

ROYAL OBSERVATORY, HONG KONG

A BRIEF GENERAL HISTORY OF THE ROYAL OBSERVATORY

containing extracts from contemporary records,
annual reports and memoranda

by

L. STARBUCK,
Assistant Director



MAY, 1951

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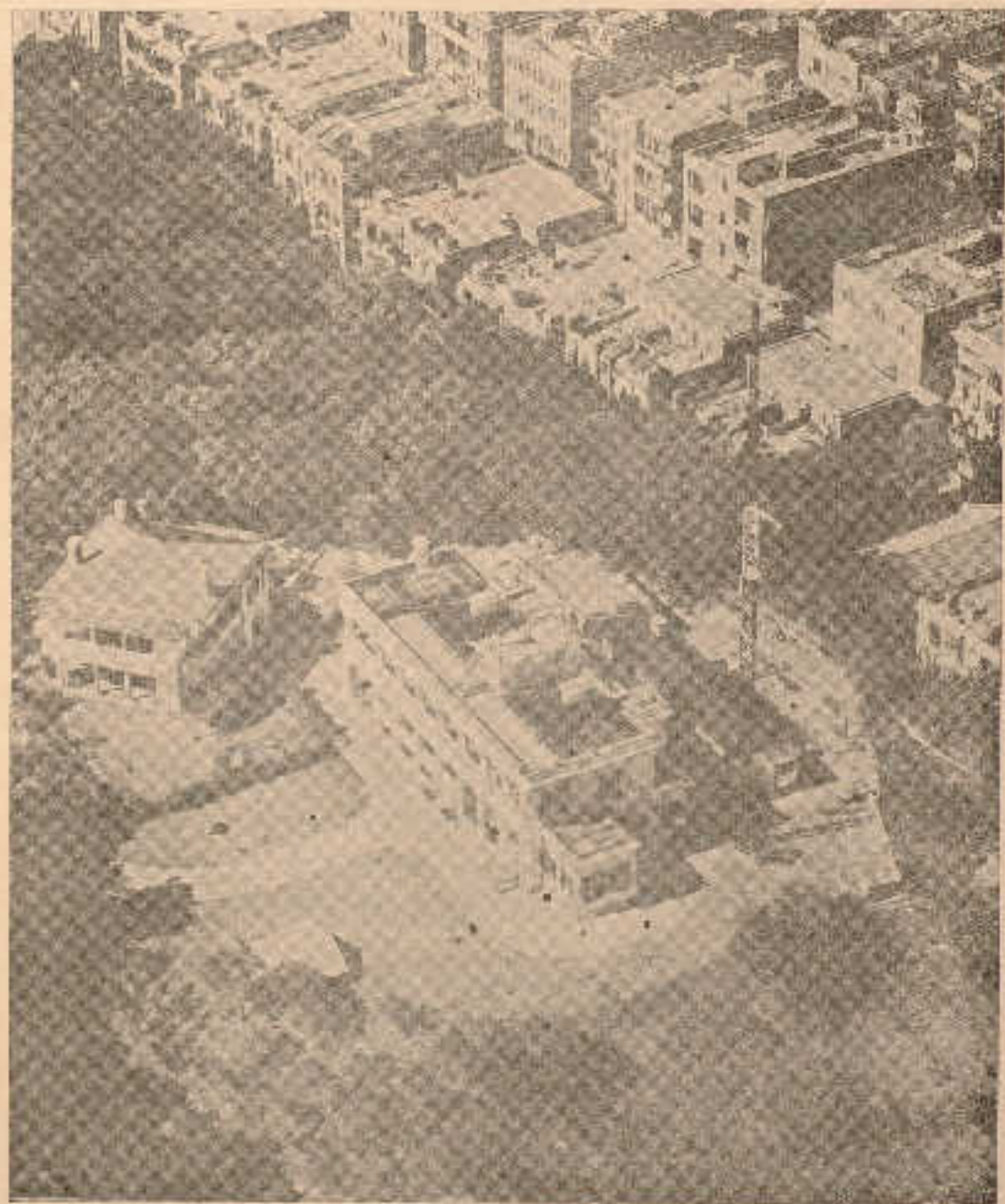


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The Royal Observatory, Greenwich, was founded in 1598, and has since that time been the headquarters of the British Astronomical Society. It is situated on the Greenwich meridian, and is one of the most important observatories in the world. The observatory is a large building, and is surrounded by a wall. It is situated on a hill, and is one of the most beautiful buildings in the world. The observatory is a large building, and is surrounded by a wall. It is situated on a hill, and is one of the most beautiful buildings in the world.



The Royal Observatory photographed from the air, December, 1851.

of regular meteorological reports. Notably, Dr. Doberck secured the support of Sir Robert Hart, then Inspector General of the Imperial Maritime Customs of China, and well known for his enthusiasm for scientific advancement in the region.

