

THE SOUTHERN CROSS

Notes of a Voyage to, and sojourn in, Australia.
with the results of
Observations of the Southern Celestial Objects

Made at Jimbour, Queensland

by Cuthbert E Peek Esq. B.A. Cantab.

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INTRODUCTION

Every astronomer inhabiting the Northern hemisphere has had many occasions to lament the low altitude at which he is compelled to observe many of the most interesting objects lying south of the equator, and which for this reason are never satisfactorily seen in the latitude of the British Isles, while the rich and beautiful assemblage of clusters, nebulae, and double stars lying around the South Pole are of course altogether below our horizon, and consequently never come within the ken of the many powerful telescopes with which many of our Northern observatories are furnished.

Until within a comparatively recent date the Southern heavens were astronomically speaking, unknown and unexplored. The first observations of any accuracy being made by the famous Dr Halley, who finding that nothing could be done in planetary astronomy without more correct tables of the stars, determined with his father's consent and assistance, to form a catalogue of those of the Southern hemisphere, and for that purpose sailed to St Helena in 1676 remaining there two years, the result was his "Catalogue Stellarium Australium" published in London in 1679, giving the position of 350 stars, and his account of the observations of the Transit of Mercury over the Sun's disc, and many other points of interest.

There are two observatories, which though they have been dismantled for several years will never be forgotten for their important contributions to Southern astronomy. One was that at Paramatta, about 15 miles from Sydney. This was originally the private observatory of Lieut. General Sir Thomas Brisbane, an active and well informed astronomer. Founded in the year 1821, it was on his return to England adopted by the government as a public establishment, and during its existence of about 10 years was in charge of two able observers, who produced a catalogue of 7385 Stars. The other was a small observatory at St Helena which though it existed only during the two years 1830 - 32 produced a catalogue of 606 stars observed by Mr. Johnson, afterwards Radcliffe Observer at Oxford.

The Royal Observatory at the Cape of Good Hope is built on a very picturesque site, at the foot of the Devil's Hill, not far from Capetown, and near the spot where Sir John Herschel carried on his important observations. It is a building of rather an imposing appearance and exhibits a time ball for the benefit of the shipping. Commenced in Sept 1825 and finished at the end of 1828.

The first astronomer was the Revd Fearon Fallows, who was succeeded in 1831 by Mr. T. Henderson, on whose retirement in 1834 - consequent on his appointment to the professorship of astronomy in the University of Glasgow - the command was taken by Sir Thomas Maclean, who remained at his post till advanced age compelled him to retire in 1870.

He was followed by Mr. E.J. Stone who left his appointment as Radcliffe observer at Oxford, and the post is now worthily filled by Mr. David Gill, so well known from his association with the Earl of Crawford in several of his astronomical expeditions. Of late years this establishment has been furnished with modern and improved instruments, notably with a large transit, a counterpart of the splendid specimen in the Royal Observatory, Greenwich.

The observatories of Melbourne and Sydney which I had the pleasure of visiting, and from the chiefs of which I received much valuable assistance and courtesy will be found described in their proper place in this volume.

Several well equipped private observatories are to be found in Australia, foremost among which may be mentioned that of Mr. John Tebbutt of Windsor, New South Wales. The principal instrument is an achromatic equatorial of only 4½ inches aperture, but such is the zeal and activity of its owner, that he is frequently the first to announce to the government observatories and the public the appearance of any new celestial wonder.

As may be imagined, the principal efforts of the government establishments are directed to Meridian Observations and the value of the results which have emanated from them can scarcely be over rated, they have however until very recently done but little toward what may be termed 'picturesque astronomy'. For most of our information in this department we are indebted to the late Sir John Herschel, who during his four years residence at the Cape in the years 1834 - 8 accumulated such an immense amount of information on the beautiful double and multiple stars, and the magnificent clusters and nebulae of the South, as to leave, in the "Cape Observations" a lasting monument of his energy and skill. To this volume as will be seen later on I have been much indebted.

I had for some time wished to visit our Australian colonies, to see for myself the manners and customs of life on the other side of the world, and to observe the effects of that wonderfully rapid march of civilisation, which in less than half a century has in several instances, converted dismal tracts of scrub and bush in which the native Aborigines hunted the opossum and kangaroo, into large populous cities, which for splendour of architecture, and magnitude of commerce, are fast over-taking that of the Western world.

I also wished to see something of life in the bush, and of the agricultural, grazing and mining resources of the country, so as to get an idea as to the relative suitability of various localities as fields for emigration, and to inspect some of the grand scenery of Mountain, plain and river for which the continent is famous.

In the autumn of 1882 several expeditions were sent by the British Government to the Southern hemisphere to observe the Transit of Venus, one of which was to be located near Brisbane, the capital of Queensland, and this affording a favourable opportunity not only for seeing the country, but also for making a series of observations on the Southern heavens. I joined a party which was in charge of Capt. W. G. Morris, accompanied by Lieut. now Capt. Darwin, and with our instruments we left London on August 24th.

Arrived at Brisbane we waited some days whilst a spot was being selected for the observatory. The choice finally falling on Jimbour, a settlement about 12 miles from Mainliner station on the Southern and Western Queensland Railway, and 170 miles from Brisbane. Situated on a gentle eminence overlooking the great plain of the Darling Downs on an elevation of about 1000 feet above the sea, and with an almost un-interrupted horizon Jimbour is very favourably placed for Astronomy.

Of its meteorology we shall have more to say further on, for the present the observations here recorded (made in one month from November 6th to December 6th 1882) must be left to speak for themselves. A mere glimpse of the Southern Heavens, only a transient glance at its chief wonders, I could only feel as the little observatory was dismantled, how much was left unseen, and hope for a recurrence at some future time of the pleasure of these brief hours, when under the still midnight sky, the stars looked down like living diamonds from a canopy of the deepest blue.

The Milky Way spread its band of softened light across the heavens. The planet Jupiter shone with unusual splendour, and the Moon in her monthly wanderings among the stars lent an additional charm to what was already a splendid celestial picture.

Chapter 1st Description of the equatorial telescope. Other instrumental appliances. Removal to Oxford. Operations at the Radcliffe Observatory - general remarks on the phenomena of Transits of Venus.

The telescope which I employed in my Southern observation was for nearly ten years located in the observatory of W.G. Lettson Esq. by whom it was extensively employed, its character was therefore beyond doubt. The Object glass is of 6.4/10 inches aperture to a focus of only 74 inches, it is mounted in a substantial cell fitted with the requisite screw adjustments for correctly setting it at right angles to the tube, which is of mahogany, with heavy brass fittings for the eye and object glass.

The Finder is mounted on a massive ring which gives a movement of rotation around the tube, so that whatever the position of the telescope the finder can be brought into a convenient position, and the field of view is provided with a metal annulus, into the centre of which an object can be brought with much greater accuracy than getting it between the cross-wires usually employed.

There are five eye pieces giving powers from 64 to 310, and this range can be much extended by the application of a Barlow lens which is adapted to the telescope, this adjunct however was very rarely used as the mounting was so heavy, and the focus so much lengthened as to disturb the balance of the Equatorial. The whole of this portion of the instrument is the work of the eminent opticians Merz and Son of Munich.

The telescope is mounted on an Equatorial stand by Cooke of York, of the usual form furnished by that optician, it differs only in few insignificant details from his latest productions, the principal being that the slow movement in declination is actuated by a milled head near the eye piece, and there is only one pair of cords used in working the instrument instead of three as in the latest form, this is found to be a positive advantage, for the twisting and entanglement of these, and the difficulty of distinguishing one from the other in the darkness of the observatory was a fruitful source of trouble in both the equatorials employed by my fellow observers.

The Movement is smooth, the mounting very firm, and the clock carries the telescope with the greatest accuracy. The general appearance of the observatory will be at once understood from the illustration which forms the frontpiece of this volume.

Amongst other subsidiary apparatus I took with me a position Micrometer, Three Diagonal eye pieces, a Pair of tinted Wedges, and a low power Kellner eye piece of very large field, which was found a specially useful addition to the telescope. Two Chronometers, a Sextant, Artificial Horizon, and a good portable telescope were also included, with a good selection of the most useful Astronomical Works - writing and drawing materials, Stationery, Note Books etc so that my equipment was tolerably complete.

A very wise provision with regard to the British Expeditions for the Transit of Venus, was that they should all go to the Radcliffe Observatory, Oxford, for training under its distinguished chief, E. J. Stone Esq., it was arranged that each party should erect their instruments in the temporary buildings in which they were intended to be used and as nearly as possible in the same way as they were to be used in the various parts of the World where observations were intended to be made. In accordance with this, my telescope was removed to Oxford early in July, and set up in the Observatory grounds near the other instruments of the Brisbane party.

The polar axis was at first placed at the angle required for a latitude of about 27 degrees 30' South, to see whether a new altitude screw which had been made fitted correctly, and also to test a new reversing movement to the clock, adapting it to the Southern hemisphere. These little matters being found correct, the telescope was adjusted to the latitude of Oxford and found in very satisfactory order for observation.

