know whether Mr. Russell was authorised to break up the...survey, & to apply its establishment to a plan of his own⁴.

There is no reason to think that Garling had the slightest intention of flouting the Surveyor General's wishes, and it was natural that he should look to the Resident for guidance in the details of his programme. Mackenzie's ill-health was largely responsible for this bitterness. He admits that he had several letters from Garling lying unread ; he refused Garling's request for leave to come and see him in Calcutta on the grounds there was no officer available to act for him⁵.

The party was pursued by bad luck ; Terry died in 1819, and Garling himself died in June 1820. Mackenzie was aging—his health broken—and he also died, the following year.

HYDERĀBĀD SURVEY, 1820-3

After Garling's death mapping was carried on under Thomas Hill, the senior assistant, till in October 1820 Mountford called him down to Madras. After handing in the Travancore maps, Conner took over charge, and on the march up to Hyderābād the whole party "suffered considerably from fever and from the epidemic. Within a month of reaching Hyderābād Conner died, 29th April 1821.

Robert Young [II, 320] was appointed to succeed but did not take over charge until December, and in the meantime Hill carried on the mapping with four assistants⁶, and took up field survey in the districts west of Hyderābād ;

There were three maps compiled by us ; one containing the Nizam's western boundary, surveyed in 1819 and 1820, which is completed and is now in possession with the Resident, Mr. Metcalfe [II, 471]⁷, for transmission to the Governor General ; the other two, containing the whole of the surveys in the Nizam's territory on a scale of 8 miles to an inch, one of which was thoroughly completed and taken to England by the late Resident, Mr. Russell, when he left this for Europe [291] ; the other, with copies of all the road surveys in 1820, are in possession with a Lieutenant Burr [281] of the Russell Brigade for completion⁸.

Mountford reports in November that,

Although the officer appointed to the charge of this survey has not yet joined the party, considerable progress has nevertheless been made. The long experience of the head assistant, Mr. Hill, ... has enabled him to carry on the work in all its details without interruption. The reduction...to the scale of 4 miles to an inch, and the original sections of the survey, have

¹ to an officer in Public Dept. Madras ; DDn. 154 (93), 10-8-19. ² Memoir, DDn. 183, M 173 ; Map, MRIO. 68 (3). ³ 15 planetable sections, MRIO. Misc. 5-O-19, with 5 fair sheets, and reductions ; ib. 5-O-19 & 20. ⁴ DDn. 156 (278-80), 25-1-20. ⁵ DDn. 149 (35), 20-8-19. ⁶ Chamarett, Bird, Long, Ficker. ⁷ relieved Russell, Dec. 1820. ⁸ DDn. 147 (241).

been brought nearly to a close. Captain Young had proposed leaving Nagpoor (provided he could get relieved from the charge of the pay office), on the 20th instant¹.

Young actually left Nāgpur for Hyderābād on 4th December, and in January took the party east of Kurnool to an area covered by Lambton's triangulation of 1811-12 [II, 245-6], a choice which appeared to Mountford "to be very judicious and proper". Lambton wrote from Ellichpur

to my sub-assistant Joseph Olliver who is now at the French Gardens [II, 394 n.11] to supply ...a sketch of the triangles. I am not sure whether the elevations of the stations above the sea have yet been computed, but, if not, you shall be supplied with them as soon as they are².

By February 1822 an area of 2,205 square miles, surveyed since Conner's death, had been fair mapped, and Mountford reported that

Captain Young and his party commenced their operations on the 13th February, and by the end of the quarter an area of nearly 1200 square miles had been surveyed, notwithstanding the prolonged indisposition of Assistant Surveyor Hill. The greatest part of the work has been protracted on a scale of 2 miles to an inch, and some progress has been made by Mr. Hill in reducing it to the scale of Arrowsmith's map [288].

It is Captain Young's intention to push on the field work towards a junction with the tract surveyed last year, but I apprehend he will not be able to prolong his stay in the field beyond the middle of June, which is the usual period for the setting in of the rains³.

The party continued to make good progress up till 6th April 1823, and covered part of Daverconda Circār⁴, though Young "was driven to quarters by an attack of the liver". The same month the assistants were brought into Hyderābād, Young reporting that

the course of the Kistnah has been explored from latitude 16°, longitude 78° 20' 19"·4, as far as a chain of mountains almost impenetrable except to the Chenchooars, a tribe of Hindoos inhabiting these wild and gloomy tracts. The full area reported surveyed during the quarter was nearly 29,000 square miles⁵.

He was granted five months sick leave, but died at Masulipatam on 2nd July. George Arthur had been appointed assistant in anticipation of this leave, but Hill took charge once more until the arrival of John Crisp [II, 321].