The Observatory was built on the Kowloon Peninsula, facing the harbour. It stands on the top of Mount Elgin, a small hill of decomposed granite which at that time rose abruptly on all sides from the surrounding level ground. Much of these steep slopes have since been cut into, particularly along the northern boundary where Hillwood Road now runs, with some loss of suitability to the site. Originally there were two prominences on Mount Elgin, roughly 400 feet apart. The top of the eastern prominence was flat, forming a circle of about 200 feet diameter. Here the main building was erected. In accordance with the third purpose of the Observatory, a Magnetic Hut was built on the western prominence, the top of which had been levelled to form a rectangle about 35 feet by 30 feet.

The main building of the Observatory consisted of a rectangular two-storied block of plastered brickwork, 83 feet by 45 feet, comprising on each floor four rooms and a central entrance hall or landing, all of which occupied the whole depth of the building apart from front and back verandas. The first floor was given over entirely as living quarters for the Director. On the ground floor to the right of the entrance hall were the Director's Office and Library combined, and beyond this, the Clock Room. On the left of the entrance hall were, first, the Computers' Room and beyond this, the Instruments Room. Abutting the eastern end of the main building was the Transit Room, 14 feet square, of which Dr. Doberck wrote that "it was unfortunately built on the wrong side of the Observatory, the windy side, before my arrival here". A similar pendant on the western end of the building, although in the original plans, was never constructed in spite of frequent rather plaintive references to it in the Annual Reports. Perhaps funds occasionally ran out before completion of a project in those days too! Two small wings, symmetrically placed on the north side of the main block, served as photographic dark room and battery room respectively.

By the end of 1883 the Observatory was nearing completion. Dr. Doberck moved in and began tri-diurnal meteorological observations from 1st January, 1884. These were used to determine the base lines of autographic records from which 24-hourly values were then read off. The times of observation were 10, 16, and 22 hours local time and were made for pressure, temperature, wind velocity and direction, cloud type, amount