Although the next Transit of Venus does not take place till the year 2004 and cannot therefore excite any personal interest among the astronomers of the present day, a few remarks on these phenomena are necessary to the correct understanding of our Oxford preparations.

We are all familiar with the ordinary diagram of the Solar System reproduced with such little variation in every Astronomical handbook, in which we see the Sun as a central body, around which the planets are shown to revolve in neat little circles, all on the same plane. We now know that such representations are not merely very incorrect, but that they produce in the ordinary mind such erroneous notions of the movements of the planetary bodies, that the explanations of such a simple phenomena as the Transit of Venus is understood with difficulty.

Now let us consider what really takes place. Imagine the Sun as an immense central body, around which the planet Venus revolves in an orbit about two thirds the distance of the Earth, and with a much quicker rate of motion, thus we shall see according to our diagram once in every revolution, Venus will pass between us and the Sun, and therefore a transit would occur about every 224 days if the planets all performed their journey in the same plane, or if the Earth stood still while Venus swept on its course, but as neither of these conditions are

fulfilled it is only at considerable intervals of time when the planet is at or near the nodes at the period of inferior conjunction that we see it projected on the Sun's face.

The first predicted Transit of Venus was that of 1631, but as this was invisible over the whole of Europe it escaped observation. The next Transit, eight years later, on December 4th 1639 was fortunately observed, and this is the first recorded instance of this, at other times brilliant planet, being detected as a round black spot on the Sun's disc.

There can however be but little doubt that these phenomena have been noticed in very remote ages and consequently long before the invention of the telescope, it is hardly to be imagined that the ancient astronomers among the Chaldeans, Egyptians and Chinese (who studied the naked eye aspect of the heavens with such attention, and detected the movements of the little planet Mercury) failed to see some of these occurrences, and many persons destitute of telescopic aid, who saw the transits of 1874 and 1882 will remember how distinct is the black disc of Venus - about 1/30th of the Solar diameter, when in transit.

There are two well known methods of utilising these transits for the determination of the value of the Sun's Parallax named after Halley and DeLisle, the two eminent astronomers who proposed their employment. The Halleyan method simply depends on the observation of the interval of time occupied by the planet in traversing the Sun's face as observed from two stations differing largely in latitude and but little in longitude.

Thus if from any one station the planet is seen to pass exactly over the Sun's centre it is evident that at that spot the transit lasts as long as possible, while from any other point North or South of this, but having about the same longitude, the planet's path will be more or less curtailed as it apparently recedes from this line, and describes a longer or shorter chord of a circle which is the Sun's circumference. This method requires:

1st Two or more stations from which the whole transit is visible differing as much as convenient in Latitude, and as little as possible in Longitude.

2nd The Latitude must be accurately known, but an exact knowledge of the Longitude is of inferior importance.

3rd A clock which can be relied on for a correct rate for several hours.

4th Fine weather at commencement and end of Transit.

The great advantage of this method is that it dispenses with an accurate knowledge of the Longitude of the observing station, and doubtless in former times when the determination of this element was a matter of extreme difficulty, if not impossibility, this had great weight. Against this advantage must be placed the great drawback of the necessity for fine weather both at the beginning and end of transit, and as this may embrace an interval of five or six hours, the chances against it are very heavy.

Delisle's method is essentially different to this. He chooses as many stations as may be convenient, placing them at points differing as much as possible in longitude so as to command a view of either the Ingress or Egress of the planet, and the farther apart the stations are, the more are these phases apparently accelerated or retarded. The observations are combined in pairs, and the exact difference of Longitude being known, a good parallactic angle is obtained.

The advantages of this method are obvious:

1st Only the Ingress or Egress of the planet is required to be observed, therefore the number of stations may be increased, as it is much easier to find places thus circumstanced than positions from which the whole transit is visible.

2nd Fine weather is only required for the comparatively brief period at the beginning and end of transit, and from this, and the increased number and scattered position of the observers, the chances of securing good observations are much increased.

As to the longitude determinations, they now present no difficulty, as owing to modern instrumental improvements both in astronomical and horological departments, and the assistance of the Electric telegraph, this element can be fixed with the greatest precision, and the record is always of great value to geographers, surveyors and men of science generally.

The actual phenomena of a transit of Venus appears on a first consideration to be of a very simple character, it is only necessary to observe the exact instant of time when the planet makes internal contact just as it is fully entered on, or is about to pass off from the sun's face and to record these times as shown by a chronometer.

These determinations however are rendered somewhat difficult by a variety of circumstances the causes of which are matter of considerable difference of opinion among the most able astronomers of the present day. It is found that as the round, black disc of Venus approaches the edge of the sun it does not make that exact and well defined geometrical contact which might be expected. Sometimes, while the two limbs are at some little distance asunder dusky ligament or connecting band gradually forms between them, and the disc of Venus and the edge of the sun are apparently connected sometime before real contact.

In other cases the usually circular disc elongates and slowly assumes a kind of pear shape. Or both the disc of Venus and the limb of the sun may appear unsteady and indistinct from atmospheric causes. Any of these illusions would without doubt produce such a confusion in the mind of an unskilled observer as to render his records of very little value.

Great pains were therefore taken to train all the observers in the use and adjustment of their various instruments, and in order that everyone might have some knowledge beforehand of what might be expected to occur, a very ingenious "Model Transit of Venus" was employed. This contrivance consisted of a metal plate, in which was cut a triangular opening, the two sides of which were curved to represent the Sun's limb. In front of this aperture a little black disc of proportional size to represent the planet Venus, was drawn from side to side by clockwork with a velocity apparently the same as the planet.

Thus the mechanical effects of the transit could be studied whenever desired, the model for this being placed on the gallery surrounding the tower of the observatory so as to be in full view of the telescopes of the expedition, which were erected in the grounds below. The three equatorials were placed at some little distance from each other, so that the conversation or signals of one observer could not be overheard by the other, thereby securing a perfect independence of results, and avoiding any distraction of attention.

Each observer taking his seat at the telescope furnished with a power of 150 watches for the instant when the model planet just touches the sun's limb and signals to an assistant who carefully notes the time by a chronometer. The planet is then put back and the clockwork again drawing it forward repeats the miniature transit and this is repeated until each astronomer has obtained several sets of observations when the results are tabulated and compared.

The information thus acquired is of the greatest value as showing whether all the observers have the same mental ideas, and optical impressions of true contact of the planet with the sun, and also what personal equation exists between them. There is little doubt that much of the discordance in the observations of the transit of 1769 were due to this want of previous co-operation and preparation.

Some observers watching the gradual approach of the planet give the time of contact the moment a dark shade springs up between the two bodies, while others delay it till all such appearances have vanished and the limb of Venus is well on the limb of the sun, and a few hit the happy medium of estimating true geometrical contact when the circular limb of Venus is estimated to just reach the Solar limb - it is obvious that these only have a true result - and of the others one is much too early as the other is too late. The importance therefore of a perfect agreement as to the correct phase to be observed cannot be overstated.

The personal equation of observers though a well known is still a none the less curious fact, it is very singular that if a number of persons all observe the same instantaneous phenomena their recorded times will differ. Thus an occultation of a star by the moon is one of the most sudden occurrences it is possible to conceive. At one moment the stellar point is shining with its usual brilliancy, and the next it is snuffed out so sharply as to startle even a practised observer. Yet if several observers are watching the event with nearly similar telescopes and within a

few yards of each other they fail to see it at the same instant. This difference then becomes the individual equation and it is therefore a matter of importance to assign its correct amount so that in deducing the results this may be applied as a correction. In contact observations such as we are involved in the transit of Venus, the planet moves so slowly and the phenomena come on so gradually that special care is needed to eliminate this source of error.

Another important thing we learned from model practice, was that the illumination of the aperture considerably modified the phenomena of contact, it was found that if this was merely projected against the clear sky, tolerable certain contact might be observed. But if a very brilliant background was obtained by placing an inclined mirror behind the opening, reflecting the sun's rays, and so obtaining a bright limb, the appearance of ligaments are often produced, particularly if the air is rather unsteady.

As this is the condition under which the real transit is generally observed it suggested the necessity of some means of modifying the sun's light, and therefore each telescope was provided with a neutral tinted wedge of glass about six inches long in which the opacity ranged from nearly total obscuration at one end to a very light shade at the other.

This being made to slide in a grooved frame in front of the eyepiece the sun's light could be modified to the greatest nicety to suit the vision of each observer. The value of this arrangement I found by repeated trials consisted not merely as a means of viewing the Solar spots under ordinary conditions but as a great improvement to definition when the Sun was but a few degrees above the horizon with a light part of the wedge and consequently considerable glare of light, the definition of the limb and Solar spots was so bad that correct observation was out of the question, but by gradually reducing this with a denser part of the wedge the definition if not good, could be greatly improved, Judgement of course being required, not to push the density so far as to obscure the details it was desired to observe.

Besides these observations and experiments, a great deal required to be done in preparation for the Longitude determinations and many long and heavy nights work got through with the alt. azimuth and transit instruments, so that it frequently happened when the morning hours were chimed out in the still air and the stars looked down on the quietly sleeping city, the glimmer of lamps in the portable observatories showed the astronomers still at work, and when their nocturnal labours were terminated by the approach of dawn, the rest was not of any long duration but was exchanged a few hours later in the day for the monotonous and troublesome calculations of the computing room.