HYDERĀBĀD SURVEY, CRISP, 1823-7

Crisp took over charge in September 1823, finding that Arthur, Hill, Ficker, Chamarett, and Britain, had spent the rains on arrears of mapping and a survey of cantonments.

Under Crisp's charge they now completed the area to the south-east, as far as the Kistna and including the country round Khammamett⁶, and in 1824 moved west towards Gulbarga. Arthur was transferred to the Malabar survey in September 1824, and in February 1825 Crisp reported that "although two of his ablest assistants have been laid up by attacks of fever" the party had surveyed about 3,500 square miles during the past quarter.

About this time Montgomerie pointed out that though a large area of the Nizām's southern districts had been surveyed, mapped, and described in detailed memoirs, yet the material was not arranged in orderly manner by circārs, the regular administrative divisions. Blacker, Surveyor General, decided that, in view of the many changes, it would be well to suspend field operations for a year, in order that Crisp might bring the records up to Calcutta, and re-arrange them in orderly fashion [121]. The party was therefore withdrawn to the Presidency, and Crisp moved to Calcutta in November 1825, being joined there by Thomas Hill⁷ with the records. Twelve months later he had reduced the surveyed area to a map on the scale of 16 miles to an inch⁸, and had systematized and compressed the...records, which embrace indiscriminately a large tract...surveyed at different periods, into distinct form and arrangement of circārs.

¹ from Mountford ; DDn. 192 (287), 28-11-21. ² DDn. 184 (175), 28-1-22. ³ DDn. 194 (83), 30-5-22. ⁴ 56 L/14. ⁵ DDn. 200 (62), 1-5-23. ⁶ 65 C/4. Maps, MRIO. 70 (88, 99-105). ⁷ sailed from Madras 8-2-26. ⁸ Sketch shewing area surveyed 1821-5 ; south of 17° 25' and east to 80° 15' ; MRIO. 67 (17, 30-2).

Of the fifteen circars, or provinces, which have come under the operation of the survey five only are completed, viz., Raichoor, Moodgul, Suggur, Pangull, and Ghirnapoor. The three former, executed and modelled by Captain Garling according to the provincial arrangement, are already in deposit at the office. The two latter are herewith submitted in the accompanying volume. ... From the same original sources I have separated and compiled all that relates to the remaining ten, and propose immediately on joining my station to complete and forward them in succession.

As myself and my assistant Mr. Hill are now prepared...to rejoin the Hyderabad survey party in the field with all possible expedition, I propose sending Mr. Hill by the first opportunity in December to Masulipatam, but I...crave...to postpone my own departure until January¹.

The party re-assembled at Hyderābād during January 1827 for field work in the circars of Golconda and Daverconda² [pl. 18]. In April Crisp resigned in order to take up another appointment, and was succeeded by James Webb.

HYDERĀBĀD SURVEY, WEBB & MORLAND, 1827-30

Webb took over in May 1827, finding Hill, Chamarett, Long, and Britain, and receiving the following instructions;

Sixteen circars in whole, or in part, have come within the operations of the survey north of the Bheema and Kistna rivers; two only are complete in their memoirs, Ghunnapoor and Pangul. The memoirs of the other circars will...be completed...when they shall be finally surveyed. It would appear from Captain Crisp's letter...to have been his intention to complete the survey of the Golkonda and Daverkonda circars, but, as...portions of the circars of Bonaghier and Nelgoondah may fall within the operations of next season's survey, you should make your arrangements accordingly, and...for extending the survey the following season to the eastern limits of the Nizam's dominions³ [pl. 18].

In March 1828, Henry Morland, who was to be connected with the Hyderābād survey for the next twenty years, joined the party as assistant, reaching Khammamet via Masulipatam [5, pl. 13 n.]. Progress during the past season had been poor and Montgomerie sent Webb a tickler;

The very limited extent of country that has been surveyed by your party since taking the field in October last being so far below the average...executed by the same assistant surveyors in 1825, I am compelled to call on you for an explanation.

This was applauded by the Surveyor General, Hodgson; " You did right in giving the Hyderābād assistants a rule; they certainly are not over-industrious, and require keeping to their duty "⁴.

Work was closed on the eastern frontier, and connection made with Snell's survey [102]. Early in 1829 Morland, with Hill and Long, surveyed about 1,100 square miles of Palnād, which had now become part of Guntūr [97-8]. Webb took sick leave to England in July, leaving Morland in charge, and Montgomerie reports;

27th October 1829. The party in the Nizam's Dominions is now rather strong, and in a short time I hope will be very efficient. Lieutenant Morland, lately appointed to the charge, has not had much practice in surveying, but, from the manner in which he acquainted himself during last season, I have reason to hope that he will conduct the survey with success.