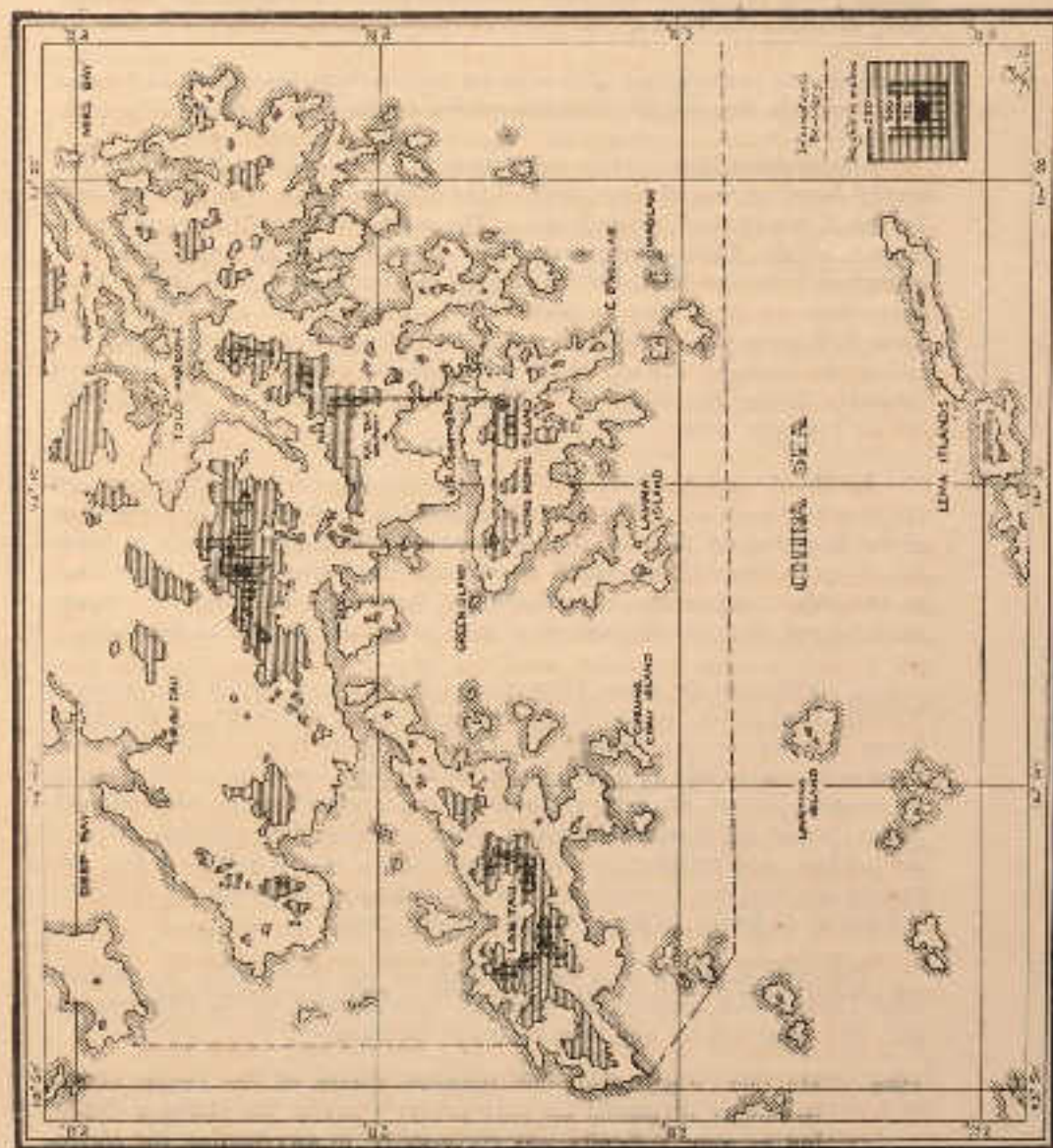


Figure 1: Map of the Colony of Hong Kong showing the high ground and the southern approaches. (Inset area enlarged on Figure 2)

and direction of motion, rainfall amount, and sunshine duration. Relative humidity and vapour tension were calculated from the temperature readings, using Blandford's Tables.

Magnetic observations of horizontal and vertical force and declination were begun in the specially constructed hut to the west of the Observatory.

Astronomical observations were made with a 6-inch Lee Equatorial in a special housing near the west end of the main building, and with a 3-inch Transit Circle in the Transit Room. The main purpose of the astronomical branch of the Observatory was "the determination of local time, but instruments are also available for making observations of such astronomical phenomena as happen to be particularly conspicuous in this region". A Time Ball tower was erected in front of the Police Station at Tsim Sha Tsui, facing the harbour, the top of the mast being 84 feet above sea level and "directly facing the shipping". The ball was dropped for the first time on 1st January, 1885.

In March and April the times of observation were increased to 10, 13, 16, 19, 21 and 22 hours. The 1925 observation was undertaken at the request of the Washington Weather Bureau, the time being approximately 07 hours Washington Mean Time, but it was discontinued after April. From May to December, apparently after the initial burst of enthusiasm, the routine settled down to four observations a day, at 10, 13, 16 and 22 hours.

In addition to the above Observatory observations, others were made at Victoria Peak at 07, 10, 13, 16, 19 and 22 hours, of which the 10, 16 and 22 hours observations were published. Cape D'Aguilar began similar observations at 04, 10, 16 and 22 hours, but later they were found to be "so wanting in accuracy" that all except "state of sea surface" were discontinued. Green Island (lighthouse) observed wind direction and velocity, state of sea surface, and weather five times daily at 05, 10, 16 and 22 hours, but the station had no instruments. Stoncutter's Island measured the daily rainfall at 10 hours, using a standard 8-inch gauge.

Use was made of such observations as had been taken by various organizations and institutions before the inauguration of the Observatory, but they were not by any means always satisfactory:

1884 "He (Mr. Egg) also took monthly means of the height of the barometer registered for over twenty years in the Harbour Office, but as some difficulty was encountered in ascertaining the corrections, which the barometers required, the results have not yet been published and will not be of much importance when published."

The necessity for such a small and isolated territory as Hong Kong to foster and maintain international co-operation was early realized, and the Director, in his annual report for 1884, made the following interesting comment:

1884 "The Superintendent of the station in Bolinao in the course of October commenced to forward observations also at other hours, whenever he apprehended atmospheric disturbances in the vicinity of Luzon. He then also observed the direction, whence the clouds were coming. The importance of similar telegraphic information from a gentleman of scientific training during the coming typhoon season cannot be overestimated."

The foundations of a storm warning service were laid when on 25th May, 1884, Dr. Deberex published a statement to the effect that "whenever there are indications of strong winds, notice will be given to the Harbour Office, the Telegraph Companies, and the Newspapers". By August of the same year, a drum, ball and cone system of signals, based on the four compass points, was introduced. A typhoon gun at the foot of the signal mast at Tsim Sha Tsui Police Station was fired once when a gale was expected, twice when winds of typhoon force were likely to occur, and three times when the wind was "likely to suddenly shift around" during gales. There were in effect therefore, from the outset, local (the gun) and non-local (the symbols) systems of storm warning. The general public insisted on confusing the two, to the exasperation of the Director, and, to a certain extent, they have insisted on confusing them ever since!

1884 "The signals, although they were rather light—being made of perforated canvas framed in leaden pipes—blew down and were damaged, because the cord that supported them was far too weak. At the time the water police had not yet taken possession of the new barracks, and there were only a couple of English constables living in the old station, but it would be impossible to refer in too high terms to the conduct of the police, who are charged with hoisting the signals, both under these difficult circumstances and afterwards."