Early in August the temporary observatory was dismantled, the equatorial and other apparatus carefully packed for its long journey, and placed with numerous cases destined for the various observing stations, in the Great Hall of the Radclyffe Observatory, which presented a scene of the greatest activity and was nearly filled with the accumulation of Astronomical apparatus thus brought together. Many of these instruments had already done good service to science and possessed an almost historic interest.

Thus the Reade Equatorial, was for many years the working instrument of the late Revd J B Reade, of Stone near Aylesbury, Bucks. This gentleman, who was an active worker in Astronomy, Optics, Photography and the Microscope was one of the pioneers of Celestial Photography - his earliest efforts were an attempt to get a picture of Alpha Lyna with this instrument in 1845.

Then there was the Lee Equatorial, so well known to many as the principal telescope in the beautiful observatory of the late Dr Lee of Hartwell House, this instrument now so altered that few would recognise it, is justly entitled to respect as the telescope with which Admiral Smyth made the observations embodied in his Celestial Cycle, a work which is well said to have done more to encourage amateur astronomy than any other book up to that time published.

Arrangements having been made to sail in the Orient Steamer "Liguria", on August 24th we bade farewell to the Radclyffe Observatory, with a grateful recollection of the courtesy and kindness of its distinguished chief. A worthy successor of those eminent men who have severally directed its operations, and whose names have rendered this institution famous in the annals of astronomy. Their monument remains in the collection of slenderly constructed Transits, Cumbrous Mural Quadrants and Circles, together with imperfect clocks, instruments so

utterly useless compared to modern instrumental appliances, as to almost excite a smile of ridicule, but for the thought that with these imperfect means these indefatigable observers obtained results of such accuracy that to their labours we owe much of the refinement of the astronomy of the present time.

Chapter 2nd The start from London. Madeira. The Cape Verde Islands. Cape of Good Hope and Simons Bay.

A fine bright morning, A crowded railway station, Heaps of luggage of the most miscellaneous description, Porters staggering along with portmanteaux, Boxes and Parcels followed by importunate travellers anxious to see their belongings safely put on the train, above all a babel of voices from the six hundred passengers who were waiting for the "special" which was to convey them to Tilbury where the Liguria was lying out in the river. This was the scene at Fenchurch Street on August 24th 1882.

The old saying, "Time and tide wait for no man" was exemplified here, at least so far as the old gentleman who usually carries the scythe is concerned. All the anxious glances at the great clock over the platform did not for an instant retard the flight of those last precious moments when friends have always something to say which until that time they have quite forgotten. So at 10.15 a.m. came the last shake of the hand, the last kiss, the shrill whistle, and we were off, rattling along at such a pace that Tilbury was soon reached. There we had a repetition of the former confusion while the luggage was transferred to the tender, when we moved out into the river where the great ship lay at her moorings.

As the tender drew up under the shadow of her lofty sides the vast magnitude of the hull, above which towered the gigantic funnels and tall masts and yards was strikingly apparent. Looking at the immense strength and solidity everywhere apparent it seemed impossible that such a structure could be tossed about like a cork on the tempestuous ocean, and the comfortable and luxurious appearance of the internal fittings favoured this illusion, which, as will be seen later on, was at times rudely dispelled.

Fancy six hundred persons just arrived at the door of some great hotel, at which they have all bespoke accommodation. Fancy the endless enquiries for room number so and so. The rushing to and fro along corridors nearly blocked up with luggage among which some were helplessly lamenting the loss of something they just wanted, while others were struggling along with their possessions and asking all sorts of questions of everybody which nobody seemed able to answer and you can form some notion of the confusion during the first few hours on board.

Gradually however, things settled down, and the deep note of the steam whistle from the tender which had remained alongside, warned all friends of the travellers to depart, and crowding over the side they took leave with more hand-shaking and farewells and with a parting cheer we were left to ourselves, when after stowing away our effects, we had time to look round and inspect our floating home, in which we were destined to live nearly two months.

As the vessel had not completed loading she did not sail until next morning, and advantage was taken by our steerage passengers of this quiet evening on the river for a little amusement. It was soon discovered that among the motley assemblage berthed forward, musical talent was not wanting, and very shortly a violin, a concertina, and the bagpipes made their appearance.

A squeal on the latter not very melodious instrument at once drew a crowd round the foremast and when this artist had performed to his satisfaction the other two came in for their share of attention. The violin however appeared to be the most popular instrument, and seated on an inverted pail the catgut scraper was soon the centre of a number of young couples who footed it on "the light fantastic toe" in energetic style. Neither was vocal ability wanting, for when the dancers were tired, roars of laughter were excited by a comic Irishman fresh from the "emerald isle" who sang of his courting adventures and their successful termination to an appreciative and admiring audience.

Whilst at breakfast the next morning (August 25th) the anchor was raised, the engines commenced to revolve, and with a movement so gentle as to be scarcely perceptible we were gliding down the river. How eagerly every point of interest was noted. Many were the lingering glances directed to the many well known spots, by some of our passengers, who in all likelihood would never look on these familiar scenes again.

Nearing Dover, a fresh breeze made the ship rather lively and developed among some of our passengers the usual unpleasant sensations. By 6.30 p.m. we were passing the Isle of Wight and the water being much smoother, the beautiful view of the Island, bathed in the declining sunshine could be comfortably appreciated. Very pretty looked the green fields stretching like velvet to the edge of the tall cliffs, and as the shadows of the evening blotted them out, the Needles light shone like a brilliant star over the water. Things seemed very quiet on board tonight, in great contrast to the noisy fun of the preceding evening, in fact the greater number of those on board seemed not exactly comfortable, and early retired to seek relief in sleep.

The expectation of making Plymouth brought us up early the next morning, which turned out fine and sunny, and about 10 a.m. we entered within the breakwater. This famous sea wall commenced in 1812 is nearly a mile in length stretching across the entrance of the Sound from East to West, and has in many severe storms proved its utility as a protection to the Harbour.

For ourselves we were very glad of its friendly shelter while we anchored four hours in quiet water, as outside a fresh breeze made it rather too lively. Here we received several passengers who had put off the evil day of embarkation as long as possible, and many friends of those on board came off in the tender to say goodbye. A quantity of mail-bags, several cattle, and a supply of vegetables were also expeditiously shipped, and the excitement of the day of embarkation was repeated on a small scale. At 2.30 p.m. we were once more on the move and passing round the West end of the break-water soon found ourselves in rough water again, and getting up full speed, the land rapidly dwindled to a shadowy line on the horizon and vanished. Night coming on we found ourselves not very cheerful company and turned in early.

Sunday August 27th was a most miserable day - we were crossing the Bay of Biscay, the weather was dull and cold with a lead coloured sky overhead and a lead coloured sea below, in which the vessel rolled so heavily as to seriously try the stability of those amongst us who had not yet found their sea legs; at noon we were in Latitude 46.10.21 N Longitude 7.21.15 W. having run 282 miles in the preceding 21½ hours. The evening came on wet and thick with every sign of a dirty night, and we turned in duller and more miserable than usual.

Monday and Tuesday with fine bright sunshine and a sea as smooth as the Thames at Gravesend, put everybody in good humour. The vacant seats in the saloon began to get filled, and conversation began to get general and lively, whilst on deck, the beautiful deep blue of the Ocean and the graceful gambols of shoals of porpoise, or the passing of distant sail were watched with interest.

Madeira was sighted on Wednesday August 30th at 7.30 a.m. It lay like a faint hazy cloud on the horizon - as we get a little nearer the cliffs appear, shimmering in the morning sun and at this distance the outline looks very peculiar, giving the impression of two islands separated by a distinct division; a nearer approach, however, shows this to be the entrance of a deep bay, walled in by lofty mountains whose peaks can be plainly perceived stretching far away inland. The island, which has an area of about 360 square miles, is a mass of Basalt, with lofty cliffs descending almost perpendicularly to the sea, which has here a depth so profound that the sounding line fails to find any bottom till close in shore and even then it is rocky and unequal with a depth varying from 35 to 50 fathoms. The largest ships can consequently approach very near with safety and so we pass the signal station so close that with a glass we can see the people walking about quite plain, and a busy inter-change of signals takes place.

Seen from the sea, Madeira looks a mere barren rock, but as everyone knows, it is really very productive, and in the fertile valleys the date palm, Indian Corn, Coffee and the Sugar Cane flourish. At a higher elevation from 750 to 2500 feet the fruits and grains of Europe are cultivated, and in this region are the vineyards, the wine from which is celebrated throughout the world. Glimpses of these I could see as we sailed by. With a good glass the ground could be seen laid out in regular oblong patches with straight well kept boundaries in striking contrast to the crooked and contorted divisions of the land in England.

The air had a peculiar soft balmy feeling, a sort of hazy humidity and warmth which one could well understand makes this a favourite spot for those who are suffering from, or in danger of, consumption. The temperature here does not seem to undergo any very great variations, in December and January it rarely sinks below 60 degrees,

and in August and September (the hottest months) it is generally about 74. Scarcely a ripple disturbed the water as we left the island behind and it was soon lost to view.