Lieutenant Dardell, lately appointed assistant officer...is on his way to join the party which is now employed in the Maiduck Circar⁵ [pl. 13]. The remainder of the party consists of 4 assistant surveyors, 1 sub-assistant, and two apprentices lately joined, whom I consider sufficiently qualified for field work. Mr. Hill, the senior assistant surveyor, has been suffering from dropsy for some time past, and will, I fear, have to be transferred to the pension establishment. The records of the survey of the Bonghier Circar...have lately been received⁶.

20th October 1830. The Hyderabad party took the field in the beginning of the month; it will be employed in...the Warungul Circar⁷ until about the commencement of the hot weather, when it is Lieutenant Morland's intention to endeavour to complete the survey of the Kummumett Circar. As a considerable portion of the tract...is considered unhealthy...I have applied...that an assistant apothecary may be attached to the party⁸.

¹ DDn. 147 (356), 30-11-26. ² Map, MRIO. 70 (99). ³ DDn. 222 (117), 25-5-27. ⁴ DDn. 231 (156), 8-7-28. ⁵ Medak, 56. J. K. MRO. map, 528, from original sections one-inch scale [pl. 13]. ⁶ Map, Bonaghur Circar, MRIO. 70 (82), DDn. 238 (135). ⁷ 58 O/NE. ⁸ DDn. 237 (245).

27th October. The assistant officer, Lieutenant Dardell, was never before engaged in survey, so that his time was mostly occupied in receiving instructions last season. He will take a share in conducting the minor triangulation¹.

Amongst other maps the India Office catalogue shews,

Skeleton plan, exhibiting the whole tract surveyed in the Nizam's dominions, from the commencement in 1816 to the present time, ... 17th July 1830, scale 16 miles to an inch [pl. 24].
Hyderabad topographical surveys, scale one inch to one mile.

The first portion of the surveys was made in separate circars, and drawn on small sections, measuring 14 inches by 7 each, including on each section 12' of latitude and 6' of longitude [II, 128, 215, 229; III, 206]. The subsequent survey was carried on continuously, and drawn on paper of large and varying sizes².

PROFESSIONAL REVIEWS, 1824-30

Frequent reference has been made to comments by Duncan Montgomerie, who succeeded Mountford as Deputy Surveyor General in July 1824. After the usual course at the Military Institution [II, 321], he had been employed with Mountford on maps that were greatly admired for their beauty and clearness [II, pl. 12; III, pl. 11]. He was for a short time surveying on the Nāgpur—Hyderābād borders [83-4] and later in the Marātha Deccan [125], and he obviously had outstanding talents, for Mackenzie had for some time been anxious to secure him for charge of a field party. He recommends him to Malcolm for employment on the map of Mālwa [84, 267], as

an officer who stands on my books...on account of the great satisfaction he gave in reducing the whole surveys of our Military Institution, in concert with another officer who has been already provided for [Mountford]. ...

The beautiful and satisfactory specimens of Mr. Montgomerie's drawings, and his character, induces me to recommend him; ... he is now with his regiment at Ellore, and I write his Colonel, ... who is much interested in him, that I have taken the liberty of recommending him to you. ... I enclose an extract of letters regarding Lieutenant Montgomerie, whom I never saw; the specimens of his drawings in maps are indeed beautiful³.

He mentions him in several letters to Mountford during 1818-9, for example; "Mr. Montgomerie, I conceive, had the first claim to be employed. ... There should be some remembrance of former service"⁴.

Within a few months of his appointment as Deputy Surveyor General, Montgomerie suggested that the older district surveys should be brought into line with the later surveys based on Lambton's survey, for their better incorporation into the new Atlas of India [194]. Blacker replied;

The districts of Tinnevely, Madura, Dindigul, Trichinopoly, Tanjore, and Poodocotta, are represented to be those which have been thus imperfectly surveyed [II, 139-51, 162], and it will be proper that you should suggest to Government the employment of a certain number of qualified officers to extend a plain triangulation, when necessary, between Col. Lambton's points⁵.

Blacker also sent him a sketch by Mountford shewing progress of the surveys;

I am desirous of receiving as early as possible a new sketch with the same view, but modified ... to exhibit those portions of the country which may be considered as "finally surveyed". The leading principle of this classification will refer to...the Great Trigonometrical Survey, which will be considered to include all Lieut. Garling's triangulations.

Colonel Mackenzie's survey of Mysore, although not grounded on the Great Trigonometrical Survey, will also be considered final; so will all such...surveys as have been proceeded by, ... or...subsequently corrected on, indubitable triangulation. ... Much of the revenue survey will have to be struck out, ... but should there be any detailed surveys in which you may repose confidence...you will...exercise your discretion as to including it under "finally surveyed"⁶.