1884 "The notice (Storm Signals) referred to was extensively circulated and it was clearly stated, that the signals are hoisted solely with the object of informing masters of vessels leaving the port concerning the whereabouts of the centre of typhoons, and that local storm-signals would be given by firing the gun,—so that it is

surprising that a portion of the public should be under the impression, that the signals indicate strong wind in the Colony, but no doubt more correct notions will get about next season."

1884 "But after all (my endeavours) I have learned, that cases still occur, where a captain, who is less familiar with typhoons, delays his ship in port, although the information issued to a practical meteorologist implies, that he is likely to encounter fine weather on a voyage to the port, for which he is about to start,—while another ship starting at the same time for some other port may run great risk."

1885 "The gun placed at Tsin Sün Tsui for announcing the approach of a typhoon, was, during the year, also fired for announcing the arrival of the mails. On these occasions the sampans and other small craft sought positions of shelter."

(Appendix B: 11/5/86) "The utility of the meteorological signals hoisted at Tsin Sün Tsui is confined to the shipping and to those interested in ships about to leave the harbour or out in the China Seas. *The Colony itself is warned by means of the typhoon gun.*"

A certain amount of dissatisfaction with the scientifically excellent location of the Observatory was expressed about this time:

1885 "The hill on which the magnetic hut is placed was early last year planted with figs, which will, when they grow up, contribute to the healthiness of the locality. The southern side of this hill was smoothed and the grass stripped in 1883 by order of the Surveyor-General, with the view of having it returned, but so far this has not been effected.—The summer rains of 1884 showed the building to be suffering from leakage, several attempts to repair this were unsuccessful, but I am informed, that the roof will be thoroughly repaired before the coming wet season. My private quarters are very draughty in the winter during the height of the NE monsoon, which is so trying to the health. This cannot of course be helped, as the Observatory should be exposed to the full force of the wind. The growth of rice in the extensive paddy fields north of this was prohibited in 1884, but the ground has not been drained and was during the heavy rains of last summer converted into an extensive swamp, to the malaria emanating from which the intermittent and remittent fevers, from which we all suffered, may be ascribed."

The first indications of any staffing problem occur in the report for 1886. It demonstrates perhaps better than in any other way the similarity between present problems in the department and those of 65 years ago:

1886 "Considerable inconvenience has been and will in future be experienced, owing to the resignation of the native assistants. On leaving school they join the staff and get a special training for the work only to retire to some other branch of the service where they expect some prospect of rapid advancement. This makes the work harder on the assistants that remain, as a newcomer is for a considerable time nearly useless."

In 1887 Dr. Doberck's title was changed from Government Astronomer to Director of the Hong Kong Observatory. In the following year he appears to have been the victim of a certain amount of scientific plagiarism:

1888 "My pamphlet on the Law of Storms in the Eastern Seas as well as my reports on typhoons have been widely utilized by scientific and nautical authorities over the world. The former has been repeatedly reprinted and translated into foreign languages e.g. together with the Instructions for making Meteorological Observations, etc. by order of the Inspector General of the Imperial Chinese Maritime Customs, for the use of residents in China. Writers very rarely make use of such reports without due reference to the Observatory from which they emanated, but in a paper in the *Annalen der Hydrographie* (Berlin, 1887, XV page 333) the substance of my pamphlet has been republished and even parts of typhoons, which were constructed at the expense of the Colonial Government, have been reproduced without any reference to this Observatory. However I am informed that this was due to an oversight."

The following "damnation with faint praise" of Figg must have been unintentional, because subsequent information shows that the Director held his First Assistant in the highest esteem:

1888 "Mr. Figg took all the clockworks of the self-recording instruments asunder and had them cleaned and adjusted, after which they went as well as before."

Another extract from the same year indicates an interesting change in the meteorological significance of "fine", although the old meaning still persists in certain parts of England:

1888 "In the beginning of June, 1886, the barometer was rising slowly in the Far East. Gradients were on the whole very slight, the