The next two days were quite devoid of any incidents of interest. Not a sail was seen, a few sea birds and shoals of flying fish were the only signs of life visible, so we were not sorry on Saturday September 2nd when the elevated peaks of San Antonio, the most northerly of the Cape Verde Islands appeared above the horizon. On a nearer approach this island appears a mere mass of brown rock and sand, not a trace of verdure or a sign of anything living could be seen. The tops of the mountains can be seen far above the clouds, which mantle their sides and rest over the valleys below. Passing round the Eastern end of San Antonio we came in sight of St Vincent, the view of the town and harbour opening as you proceed like a beautiful panorama; prominent in the middle of the bay is the very curious "bird rock" on which is a very white and solid looking signal station.

From this a flight of steps leads up to the foot of a most lofty and elegant lighthouse perched on the very pinnacle of the rock. At the time of my visit this port was rendered unusually busy by a conjunction of two important events, viz. the troubles in Egypt which deterred many vessels from going through the Suez Canal, and the epidemic of small pox by which they were prohibited from calling at the Cape of Good Hope for their usual supply of coal. Our Captain therefore found a telegram awaiting him from his owners, directing sufficient coal to be taken on here for the run to Melbourne, so that our stay here was unduly prolonged.

The white houses of the town look very pretty, with the background of the mountains, one of these, prominent among the rest has a divided summit and is called "the double peaked mountain". The tops of these are often enveloped in clouds. On landing the first thing to arrest the attention is the utterly barren appearance of the surrounding country. Nothing but rocks covered with sand in which the foot sinks at every step, is to be seen. The rainy season is said to be from July to November, but though the date of my visit was about the middle of this period, appearances showed that none had fallen for some time, and on enquiry I found it was very uncertain and no rain had been known for the last five years.

The principal square is ornamented with a Town Hall, and a Catholic Church, in which a few candles are always burning on an altar decorated with a little tawdry gilding. A few general stores are near this, but nearly everything exposed for sale is of European manufacture, and no more than can be seen in London. Some large palms in this square are the only vegetation visible. The rest of the town is so irregularly built that nothing worthy of being called a street exists and the houses and shops are of the rudest description.

Many of the windows are without glass, the doors are destitute of locks and bolts, and the furniture is limited to a rough stool and table with a few domestic utensils of coarse brown earthenware. In some of the smaller shops abundance of oranges, bananas and pine-apples are offered for sale, grown on the adjacent island of San Antonio, the valleys and low lying ground in the interior of which are very fertile, thus belying its forbidding aspect as seen from the sea.

The inhabitants are mostly negroes, mixed with mulattoes the descendants of the Portugese, to whom these islands belong. Their habits appear very indolent. The children run about naked till they are about twelve years of age. They follow the travellers in swarms begging for money in a most importunate manner. Whilst here, a company of Portugese soldiers marched into the Grand Square. Their awkward gait, slovenly uniforms and dirty arms were in striking contrast to our troops at home.

Sunday September 3rd we remained at St Vincent the whole day, nearly suffocated by the intense heat, with every port and hatchway closed during the dirty operation of coaling. 1500 tons of this very necessary article had to be taken on board, so that not only were all the bunkers filled but a considerable quantity had to be stowed on deck. Coal and coal dust were everywhere, and the only part of the ship at all bear-able was the stern. Here, beneath an awning to protect from the fierce tropical sun was quite a little market of Bananas, Oranges, Pine-apples, Birds etc which a crowd of small boats had brought off from the shore, and quite a brisk trade was carried on with a great deal of chatter and gesticulation.

Much amusement was caused by the wonderful performances of the diving boys, who came off to the ship in great numbers, paddling along in rude little boats made from the hollowed out trunk of a tree. These young urchins seem to be perfectly amphibious and as much at home in the water as the fishes. They eagerly watch for

the six-pences tossed over the side by the passengers, and four or five of them instantly follow the coin as it enters the water, which is so clean that they can be plainly seen diving and struggling for its possession far below the surface.

I never saw them lose a coin, it is certain to be caught, placed in the mouth and brought up to be exhibited in triumph. I got some of them to dive under the ship's keel, and although she drew 27 feet of water it was done without difficulty. I then tried to persuade one or two of the best divers to get up a stone from the bottom, but as there is here a depth of 60 feet, this proved too much for their powers.

Leaving St Vincent the next morning we sailed on a sea as smooth as glass, all day being within sight of some of the fourteen islands of which the Cape Verde group consists; several of them are mere barren rocks, and on others the population is but small and scattered. About 6 p.m. we passed between the two most southerly, one of which is the Island of Fogo on which still exists a volcano with an elevation of 9157 feet. The rest of this week passed very agreeably, the weather continued fine and the sunsets were very grand.

No words can adequately describe the beauty of the scene when the "Orb of Day" approaches the horizon, going down to his rest in a splendid bed of clouds, ablaze with the richest crimson and gold and leaving a burnished path of glory across the broad expanse of the ocean, slowly diminishing in lustre till it softly blends into the tropical twilight with a glory never seen in our Northern latitudes.

A large flock of sea bird followed us, apparently always upon the wing, for at any hour of the day or night they could always be seen gracefully circling round the vessel's stern. These and numerous shoals of flying fish were the only signs of life in the waste of waters. It was very curious to look over the bows, down into the clean water and see these little fish vigorously struggling up from the depths below, leaping from the water and skimming along before the ship a little way and dropping back exhausted.

A little excitement was caused by the sight of a sail on Friday September 8th. On a near approach it turned out to be the well known clipper "La Hogue" she was outward bound with a large number of passengers, we deviated a little from our course and passed quite close. Both vessels signalled, the sailors mounted the rigging and exchanged ringing cheers, when with a mutual dipping of the ensign we stood on our way.

On Sunday we were in Latitude 6.14.01 South. Longitude 6.07.15 West. and the weather being very fine, divine service was held both in the First and Second Saloons, and also in the Steerage. It was very gratifying to observe how heartily all classes joined in the religious observances of the day, scarcely one was absent except those actually on duty. There was something very impressive in seeing the assembled passengers reverently bowed in prayer and listening to the strains of the well known hymns, a sort of strangely familiar sound when heard on the broad ocean. To the credit of the Captain and officers of the Liguria, it must be said that the Sabbath was always decently and decorously observed, and whenever the exigencies of a seafaring life permitted, the services of the English Church were always performed.

The next week affairs were getting rather monotonous, so a theatrical performance was arranged to take place on the quarter deck, where under the direction of the Captain and officers a very comfortable theatre was rigged up with the aid of a few old sails. The stage was made to present a very gay appearance illuminated by numerous ships lamps, and tastefully decorated with an abundance of brightly coloured flags, the Union Jack forming an appropriate background.

Neat little hand-bills were circulated announcing a performance at the "Liguria Theatre Royal" on Wednesday evening, and on the morning of that day, considerable amusement was caused by several amateur sandwich men parading the deck bearing boards displaying bills of the play, humorously illustrated by the skilful hands of some of the first class passengers.

On entering the theatre, programmes likewise comically adorned were distributed by a black servant well got up for the occasion. The first part of the entertainment consisted of songs, Recitations and Pianoforte solos, received with great applause by the numerous audience. In the interval refreshments were handed round by the stewards, after which followed a little farce, entitled "Who Speaks First" provoking roars of laughter.

Our good Captain Coulan then came to the front, and in a neat and genial speech expressed the pleasure it afforded him to see his passengers enjoying themselves, he hoped they would all have a safe and comfortable voyage, and announced the determination of himself and his officers to do their utmost to make everybody happy. It need hardly be said that these sentiments were cheered to the echo and after they had been emphasised by the musical assertion that "He's a Jolly Good Fellow" the National Anthem concluded a very enjoyable evening.

Another entertainment was given the next night at which the farce of "Little Toddlekins" was performed amid roars of laughter to a crowded audience. The well known ditty "The Crew of the Nancy Bell" was then recited by the Chief Engineer in such splendid style as to bring down the house.

On the morning of Sunday September 17th we again sighted land, and after passing several projections of the African coast, saw the unmistakable figure of the Table Mountain toward afternoon. Owing however to the prevalence of small-pox, of which we have before spoken, we were not allowed to go to the usual anchorage in Table Bay but had to round the narrow promontory the Southern extremity of which forms the Cape of Good Hope, and go up to Simons Bay on the other side.

In doing this we had a fine opportunity of seeing the Table Mountain under various aspects, and certainly the change of appearance as we travelled round it was very remarkable, in some positions it is so mixed up and partially hid by the adjacent mountains, some of which fully equal if not exceed it in elevation, that its individuality is quite lost, but in other aspects is so remarkable as to at once arrest attention; it looks as if a large mountain had been sliced off about two thirds of its height, and the flat top thus produced appears so very level as to almost lead to the idea that it has been artificially produced. This platform is 3567 feet above sea level and when I saw it was as usual covered with a white cloud, giving rise the common expression "the table cloth is laid".

