much as the whole of the observations have been since re­peated and recomputed by more scientific and accurate me­thods. General Roy’s operations gave the difference of lon­gitude between Greenwich and Paris = 2° 19' 51", or in time 9m∙ 19s∙4. Legendre found, from the same operations, 9m∙ 21s. *(Mémoires de. l'Acad.* 1788). This last determina­tion would appear to be very near the truth, the difference of the two meridians having been found by tire-signals, — 9m∙ 21s.·48 (Henderson, Phil. Trans. 1827); by Captain Rater’s remeasurement of Roy’s triangles, = 900∙21s.·18 (Phil. Trans. 1828); and, lastly, by the transit of chronometers from Greenwich to Paris and back, = 9m∙ 21s.·14 (Dent, Pro­ceedings of the Astronomical Society, January 1838).

The account of the remeasurement to which we have just alluded is given by Captain Kater in the Phil. Trans, for 1828. In 1821 the Academy of Sciences of Paris com­municated to the Royal Society their desire that the ope­rations for connecting the meridians of Paris and Green­wich should be repeated jointly by both countries; and the proposal having been acceded to, Colonel Colby and Cap­tain Kater were appointed by the Royal Society to co-ope­rate with M. Arago and M. Mathieu, the commissioners chosen by the Academy of Sciences. The requisite assistance having been readily obtained from the Ordnance department, the operations were begun in the autumn of the same year.

The instrument employed on this occasion was the great theodolite belonging to the Royal Society, the same which had been used by General Roy. The signals for connect­ing the stations on the opposite coasts were lamps with compound lenses, constructed on the principle and under the direction of M. Fresnel ; and Captain Kater remarks, that the light far exceeded that of any of our light-houses, appearing at the distance of forty-eight miles as a star of the first magnitude. Having selected convenient stations on Fairlight Down and near Folkstone turnpike, the party carried the instrument across the channel, and observed the angles made at the stations of Cape Blancnez and Mont- lambert with those on the English coast. They then re­crossed the channel, and observed the angles subtended by the signals at Cape Blancnez and Montlambert from the stations on Fairlight Down and Folkstone. After some difficulty, General Roy’s station was discovered on Fairlight Down, and the observations at both stations were satisfac­torily completed on the 27th of October. These reciprocal observations sufficed to establish the connection between the two countries ; and the object now proposed by Colonel Colby and Captain Kater was to connect the triangles with General Roy’s base on Hounslow Heath. On examination, the guns marking the termination of the base were disco­vered ; but in consequence of the erection of numerous buildings since 1783, one end of it could not be seen from the other ; it was therefore necessary to adopt a side of one of General Roy’s triangles as the measure of the linear dis­tances, and that from Severndroog Castle, on Shooter’s Hill, to Hanger Hill Tower, was selected, these being the near­est stations to General Roy’s base which would be identi­fied with sufficient precision. In the course of the two fol­lowing summers the angles were observed at all the inter­mediate stations, and also the observations completed at Greenwich which were necessary for determining the azi­muths or bearings of the sides of the triangles in respect of the meridian of the observatory. In the calculation of the triangles Captain Kater made use of the theorem of Le­gendre (which will be afterwards explained), whereas Ge­neral Roy’s calculations, as already stated, were made by considering the surface a plane. The latter method is ob­viously incorrect ; yet, from the near agreement of the re­sults, it is evident that no differences of any consequence

arose from the different modes of computation adopted. The following comparative table of distances given by Captain Kater shews the agreement between the two independent operations. The measures are here given in imperial feet.

|  |  |  |  |
| --- | --- | --- | --- |
| **Distance from** | **By Gen. Roy.** | **By Capt. Rater.** | **Difference.** |
| **Feet.**  **113850·59 71577·24 154802·70**  **137459·40**  **45222·72** | **Feet.**  **113807·34 71580·75 154807·00 137471·03**  **45221·01** | **Feet.**  **6·75**  **3·51**  **4·30**  **12·59**  **1·71** |
| **Fairlight to Tenterden**  **Fairlight to Folkstone......**  **Dover to Nôtre Dame.**  **Calais Nôtre Dame, Calais, to**  **Fiennes** |

Although the geodetical operations which had been car­ried on by General Roy, might be regarded as subservient to a general survey of the country, they did not form part of any systematic plan for accomplishing that object ; and on the death of the General, which took place in 1790, some time elapsed before any measures were taken to prosecute them further. In the introduction to the ac­count of the first part of the survey carried on under the direction of the Board of Ordnance, the renewal of the ope­rations is ascribed to the accidental circumstance of the Duke of Richmond, then master-general, having had an opportunity of purchasing “ a very fine instrument, the workmanship of Mr Ramsden, of similar construction with that used by General Roy, but with some improvements ; as also two new steel chains of one hundred feet each, made by the same incomparable artist.” The new instrument is said@@\* to have been ordered by the East India Company for the purpose of surveying their possessions in the East, and Ramsden had exerted all his ingenuity in endeavouring to render it perfect ; but some misunderstanding having arisen about the price, the directors refused it, and it was thus thrown on the hands of the artist. The Duke of Rich­mond having been advised to purchase it for the Ordnance, the instrument thus became the property of the public, and has been employed as the principal instrument of the sur­vey down to the present time. It has been already stated, that the instrument used by General Roy was the proper­ty of the Royal Society.

In 1791 the Ordnance survey was begun, and its exe­cution committed to Colonel Williams and Captain (after­wards General) Mudge of the Royal Artillery, and Mr Dalby. The first operation which they undertook was the remeasurement of the base on Hounslow Heath. It had been objected to the former measurement, 1st, that some error might be supposed to arise from the ends of the two consecutive rods being made to rest on the same trestle, because when the first rod was taken off, the face of the trestle being pressed by one rod only, would have a tendency to incline a little forward, the ef­fect of which would be to shorten the apparent length of the base ; 2d, it was supposed that some error might arise from the casual deviation of the rods from a straight line in the direction of the base ; and 3d, it was supposed, that from the manner of supporting the rods on two trestles only, they would be liable to bend in the middle. For these reasons it was determined to remeasure the base by a totally different method. Instead of measuring rods, the two new steel chains above alluded to were used. These were 100 feet in length, and containing 40 links of 2½ feet each. The links were in form of a parallelogram of half an inch square, and their length was considered advantageous, as ren­dering them less liable to apply themselves to any irregu­larities of the coffers on which they were supported. In

@@@, See Professor Playfair’s Review of Mudge's Account of the Survey, in the Edinburgh review, vol. v.