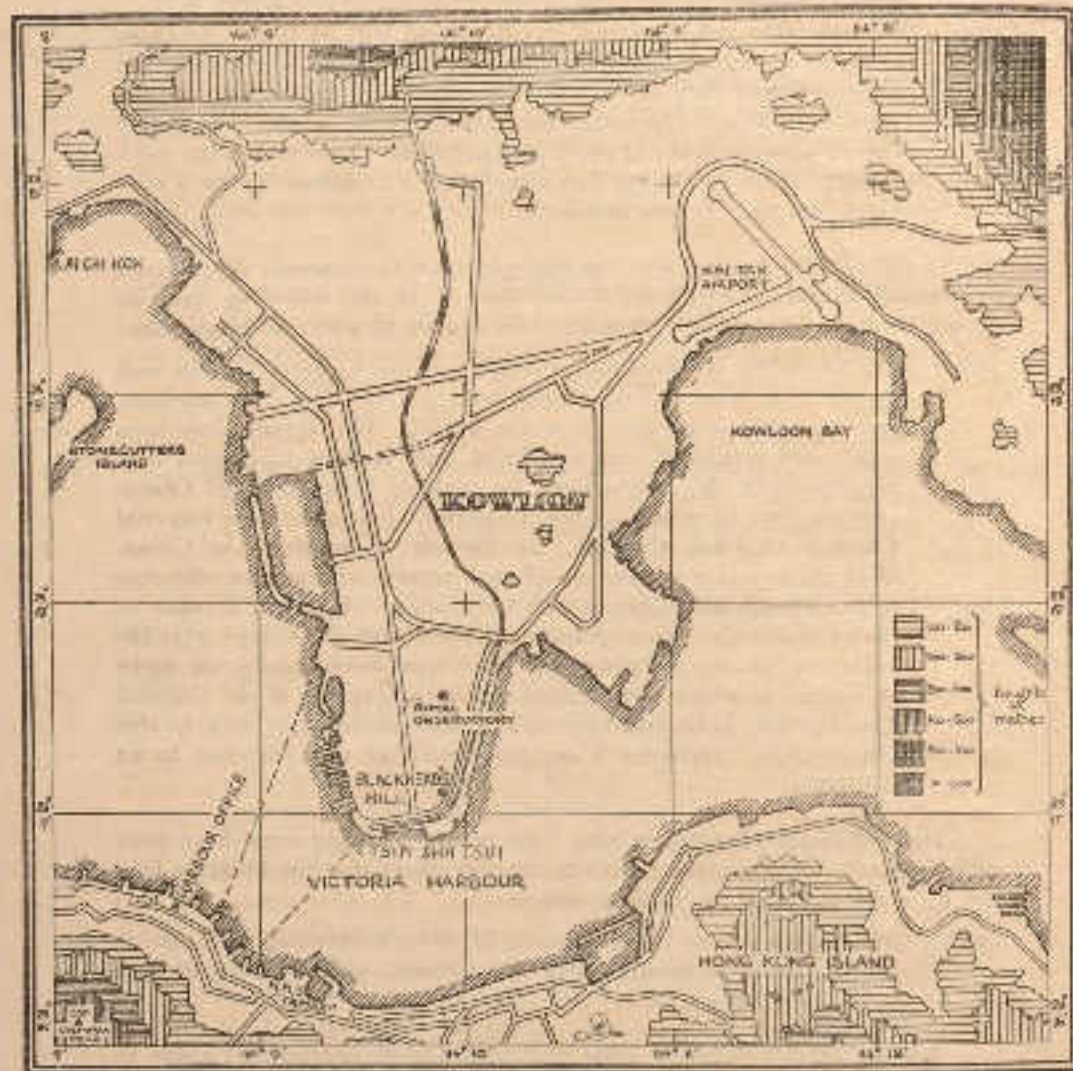


Figure 2: Map to show the relative positions of the Royal Observatory and the Kai Tak Airport.

temperature and humidity rather high and the weather cloudy but fine."

During the following year staff difficulties in the department became so serious that the Director petitioned the Governor:

(1886) "—the staff is so badly worked that I ventured last summer to call His Excellency's attention to the necessity for appointing another European as Chief Assistant. His assistance would also be available during bad weather, and he would assist in collecting information about typhoons."

His Excellency Sir G. W. des Voeux, K.C.M.G., Governor of Hong Kong, in 1890 appointed a commission to enquire into the working of the Hong Kong Observatory. A memorandum was submitted to the Commissioners by Major-General H. S. Palmer, R.E. who had drawn up the scheme for a "general scientific observatory" in 1881. After comparing the various parts of the scheme with the actual working up to that time, he concluded by stating:—

"The only important departure from my suggestions is the refusal by the Colonial Office to sanction the buildings and equipment for autographic magnetic records—a refusal apparently dictated by reasons of economy.....with reference to current investigations, the Observatory is really less purely scientific than was contemplated by the Royal Society and Governor Hennessy, and approved, later, by the Legislative Council."

Dr. Dobereck's emphasis on the Commission of Enquiry was not unnaturally in rather a different direction. In his annual report for that year he made the following comments:

1899 "Early last year His Excellency appointed a Commission to enquire into the working of this Observatory. The Commissioners held several meetings, visited the Observatory at my request, and then submitted a report."