Simons Town, lying at the head of the bay is a very pretty place, the houses have an unmistakable English air of comfort about them, they are all white-washed and spotlessly clean embosomed as they are in the most luxuriant vegetation it looks a very desirable spot; there are two or three churches, some forts, and a cemetery in which one can plainly see the crosses and monuments in memory of those who sleep below. The regret is universal that in this homely looking place we are not allowed to land, but it is in vain. Some absolutely necessary stores are taken on from boats alongside and a few of our passengers are put ashore, this being their destination.

A boat came up with David Gill Esq. the astronomer Royal at the Cape and he and Capt Morris had a conference over the ship's side concerning the work of the expedition, but so strictly was the isolation enforced that they were not allowed to shake hands. Close to us lies HMS Boadicea the flagship of the station and at 8 a.m. her flags were run up and commencing with the National Anthem, the band on the Quarter deck discoursed sweet music for an hour to our great delight.

Many of the passengers amuse themselves with fishing and are very successful in bringing up many curious specimens. They are, however, unfit for the table and notices are posted up in various parts of the ship warning persons of their poisonous nature. One of the most remarkable is the "Toad Fish" so named from the back being beautifully spotted and marked like a large toad.

The belly is silvery white with very pretty fins, they are about 8 or 9 inches long with a large chubby head, and so virulent is the poison that on eating it death is certain. Within a few minutes, two or three of these were caught and put in a pail and were regarded by all on board with great curiosity.

On Monday at 2.30 p.m. we weighed anchor and moved round the Roman Rock which lies in the middle of the bay, the top is just visible at low water. It is surmounted by a curious looking light-house conspicuously striped Red and White, and leaving this behind we again stood out to sea.

Chapter 3rd Simons Bay to Amsterdam Island, Rough Weather, Man Overboard, Amusements at Sea, Arrival at Melbourne.

No sooner had we left the friendly shelter of Simons Bay than we discovered that we had also left fine weather and smooth water behind, during the night the vessel rolled so heavily that it was difficult to keep in bed, and in

the morning the performance of the usual toilette required a deal of patience. I struggled on deck to find the ship going through a gale, with a sea mountains high.

The huge Mainsail had been split by the force of the wind and it was impossible to replace it by another till the weather moderated. Every few minutes enormous waves would dash over the bows, carrying everything movable before them. Wednesday was no better, water poured in everywhere, and about mid-day one of the massive cattle pens, secured to the deck by thick ropes fastened to heavy iron ring bolts and containing several pigs, was lifted as easily as a piece of cork, the ropes torn away like so much thread and carried bodily overboard.

Thursday was but a continuation of misery, the waves flew to the top of the funnels and washed half up the main mast. It became positively dangerous to remain on deck so we were reluctantly compelled to go below where in a state of semi-darkness and suffocation we had to drag out the day - reading was nearly impossible from want of light and violent motion and at meal times the saloon looked more wretched and cheerless than ever.

Many vacant places are seen at table and those who do manage to put in an appearance look more or less ill and wretched, in fact it is almost a farce to attempt to eat under these conditions for it requires a considerable amount of management to get through a meal while you hold on to the table with one hand and secure your plate with the other, meanwhile the knives, forks and spoons are travelling in all directions, and you are fully alive to the danger of being deluged by a tureen of soup or something equally savoury and convenient.

On Friday September 22nd the wind abated, the sea went down and to everybody's great delight we could walk on deck with comfort, enjoying the fresh air and sunshine. Observations at noon showed we were in Latitude 38.12.3 South Longitude 37.29 East. After sunset the moon shone with great splendour for about an hour, when heavy clouds came up, with vivid lightning and a torrent of rain which continued with but little intermission the whole night. About 2 a.m. the darkness was intense, the sky was literally as black as ink, not a glimpse of sea or horizon was visible except when a flash of lightning showed for a moment the angry seething waves clear as noonday, to be instantly lost again in the blackest night.

The thunder rolled long and loud, and with the wind and the waves made such a terrible din as to nearly drown the voice of the Captain who was on the bridge. The shouts of the sailors, the clatter of chains and the roaring of the wind through the rigging put all idea of sleep out of the question, by 9.30 a.m. the thunder was muttering on the distant horizon, but it had left behind a gale of wind and cold rain with a tempestuous sea which increased in violence as the day wore on till the ship had one side under water, and at night we have to make ourselves secure in our bunks to avoid the unpleasantness of being somewhat rudely deposited on the cabin floor.

Next morning we got another brief lull, the wind and the sea quieted down and we could walk round and see the evidences of the storm by broken ropes, split sails, a large piece of the bulwarks torn away, and the Saloon skylight smashed in.

Monday September 25th bears a sad memory in the records of this voyage. The weather was very squally and uncertain - now an hours beautiful sunshine, then in a few minutes, black clouds, wind and a deluge of rain. In the afternoon some of the sailors were busy getting up one of the new sails, when by some means the running gear got foul and a seaman went out on the boom to get it clear, while doing this a sudden squall sent it over to one side with great violence, and the Captain, observing this from the bridge, sung out to the men below to hold on to the stays to keep it steady.

By some means his orders were mis-understood or not promptly obeyed, and the rising wind jerked the boom over with such force that the poor fellow could hold on no longer, but was flung clear over the side into the water. He instantly rose and struck out bravely, and several life buoys were at once flung over towards him, but the vessel going at full speed, he was quickly left far behind. The cry of "Man Overboard" was raised and the second officer (Mr. Taylor) jumped into a boat with eight volunteers, and impatient at the delay in lowering, the ropes were cut away, the little boat tossing on the waves like a cork.

Meanwhile the engines were stopped and the ship brought round broadside to the wind. Hitherto we had been going with the gale and therefore had not felt its full power, but now, feeling the full force of wind and sea she heeled over to an alarming extent. The Captain, hoarse with excitement, shouted to his men to let go the sails,

but those who best understood this duty were gone with the boat, and the men on board getting bewildered he ordered them to cut away which they did with a will, some of the sails tumbling on deck and others flying loose in the wind, snapping with a tremendous noise.

The vessel eased of the pressure began to right herself. Still the engines being stopped, she rolled like a log in the trough of the sea, and heavy waves swept clean over her carrying everything before them. The passengers, who on hearing the alarm had rushed on deck were soon made aware of their danger by being dashed in a confused and half drowned heap against the side of the ship, and several nasty falls took place and a general scene of confusion ensued. However we were all anxious for the fate of the brave fellows who were now out of sight, and the Captain from the bridge, failing to discern them, ran up the signal of recall.

For some time we all looked in vain, at last we could just catch a momentary glimpse of the boat like a tiny black speck on the crest of a wave, then lost to sight again as it descended the deep hollow between, to presently appear again on the top of the next and so on. Gradually they struggled nearer till within shouting distance when a loud cheer was raised on the supposition that they had picked up their unfortunate comrade, but this was not the case, the poor fellow was never seen again. The boat managed to get on the lee side of the ship, but so violent was the sea that it was impossible to come close to the side and ropes were at last flung over by which the men were hauled on board half drowned and exhausted.

The brave second officer being the last to be pulled on deck, our good Captain Coulan was so overcome that he embraced him and wept like a child. The boat was allowed to drift astern and the engines being started was smashed up by the propeller. The vessel was again put on her course and for the next few hours all hands were busy clearing the deck of the litter of ropes, oars, sails and so on, while the doctor was engaged below administering restoratives to several ladies who had fainted with fright, and dressing the wounds of those who were unfortunate enough to require his services. A movement was soon made to reward those who had so bravely done their duty, and about £60 was collected for this purpose, when after a respectable sum had been placed to the credit of each seaman, it was decided to present the officer with a massive gold Maltese cross, engraved with a suitable inscription - to be purchased on our arrival at Melbourne.

The next two days we had better weather, and at noon on Thursday September 28th made Latitude 37.41.44 Longitude 75.11.50 East. The sea is nearly as smooth and as deep blue as in the tropics. In the afternoon we sight Amsterdam Island. This little speck in the ocean is merely the top of a submarine volcano seen from the ship it has the colour of a heap of Scoria from an iron furnace, the cliffs on one side descend almost perpendicular to the water and the central peak rises to a height of 2,500 feet. It is altogether a most desolate looking spot and quite un-inhabited. To me however it was interesting as an indication that we had accomplished about half the distance from the Cape to Melbourne.

Saturday evening, September 30th was enlivened by a performance of the "World Renowned Ligurian Christy Minstrels" in the First Saloon. The fame of these dusky gentlemen was sufficient to draw a crowded audience who greeted their entrance with loud applause. Mr. G W Moore found a good representative who displayed the conventional abundance of shirt front decorated with prodigious diamonds. He gave the famous song "Dem Golden Slippers" in a manner which evoked tremendous applause, as did also the pathetic "Silver Threads among the Gold". The indispensable "Sambo" was also in excellent form and the convivialities bandied between these two eminent ethiopians, and the equally got up centre man were productive of roars of laughter.