On receipt of Montgomerie's report, Blacker asked whether those surveys which you consider "finally surveyed" are complete in all their records, and that these are preserved with so much care as to be...immediately accessible to reference. ... I

¹ DDn. 237 (249). ² *IO Cat.* (282-3); GBO. museum, original 4-inch svy. Secunderabad cant., 1828.
³ DDn. 154 (7), 7-9-18. ⁴ DDn. 149 (49), 4-3-19. ⁵ DDn. 220 (51), 5-8-24. ⁶ *ib.* (52), 3-9-24.

NIZĀM'S DOMINIONS

Reduced from one-inch survey of Medak Circār, season 1829-30, by Hyderābād survey party under Henry Morland [119]. Shows Mānjira River, flowing north towards Medak, 50 m. north of Hyderābād.

The tanks are often dry.

The topographical survey of the Nizām's Dominions was commenced in the extreme south-west under James Garling in 1816 [115] and continued with occasional breaks till 1855. Henry Morland held charge for more than twelve years between 1829 and 1848.

*Henry Morland Captain
in charge of the Survey
R.L.
W.H.S.*

(Assistants Long and Turnbull)

consider...any plan as unworthy of confidence when the records are either missing, unsatisfactory, or incomplete [I, 225]. and...therefore...class under the head of "requiring to be re-surveyed" the tracts comprehended in Captain Beatson's map of the Palnaud District [I, 110; III, 96], and Captain C. C. Johnson's map of Nellore and Ongole districts [II, 149].

The insular parts...on the borders of the Military Institution's survey require to be surveyed, and the portion of the Madura and Trichinopoly districts...should be surveyed at the earliest opportunity, after which, and the extension of the Malabar survey through Canara, with the small districts of Punganoor and Venkatyghurry Kotah¹, the topography of the southern parts of the Peninsula would appear to be complete².

Montgomerie then submitted a full review of all the surveys shewing the extent to which original documents and memoirs were complete and Blacker asked that these should be brought up-to-date for all surveys then in progress ;

I am fully aware field operations may be partially interrupted by the duty...which I consider paramount to all others. You report the deficiency of memoirs of surveys whose plans are already in your office, and which may therefore require to be surveyed over again. It is consequently evident that the written registers and descriptions, not the plans, are the essential results of the operations of a survey, and that if they are not satisfactorily prepared, the expences of the survey may be considered in a considerable degree nugatory³.

On these orders both the Hyderābād and Vizagapatam surveys were closed down in 1825 [102, 118-9], whilst Montgomerie made that critical review which has been frequently quoted, and on which the future programme was based.

In January, 1827, after discussing with Hodgson what material was fit for incorporation in the atlas [120, 284], Montgomerie addressed the Madras Government regarding the

state of this department, both as relates to the immediate duties in the office, and what has yet to be accomplished in the field. ... The drawing establishment is now strong, and...the parties in the field are weak. ...

The surveys executed under this Presidency since...1810, accompanied by ample memoirs and comprehensive statistical accounts, are not surpassed by those of any other country⁴. ...

The surveyors...have no doubt possessed a great advantage from the Great Trigonometrical Survey, either as the foundation of the late surveys, or as the means of verifying those which had preceded it. ... [Of] the diversified features of the country, being in general favourable for an elegant topographical delineation, every advantage has been taken...by the insertion of the minutest details.

But, highly valuable as these surveys undoubtedly are, the operation by which they are obtained is very tardy. ... Five years were taken up in surveying that portion of the Nizam's dominions north of the Kistnah⁵, ... and although the party in that quarter has for some time been stronger than either of the other surveys, yet, unless it be considerably increased, the prospect of a final completion of that survey must still be distant.

The survey in the Northern Circars, with which there is now only two assistants of the old revenue surveying school, has nearly reached Vizagapatam, so that a considerable portion of that district, and the whole of the Ganjam District, remains to be surveyed, and...the operations of the surveyors are slower than in the Nizam's territories, while in that quarter we have not the advantage of the operations of the Great Trigonometrical Survey.

The survey of Malabar has now also only two assistants remaining of the old revenue surveying school. This survey is considerably advanced, but with the present strength...it will require two or three years more before it can be brought to a close. ...

Much yet requires to be done before the territories under this Presidency can be considered as finally surveyed⁶.

Montgomerie again put up a very full review in 1833, before resigning from the post of Deputy Surveyor General⁷.

¹ Punganuru, 57 K/11 ; Venkatagiri, 57 O/9. ² ib. (60), 8-12-24. ³ ib. (87), 4-8-25. ⁴ fully appreciated by Everest, DDn. 238 (8), 12-1-32 ; by Waugh, DDn. 665 (37), 5-9-54 ; cf. Jervis (26). ⁵ 16, 237 sq. miles from 1821 to 1825 DDn. 202 (295). ⁶ DDn. 222 (2), 12-1-27. ⁷ BM Addl MS. 14380 (103-7).