"They strongly recommended a much larger annual expenditure and stated that 'the increased staff that has been found to be essential would involve a greater outlay, and the annual cost cannot be estimated at under thirteen thousand dollars a year; or nearly twice the sum now spent.' They also stated that 'to render the working of the Observatory properly effective, there should be three European Assistants at least, one of whom should

have sufficient experience and knowledge to permit of his taking charge of the Observatory, when necessary; there should also be three Portuguese or Chinese clerks." They also stated that "it would appear that a great deal of useful work is done at the Observatory, but that the beneficial outcome of this work is diminished by the inadequate sum that is allowed to be spent each year. The annual cost of the upkeep of the Observatory was originally estimated at ten thousand dollars, but only seven thousand dollars has been spent." They also strongly recommended that "European Assistants should be obtained from England as speedily as possible and that, in the meantime, temporary assistance should be locally obtained."

"I have to record my appreciation of the great skill and invariable courtesy with which the Chairman of the Commission conducted the enquiry. It is proper to call attention to this as it does not appear from the printed evidence attached to the report. But the printed evidence is quite incomplete and misleading. Many important remarks have been omitted by the reporter and my explanations are quite incorrectly put down or not entered at all. Had the circulation of the printed evidence not been limited it would have done much towards strengthening popular fallacies about typhoons."

"The Commission recommended the establishment of a branch observatory at the Peak..... General Palater reported in 1881, that he considered an anemograph on the top of the Peak to be desired. At present an advance upon the knowledge of typhoons gained in the Observatory during the past seven years depends mainly upon observations made on the top of the Peak. We do not know how far the present registers, kept by the signalmen, are to be trusted, e.g. they shew that the wind blows less strongly there during a typhoon than at sea level. It would be interesting to have the point cleared up. We have no right to say that the force of the wind is wrongly estimated. We do not know whether it is right or wrong."

In the same year reference was again made to problems that are still with us:

1890 "I regret to have to report that the magnetic hut was twice broken into and all the brass hooks and fastenings broken and stolen. Fortunately the magnetic instruments had been removed before this happened."

1890 "This is always the way with native assistants as soon as they are any good. They get more money offered elsewhere and they go away."

In 1890 also more definition was given to the system of "non-local" storm warnings by introducing two sets of symbols, one in red, which referred to tropical disturbances at more than 300 miles distant from the Colony, and another in black, which referred to disturbances at less than 300 miles distance. Night signals, a pair of lanterns, without specifications except to distinguish between a veering wind (vertical) and a backing wind (horizontal), were introduced in the same year.

Some slight increase in locally recruited staff in 1891 allowed the taking of meteorological observations hourly from 07 to 23 hours daily. In May of that year the department received its first expatriate addition to the staff. He was Mr. J. I. Plummer, who was appointed Chief Assistant, presumably over the head of the First Assistant, Mr. P. G. Figg, who had arrived with the Director in 1883. For some years previously, Miss Annie Doherty, the Director's sister had been giving assistance, particularly in connection with the storm warning service and liaison with reporting ships.

The Director does not appear to have been overimpressed by Government's response:

1891 "The staff recommended by the Observatory Commission as a minimum, below which this institution could not be expected to do justice to the immense shipping interests in this great port, has now been appointed, but it is regretted that in the meantime the staff was so utterly inadequate. The work done during the past two years has suffered in consequence, and no amount of expense now could possibly remedy the loss. Once a certain phenomenon has passed unrecorded the opportunity for observing it can never arise again, the same conditions being never repeated in the physical world."

In 1891, as an appendix to the annual report, the Director published "The Climate of Hong Kong investigated from Five Years' Observations". The medical references therein are interesting:

1891 "In spring, between the two monsoons, bronchial catarrh and pneumonia are prevalent. Measles, mumps and simple continued fevers are very common."

In summer the dampness of the air is excessive. Europeans suffer much from prickly heat and similar diseases produced in consequence of the heat and dampness. The Chinese are also subject to diseases of the skin, especially the different varieties of *Tinea*. Malarial fevers and diarrhoea are the worst hot weather diseases, the former chiefly of an intermittent type in summer. They are worst in August and September, when the Colony is under the influence of the high pressure areas preceding and lying to the north of typhoons. In these areas the wind is light and the air descending, so that it is stifling, dusty and probably full of bacteria. Want of sleep during such weather tends to produce anaemia from loss of appetite and therefore lays the foundation for many diseases such as diseases of the brain.

In autumn the dampness of the air decreases, and the temperature falls rather suddenly when the NE monsoon sets in. This causes affections of the chest and catarrhs, but Europeans enjoy almost an immunity from phthisis while to the Eurasians this is an ever present scourge. Malarial fevers assume more frequently the remittent and bilious remittent type. Beriberi is frequent among the natives, but cholera is never more than a minor evil in Hong Kong.

In winter, dysentery—the dreaded scourge of the Pacific—occurs. This is the worst disease of the China Coast and often leads to abscess of the liver. Small pox is endemic and occasionally epidemic. Typhoid fever is very rare, but typho-malarial fevers are common during the end of the winter and also in spring along the southern coast of China and Annam.