In addition to the usual well worn conundrums were a few new ones got up for the occasion. Thus "What would most surprise the passengers on the Liguria?" Why to see Sparkes come out of the funnel and give a recitation on the quarter deck. Now Sparkes is the name of our chief engineer, a jolly sort of fellow, whose recitations at some previous entertainments were given with such a dry humour as to convulse his audience with laughter, so the point of this joke was well appreciated. Again, "suppose the comet broke his tail, where would he get it mended?" Why in a London gin Palace, for there spirits are re-tailed. One more (not Moore) "Why are the ladies on the Liguria like an umbrella?" You give it up of course, well because you can't shut it up.

Then followed the usual photographic farce in which the artist displays a few choice specimens of his ability, and guarantees to his patrons a faithful likeness. After a great deal of trouble in adjusting the apparatus and getting the proper expression the result is the reverse of flattering and the disputes arising from this and the difficulties in

adjusting the pecuniary portion of the business ended in a universal rumpus in which the operator his apparatus and his patrons all get strangely mixed, the curtain falling on this scene of confusion.

On Monday a concert took place in the Second Saloon when a variety of comic and sentimental songs were very well rendered. The honours of the occasion falling to a young lady from Wales, who appeared in the tall black hat and characteristic costume of her native land singing her songs in a manner that showed musical talent of no mean order. Whilst we were thus enjoying ourselves below our fellow voyagers in the steerage were vigorously footing it on deck just above our heads to the squeal of the bagpipe or the scraping of the violin, so the evening seemed going in a merry style, it was well we thus seized the opportunity for a little amusement, for early next morning heavy clouds came on, the wind rapidly increased in violence till in the afternoon it was a fierce gale. Heavy seas flew high over the funnels and fell on the deck with such force as to make the big ship tremble like a little boat and some tons of water found its way down the stoke hole, from which rose clouds of steam.

It was impossible to remain on deck so we were again compelled to go below and even here the water followed us pouring through every crevice of the sky-lights and ventilators. The ship rolled so heavily that we could hardly manage to take tea and this night surpassed all our previous experience at sea. I only kept in bed with the greatest difficulty and as to sleep, that was out of the question, the noise of the steering engine, the racing of the screw, boxes and everything movable flying all over the cabin, and the sound of smashing crockery together with the wind and the waves made that quite impossible. No wonder that many seats were vacant at breakfast that morning, and complaints were general, several had been thrown out of bed, and one or two cabins were unfortunately flooded with water which found its way into the saloon in considerable quantities.

By Friday October 6th the weather was beautifully fine and warm, the sea is very calm and the land breeze as we were nearing Australia is very perceptible. At noon we were in Latitude 38.51.41 Longitude 129.56.15 East. This afternoon, in deference to the wishes of a large number of the passengers, Capt Morris gave a very lucid and instructive lecture on the approaching Transit of Venus, and the method of turning this interesting phenomena to account in determining with increased precision the dimensions of the solar system. His remarks occupying over two hours were listened to with the greatest attention, and at the close a cordial vote of thanks was accorded to the speaker. In the evening a Fancy Dress Dinner took place in the First Saloon and gave an opportunity for a display of a great variety of elegant and elaborate costumes.

There was a well got up Father Neptune, with the flowing robes, long beard, glittering crown and trident of the Aquatic Monarch, accompanied by the Queen of the Waters, robed in Ocean Blue. His Majesty with the aid of his speaking trumpet addressed the assembly, welcoming them to his watery domain, and expressing the hope that they had enjoyed themselves whilst passing his dominions, he announced his intention of very shortly introducing his hearers to the New World of Australia where he hoped they would long live, prosperous and happy. These sentiments were received with hearty cheers and the piano struck the lively tune "A life on the Ocean Wave". His Majesty turned to his Queen and the stately pair led off the dance, followed by a glittering crowd of Chinese, Circassian Chiefs, Spanish Brigands, Negro gentlemen, Ladies in quaint and elegant costumes, Red Riding Hood, and numerous others.

The beautiful illuminations of the saloon, the rich dresses and sparkling jewellery made up a scene of splendour not easily forgotten. On Saturday another and final theatrical performance took place before a crowded and good humoured audience, allusions to the end of our voyage were made in neat congratulatory speeches, and our Captain's smiling face and hearty laughter showed he was well pleased to see such a pleasant termination to our long journey, and good wishes were universal.

Sunday October 8th we all rose betimes to see the first glimpse of the new world, and very refreshing was the sight of the long low outline of the land on the horizon, for during the last twenty days since leaving Simon's Bay all we had seen was the desolate little Island of Amsterdam, not a single ship had been seen the whole time, nothing but the everlasting sea and sky.

The coastline as we steam towards the entrance to Hobsons Bay is not broken by any tall mountains, a succession of headlands of moderate elevations come into view affording a continual change of scene as we move along, and the dark blue of the Indian Ocean is now replaced by a sea of delicate green, flecked with the gentlest ripples.

Queenscliffe with its tall white lighthouse lies on our left, the neat villa residences of this celebrated watering place, which is to Melbourne something like Brighton is to London could be distinctly seen in the sun. On the other side of the entrance is the quarantine station, a series of buildings charmingly situated amidst the most luxuriant vegetation, the beautiful green lawn sloping down to the water was quite refreshing to our sight after the long sea voyage, but as we noticed the yellow flag on the flagstaff we recalled the famous line of "Campbells" - "Tis distance lends enchantment to the view" as very applicable to this, for in consequence of the scare about small pox we were fearful of detention here longer than agreeable especially as there was a rather doubtful case of sickness on board. No sooner had we dropped anchor than a boat left to fetch the health officer, and when after some delay that official made his appearance on deck, quite a flutter of excitement was caused by an announcement that all on board would have to undergo an examination to ascertain if they had been duly vaccinated.

This took place in the Saloons, the ladies first and then the gentlemen passing the doctor's scrutiny with very amusing results, for while those on whom the marks of vaccination were apparent were jubilant, others who had got to undergo that simple operation looked as serious as if some serious amputation was in prospect. Various formalities delayed us till 6 p.m. on Tuesday, when we moved up the broad expanse of Hobsons Bay toward Melbourne which was reached at about 10 p.m.

Chapter 4th The Southern Constellations - Observations of the Great Comet - Chronometer Signals

The two preceding chapters have been devoted to a somewhat light and gossiping account of the incidents of my voyage to Melbourne. During the considerable interval thus occupied the scientific object of my journey was by no means lost sight of, and advantage was taken of the beautiful evenings with which were often favoured to become familiar with the naked eye aspect of the Southern Heavens.

No sooner do we turn our back on the North star and commence the Southward voyage than we begin to notice from night to night fresh stars rising over the horizon before us, and by the time we have reached latitude 41 degrees 30 minutes that is to say have travelled 10 degrees southward - the constellations of the other hemisphere begin to excite our wonder.

About the end of August the most prominent constellation in the SSW in England is the Scorpion pointed out to the most casual gazer by the ruddy star Antares, that portion of the Asterism visible in our latitude is however of limited area, yet, as it is singularly rich in telescopic objects of interest it has in spite of its low altitude attracted considerable attention. The two stars _ and _ which mark the tip of the scorpion's tail lie so nearly on the Southern line of visibility for the latitude of London that I never remember to have seen them at home. The Milky Way in this region is wonderfully distinct, one of the richest portions lies about midway on a line from _ and _ Scorpio to _ Sagittarius.

It is a bright spot to the naked eye including the cluster Messier - a fine field with a low telescopic power and interesting even with a binocular glass - even thus early on our voyage the air was so clear and transparent that the colours of the stars came out with great distinctness and the ruddy tint of Antares was in striking contrast to the stars on either side of him which appeared of a decided green.

A little east of the Scorpions tail is the constellation Corona Australis (the Southern Crown) its lucida is a star of only the fourth magnitude and with three others of the fifth they make a little curve, a very feeble imitation of our much more conspicuous Corona Borealis (Northern Crown).

As we proceeded further South the bright star Achermar came in sight, the Southern termination and brightest star of the long rambling constellation of Eridamus and we can without difficulty connect this star and Fomalhaut with Antares making a large imaginary triangular figure and forming a base from which we can proceed to recognise the other constellations adjacent to the South Celestial Pole.

Near Fomalhaut and within that corner of the triangle, we see the conspicuous constellation of the Crane, the long neck and body of the bird are marked by a conspicuous string of stars, but the brightest alpha gruis is placed on his preceding wing, this with the 2nd magnitude star alpha pavo and the third magnitude star alpha Indus

(which lies nearly on the line connecting Formalhaut with Antares) from another small but easily recognised triangular figure.

On Saturday September 9th (1882) we made latitude 2 degrees 28 minutes South and this evening for the first time beheld the Southern Cross, it must not however be supposed that this constellation cannot be seen in more Northern latitudes, for as its centre is scarcely 60 degrees South of the Equator it is obvious that it will come into view as we cross the parallel of 30 degrees North provided we do so at a period of the year when it passes the Meridian above the pole at a convenient hour of the evening to be visible - thus had I been travelling South at the beginning of May I could have seen it nine days earlier on the voyage than I did in September.

Making use of the line we have already drawn from Formalhaut to Achermar and continuing it to about twice the distance it nearly falls on Canopus, the brightest gem of the constellation Argo - when connecting this back to our starting point Antares we have another very large triangle, including the South Polar Point and the two Magellanic Clouds.