The most unhealthy places are situated in ravines between the hills, near marshy land or paddy fields. In such places malaria is deadly. Between one and two thousand feet up on the hills the air is pure and fever less common and of a milder type, which is as a rule easily cured by quinine. It is more agreeable to live in the upper regions although the air is frequently saturated with moisture.

It is not to be assumed that Dr. Doberck was unaware of another very common cause of "abscess of the liver":

During this period the Time Service had consisted of a time-ball released at 13 hours daily on the tower at the Tsui Shu Tsui Police Station.

Further attempts to secure staff increases were made during the year, this time on the grounds that insufficient use was being made of both ships' reports and reports from shore stations:

1891 "The total number of ships whose log books have been made use of was 270; the total number of days' observations was 5,278. This number might with advantage be increased. The difficulty is that we are all so closely engaged at the Observatory that no more than one of us at a time can be spared for visiting ships in the harbour, and he can devote only half his hours of duty to work afloat. Every vessel entering the harbour ought to be boarded, and every log-book found to be properly kept ought to be copied. That would be useful for storm warnings."

1892 "Unfortunately there is no prospect of additional clerical help for a purpose so useful to the shipping as this undoubtedly is. The immense bulk of records from stations on shore is not utilized for anything beyond investigations of typhoons."

Approval was given, however, in 1892 for Miss Annie Doberck, sister of the Director, to join the staff. That she was not quite in the direct line of succession would appear to be the case from her title—Meteorological Assistant. The term "meteorological" appears to have been used with special significance in those days, as e.g. with the "meteorological signals" which were nothing more nor less than early typhoon warning signals. Miss Doberck was a sort of early Marine Liaison Officer, the nature of her duties earning her the sobriquets "Typhoon Annie" and "Sampan Annie".

The following year an additional argument was urged— inadequacy of pay:

1893 "The staff of this department is remunerated on a lower scale than that suggested by General Palmer and, moreover, the salaries were not increased in 1890 at the time general increases of about thirty-five percent were awarded to officials in other Government departments. In the event of a vacancy arising, from any cause, amongst the foreign staff, it will be quite impossible to efficiently fill it on the present salary scale."

A rather remarkable "acknowledgment" paragraph in the report for 1894 definitely foretold the eventual passing over of Mr. J. L. Plummer, Chief Assistant, in favour of Mr. F. G. Figg, First Assistant. The final