Nearly two thirds of the distance from Canopus to Antares our line falls on Alpha Centauri and we see that this and its brightest neighbour Beta point toward the Southern Cross - indeed in the South they are known to ordinary persons as the pointers - just as the two well known stars alpha and beta Ursa Major have acquired the name in the Northern Hemisphere. They do not however point exactly at the Cross but considerably to one side of it, and so are not so correct a guide as our Northern pointers are to the pole.

Another smaller but nevertheless well marked triangle is formed by connecting the stars Alpha Pavo, Alpha Centauri and Antares, including near its centre the little asterism of Ara (the Altar) and thus by this simple system of alignment connecting a few of the brighter Southern stars with some of those visible in the latitude of Great Britain we soon become familiar with the leading stars around the South Pole and these once known, the minor constellations are easily identified.

Unquestionably the grandest celestial spectacle of the voyage was the great comet, discovered by the officer of the watch of the "Liguria" September 14th and which has since taken its place in astronomical annuals as comet beta 1882. It was reported to me as a bright comet rising about an hour before the Sun, and the next morning, September 15th the horizon being perfectly clear, I saw it rise in great splendour about 40 minutes before the Sun.

The nucleus was certainly brighter than Sirius and the tail 8 or 9 degrees in length - and so brilliant that it rose above the horizon as a bright beam of light followed by the nucleus which continued visible till the approach of daylight and a few clouds blotted it out.

September 16th The comet was evidently nearing the Sun for it did not rise till daylight was so far advanced as to blot out even the brightest stars. Its brightness was however so increased that it continued visible until the Sun was well above the horizon.

September 17th The comet was well seen at Sunrise, it is rapidly approaching that luminary and the tail which is of great brightness points exactly away from the Sun, it continued visible till the Sun was half an hour above the horizon.

On Monday September 18th while lying at anchor in Simons Bay, I saw the comet as on the three previous days rising before the Sun - but this morning it was remarkably brilliant, and to the astonishment of everyone on board it remained visible the whole day. At noon, and within little more than a degree from the Sun's limb it appeared as a very bright star with a short but distinct tail - it was evidently moving round the Sun with great velocity and the change of position was apparent from hour to hour.

The next day being very clear I expected to see the comet again but a careful search around the sun with the naked eye was in vain - and a good binocular glass was employed without success.

After Sunset I was surprised to observe Venus looking very ruddy and more like Mars than the usual silvery evening star and the sky being clear and free from mist I could not for some time comprehend the cause, till as

evening wore on the red colour gradually disappeared and the planet resumed its usual whiteness. I found the illusion was an effect of fatigue of the eye from continued gazing on the brilliant Sun in my search for the comet.

A long continuance of bad weather prevented any further observations till September 27th when at 4 a.m. (ships time latitude 37.32'27" South. Longitude 68.36'30" East) the comet was seen rising tail first above the E by S horizon, by this time it had developed into a magnificent object far exceeding any comet I had previously observed. At 4.30 a.m. when well above the horizon, the tail which was slightly curved in a following direction appeared about 10 degrees long.

The preceding on convex side was remarkably brilliant and sharply defined while the following, or concave side was less bright and faded away more gradually. A clearly defined dark channel could be seen by the naked eye down the middle of the tail and with the binocular glass could be traced as a fine line nearly down to the nucleus. The nucleus though intensely bright does not show the well defined planetary disc it did on September 18th when close to the Sun.

September 28th at 4.30 a.m. the morning was very clear and as the comet rose above a few clouds which lay along the horizon I saw the details of its structure with the binocular glass better than on any previous occasion. The comet appears to lie on, or rather I should say is enclosed within a large or fainter envelope or case, the sides of which are distinctly seen to be straight and therefore quite distinct from the curved outline of the cometary tail within.

Neither does the envelope taper off or become narrow toward the head in anything like the same ratio as the enclosed comet, but appears to extend beyond the nucleus in front of the head tapering off in two points marked alpha and beta between which the enclosed space appears quite dark as if a quadrant shaped shadow projected in front of the nucleus.

The whole appearance was suggestive of a comet enclosed within a straight tubular envelope, so clearly transparent that the details of the internal body could be clearly seen. I have no doubt these interesting features might have been as well seen on the following morning but that clouds lying along the horizon prevented my seeing the comet till 4.45 a.m. by which time daylight had so far advanced as to render this impossible.

October 3rd The comet now rising earlier was beautifully seen at 4.15 a.m. it is certainly diminished in brilliancy - the nucleus equals a first magnitude star, and the tail though not less in length is decidedly less distinct, as is the dark channel down its centre.

October 7th The comet's tail quite as long but decidedly fainter, a remarkable proof of this was noticed when although at a greater altitude and on a darker sky than formerly, the approach of dawn blotted it out with marvellous rapidity and it very quickly became invisible. The dark streak down the tail is barely visible to the naked eye. The convex side is still brightest and sharpest defined, and the large enclosing envelope with its sector still visible. I can now distinctly trace a comet outline in front of the head, the space before the nucleus, hitherto quite dark, is now filled with faintly luminous matter.

October 9th The comet appears exactly as on the 7th. The tail nearly reached to Alpha Hydra and as dawn advanced I carefully matched this 2nd magnitude star and the nucleus - they were so nearly equal that I failed to decide any difference and the increasing light blotted both out at the same instant.

October 10th 3.30 a.m. The comet continuing to rise earlier is very well seen, curious changes are being developed in front of the nucleus. The space between the sectors A.B. which on September 28th appeared quite black, has since become filled with luminous matter which is increasing in brightness and now extends like a hollow tube fully one degree in front of the nucleus. The sectors A.B. are becoming fainter.

October 12th 3.30 a.m. Changes in the comet's head are rapidly progressing the Sector A is quite gone and B is very faint. The tubular appearance of the envelope is very distinct and very curiously the following side is much brighter and better defined than the preceding, in this respect exactly the reverse of the tail. The Nucleus is decidedly fainter than Alpha Hydra and it is marvellous how quickly the comet is blotted out with the approach of dawn.

October 17th 3.30 a.m. (Sydney time) The comet is seen very well but its lustre is wonderfully diminished. The nucleus is not brighter than a 5th magnitude star, and all signs of envelopes, or sectors in front of the comet have vanished, a very singular change has however occurred in the tail, down the middle of which runs a bright streak, so much brighter than the rest of the tail that it can be traced fully half a degree beyond the other portion, giving the comet the singular appearance of a tail longest in the middle - in striking contrast to its former appearance when the preceding side was brightest and longest and this was the case at the last observation on October 12th the aspect is suggestive of the comet having performed about one third of a revolution on an axis running up the tail.

After this date the Comet continued to be observed as often as circumstances permitted, but it so rapidly declined in lustre that very little of interest was noted. When the Observatory was established at Jimbour we often watched it rising pale and ghostly in the East with its tail nearly horizontal and in the early morning hours it passed our meridian in the zenith - the South declination corresponding to our latitude.

A rather curious phenomena attended its departure in that the nucleus and the head became so faint as to be quite invisible to the naked eye while the tail could be seen as a broad ill defined band of light - while with the telescope the head could be made out as a faint nebula but no trace of the tail could be perceived.

By January 6th 1883 it had become so faint that though easily seen by a practised observer, it would certainly not attract ordinary attention as it lay between the stars Epsilon and Sigma of Canis Major. On February 10th I could just perceive it with the naked eye lying nearly midway between the stars Beta of Canis Major and Sigma Leporis. This was the last time I saw the comet which I had followed for nearly five months.

On October 13th 1882 when at the Melbourne Observatory, I had the pleasure of looking over the Notes and drawings of this object made by Mr. Turner of that establishment.

The resemblance between that gentleman's drawings and my own was so remarkable that they might almost have been supposed to have been executed by the same hand - whilst our remarks on the structure and appearance of the comet are expressed in nearly the same words.

Mr. Turner's experience in drawing the tails of comets is similar to my own, in that he employed a good binocular glass, as being more effective for this purpose than any of the usual astronomical telescopes.

Reference has been made on page 16 to the personal equations of Observers, and from the remarks there expressed it will be seen what an important factor in the reduction of observations this equation may become. Longitude determinations being one of the important objects of the expedition we attempted on the voyage out to ascertain something as to the differences between Capt W G Morris, Capt Darwin and myself.

In this work we employed a simple but effective arrangement of apparatus for exchanging signals which will be at once understood by a reference to the diagram where it will be seen that the source of power is a Bichromate Battery to which are connected two galvanometers marked A and B and a tapping piece by pressing the key of which the needles of the galvanometers are both deflected at the same instant, thus making a conspicuous signal the time of which can be chronometrically noted by the observers.

It is obvious that these several instruments may be at any distance from each other, and as a matter of fact it is essential that they should be so separated that each observer can neither see nor hear the operations of the other so that each result may be perfectly independent. Our best thanks are due to Capt Conlan and his chief officer Mr. Perry for affording us every facility for carrying out these experiments by placing at our disposal several hours each day their cabins on the deck of the 'Liguria'.

Thus having each galvanometer in a separate cabin with an observer and a chronometer, the operator proceeds to send a set of signals say every five seconds continued for three minutes, while the observers record them as received - it is therefore obvious that the intervals between these signals being the same for each, any difference must be the personal equation and as numerous changes may be made by sending the signals at longer, shorter,

or irregular intervals and by changing the observers to different galvanometers, and appointing all to send sets of signals in turn, it is obvious that by this method great exactness may be obtained.

Chapter 5th

As we moved up to our anchorage opposite Melbourne the water was smooth as a mirror, and the innumerable lights of the city were reflected like stars in the depths below. Another large steamer of the Orient line, the 'Cotopaxi' was just moving out on her homeward voyage, the two vessels passed within a few yards of each other. Red and Blue lights were burnt and the passengers of both ships crowded the sides and exchanged hearty cheers which only ceased as the huge form of the 'Cotopaxi' faded away into the darkness.

Scarcely was this little excitement over than our ears were greeted with the familiar strains of "Home sweet Home" beautifully sung in unison and softly wafted across the still water. As the melody drew nearer we found it came from a steam tender coming out to meet us crowded with the friends of the returning Australians, eager to welcome them on their return to the land of their adoption.

No sooner were they made fast than our deck was crowded with a motley assemblage, chatting, laughing, crying, Hand shaking and every expression of joy. The Saloons soon presented a lively scene filled with animated groups of friends eagerly recounting to each other the numerous events of interest to each during the period of their separation, and under the influence of liberal supplies of Champagne the welcome extended far into the small hours of the morning, and as long before the departure of our fellow passengers and their friends the steam winches were at work taking out cargo on one side and taking in coals on the other, sleep was out of the question.

The next morning (Wednesday October 11th) the sun rose without a cloud and the view of Melbourne from the sea was very beautiful. The numerous shipping in the harbour, the Turret ship Nelson with other men of war at anchor and numerous little steamers puffing to and fro with passengers and stores made a very animated picture.

Landing at Sandridge Pier the Railway Station is close at hand, and a few minutes ride brings us to the Melbourne Town Station; on seeing which, with its Bookstalls, Daily Papers, Wall advertisements etc exactly like those at home we find it hard to believe that we are on the other side of the world. There is however one slight difference here in that the uniforms of the officers all bear the initials V.R. the Australian Lines being under state control.

A good walk through the principal streets of Melbourne excites feelings of the greatest wonder when we recollect that 50 years ago a few rude wooden huts were the only buildings on the site of what is now a splendid city. The streets are fine and wide running at right angles to each other and perfectly straight.

The principal buildings are of noble proportions and imposing architecture, and in many instances ornamented with a profusion of statuary and decorative sculpture equal to the finest specimens of street architecture to be seen in our own Metropolis.

Great enterprise is displayed by the tradesmen here in the fitting up of their respective establishments and in the splendour of the exterior and the elegance and the costliness of the goods displayed within, they fairly equal their friends at home, almost everything offered for sale is of English manufacture, and there is little or nothing to be bought here that is not to be equally well obtained in London.

Melbourne is situated on the Yarra Yarra river, which is however so shallow as not to allow of vessels exceeding 200 tons coming up to the city. Larger vessels lie out in Hobsons Bay or come up alongside the pier of Williamston which is in connection with the railway by which goods and passengers are conveniently conveyed. The growth of the city received a great impetus after the discovery of gold in the colony in 1851 and among the principal sights may be named the Cathedral, the Governor's Residence, the Post Office and the New Museum and Picture Gallery.

The Melbourne observatory is beautifully situated on a gentle eminence in the Botanical Gardens about two miles out of the city. It is an important and extensive establishment with a good collection of instruments all in excellent

order and in active use under the direction of the courteous chief Prof. R J Ellery who very kindly gave us every facility for seeing everything of interest at the observatory during our stay. Among the instruments worthy of notice are a 8" Equatorial by Cooke, of the usual form with the ordinary clock movement. A new driving clock has been constructed in the observatory workshop with Grubbs electrical pendulum which carries the telescope so accurately as to keep a star bisected by the micrometer wire for two hours.

There is another Equatorial here of but 4½" aperture but of such great accuracy that it has been employed by Mr. White (the first assistant) to fix the positions of the Great Comet now visible. A Photoheliograph is also kept at work and during 1882, 217 pictures of the sun were obtained. The transit is not more than 4" aperture and of old form and construction but the necessary funds have been voted for a new transit circle of modern form and of dimensions sufficient to cope with the present requirements in Meridian work.

The Great Melbourne Telescope is of course one of the sights of the colony. As to its mechanical details and general appearance it has been so often described and illustrated in most modern astronomical and scientific works that it needs no repetition, suffice it to say here, that mechanically it is a model of what great telescopes should be. The movements are smooth and easy, the Circles large and easily read by conveniently placed verniers.

The Focusing arrangements and clamps are very handy and the clock movement very accurate, in fact there is no doubt that this instrument fully merits the character it has acquired as the "handiest of great telescopes" which is no small recommendation considering the tube is 40 feet in length and five foot in diameter. The moving parts weighing about 12 tons.

I was however very anxious to have some opportunity of seeing something of the optical power and defining qualities of this gigantic instrument and therefore met Mr. Turner (who has the charge of the telescope) at 3 a.m. on the morning of October 13th 1882. I was fortunate in having a very clear morning, the sky without a cloud - Jupiter intensely brilliant and Saturn and the Comet conspicuous.

The telescope was first directed to N Argus and as might be expected from an aperture of 48 inches the field was very brilliant. There was however a want of proper definition of the numerous stars included and no amount of careful focusing gave them the neat appearance they present in any good moderate sized telescope.

The wonderful Nebula which spreads in complicated folds over this region appeared very conspicuous, but confused, ill defined and certainly unlike the drawing by Sir John Herschel in his "Cape Observations". During November 1882 I directed special attention to this object at my observatory at Jimbour, Queensland with the 6 4/10inch Achromatic and as will be seen later on the Nebula much more resembles Herschel's drawing of 45 years ago than the more recent drawings of the Melbourne Observers.

(omega) Centauri. This gorgeous cluster of stars appeared so brilliant as to strike even a practised observer with astonishment, but there is such a want of accurate definition that the closer stars run into each other and the separation of the individual stellar points is impossible.

Jupiter was intensely brilliant, but on attempting to focus his belts the same defective defining power was apparent and no more could be made out with this giant than is equally well if not better seen with an 8" achromatic. The satellites did not show the neat circular figure which they present in many a small telescope.

Saturn appeared no better, the same bad definition prevented anything like detail being seen. The satellites looked very bright but ill defined. I looked carefully for the two inner moons, Minas and Euceladus but failed to see them.

Mr. Turner has attempted to remedy this want of definition, by the application of a metal plate, pierced with a number of small apertures of varying diameter which is made to slide in front of the eye piece, and thus limit the amount of light which reaches the eye of the observer - by thus applying a very small aperture, a decent image of Jupiter or Saturn could be obtained, but so much of the effective aperture of the Great Telescope had to be sacrificed in this manner that the resulting image was no brighter than I had been accustomed to see with a 10 or 12 inch Silvered Glass Reflector, and even then the definition of the details on these planets, and the discs of the

Satellites was nothing compared to what I afterwards saw with my own 6 4/10inch achromatic when erected at Jimbour.

These observations are sufficient to show that so far as definition is concerned this telescope is a failure, and surpassed by many instruments so much smaller that the comparison is simply absurd. The enormous aperture has allowed the observers to pick up many of the smaller and fainter Nebulae which are invisible with lesser instruments, but even this is a doubtful advantage, since the definition is so defective with the full aperture that we can never feel sure that what is seen is seen correctly, for instance a smaller star may be described as a planetary nebula, or a well defined nebula may be described as hazy and diffuse, or such objects as the Satellite of Jupiter and Saturn might be credited with the possession of an atmosphere, all arising from instrumental defects.

It is pleasant after saying so much that may seem like fault finding to have to notice here an important class of work so successfully performed by the Great Telescope as to at once take the lead of all other instruments. I allude to Lunar Photography. Anyone who is familiar with the production of De La Rue in England and Rutherford in America, knows to what perfection this art has been brought, but the later Melbourne pictures are without doubt far and away the most beautiful and perfect photographs of the Moon that have ever been obtained.

Before leaving the observatory we ascended the tower on which a time ball signal is exhibited. From this elevated position is visible a magnificent panorama of the surrounding country, and a fine view of the city of Melbourne with the domes and spires of the various buildings. The docks with their forest of masts, and beyond all the wide expanse of Hobsons Bay, which is indeed of such extent as to appear like an inland sea.

This marks the end of Cuthbert Peek's account.

PEEK Sir Cuthbert Edgar.

2nd Baronet. J.P. Devon. F.S.A. b.30 Jan 1855 son of Sir Henry W Peek 1st Baronet. Created 1874.

Succeeded father 1898. Married 1884.

Eton. Pembroke College, Cambridge M.A.

Publications: Meteorological and Astronomical Observations at Rousdon Observatory, Devon 1886 - 1895 et seq.

Died 9th July 1901. Succeeded by Wilfrid Peek b. 9th Oct 1884.

Original typing John Grover. (Great grandson)

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