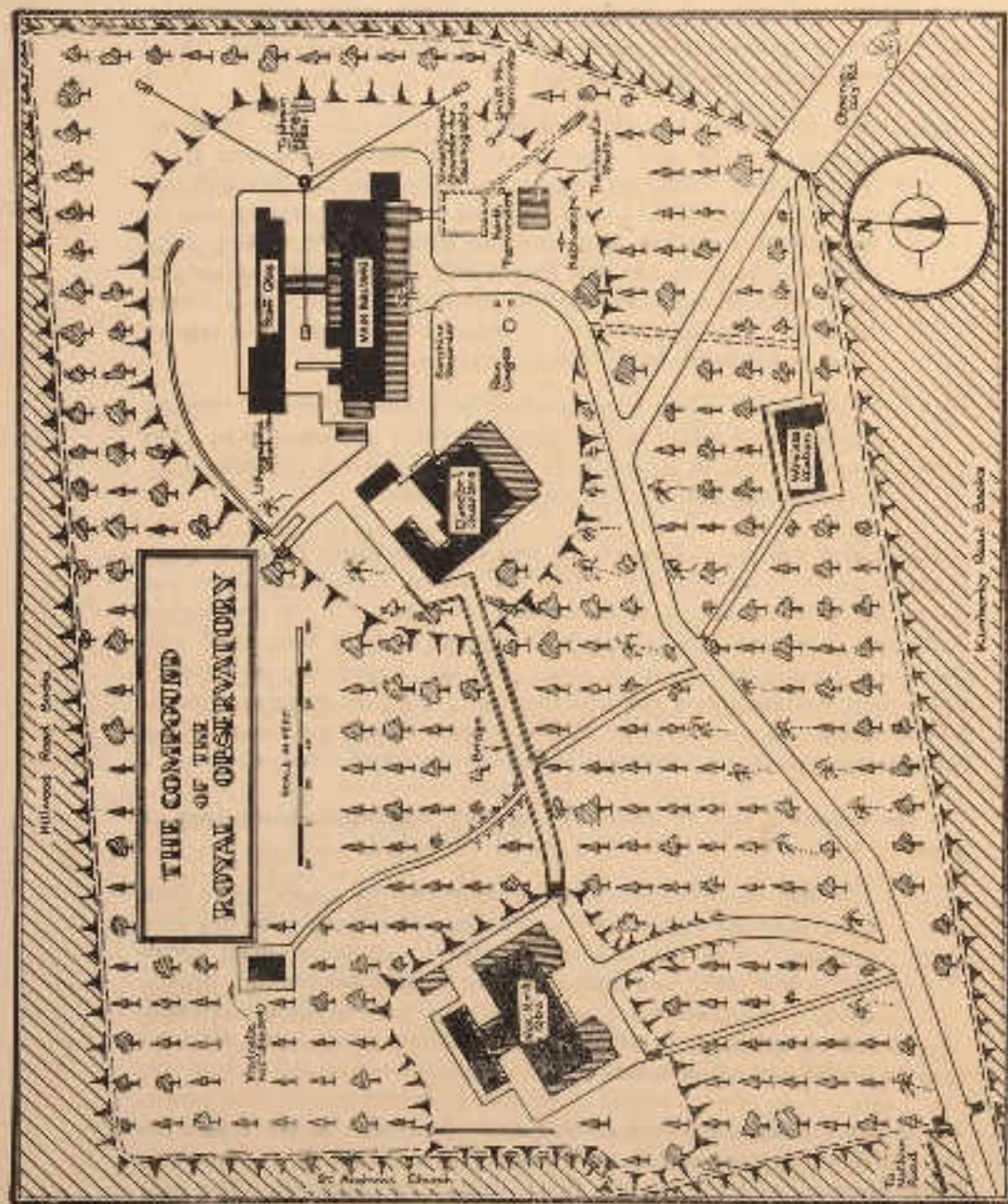


Figure 3: Sketch map of the Compound of the Royal Observatory.

paragraph leaves us in no doubt that the Director had every confidence in his own abilities:

1864 "During my (Dobson's) absence on leave from 28th May to 26th December, inclusive, after eleven years continuous service in the Colony, Mr. J. I. Plummer, Chief Assistant, took charge of the astronomical & magnetic observations, including the time-ball, and Mr. F. G. Figg, First Assistant, attended to weather forecasts and storm warnings and superintended the meteorological work. The way Mr. Figg discharged these duties, which are of considerable importance to shipping, during my absence, is deserving of the highest praise, and calls, I respectfully submit, for some reward from the Government..... Some of the instruments suffered during my absence from various causes, but I expect to have them in as good order next summer as they were last spring.

The name "computer", which is still used in the department for a member of the non-professional technical staff, was first mentioned in 1864.

Eulogistic comment of an exceptional order stands out in the otherwise rather dull report for the year 1897. Again the First Assistant is the subject:

1897 "Too much credit cannot be given to Mr. Figg, our eminent weather-forecaster, for the service he has rendered..... His warnings have saved enormous sums of money for the wealthy communities of the Far East, and have indeed been a benefit to nearly all who trade in these seas, quite apart from the lives that have thereby been preserved".

At the beginning of February, 1867, the storm signals invented by Admiral Fitzroy in 1861 were introduced, and the typhoon gun was fired when the drum was hoisted. "In spite of the great advantages accruing from the adoption of the system of storm signals in use in England and in other countries," states a contemporary report by the Director, "it has been decided to revert to the system in use here from 1884 to 1896 inclusive". It was actually decided on the suggestion of the Committee of the Chamber of Commerce, who stated "These signals, having been in use for 13 years, were becoming gradually more understood and rightly interpreted by the boat and seafaring people as the time went on, as is always the case, the Committee believe, when a system of signalling is introduced". The signals were from this time repeated on the flagstaff of the Kowloon Godown Company, and by day at the Harbour Office and on His Majesty's Receiving Ship.

During 1903 it was decided to arrange the drum, ball and cone in pairs so as to indicate the bearing of typhoons from 8 instead of 4 compass points. At the request of the Hong Kong General Chamber of Commerce the Government decided to adopt, in addition, the Shanghai Flag system of signalling meteorological information. A mast for this purpose was erected at Blackhead's Hill, Kowloon Point. The changes came into force on 1st January, 1904.

In the same year, 1904, Standard Time was adopted instead of Local Time. (8 hours in advance of Greenwich instead of 7h. 36m. 41.86s. — later 41.759s.)

Excavations begun in 1905 at the western end of the Observatory compound for the purpose of building a church (St. Andrew's) caused some concern since the 30-foot precipice produced thereby came within 10 feet of the magnetic hut. The Director made no secret of his strong feelings on the subject (even the Church should not be allowed to interfere with the proper progress of science) and submitted his protest in the following terms:

1905 "During the past year gangs of coolies have been at work excavating the hillside to the west of the magnetic hut, and the erection of a church on the site thus formed has been in progress. The west side of the magnetic hut is now only ten feet from the edge of the cutting which goes almost sheer down for more than thirty feet.

Owing to the earth cutting in progress in close proximity to the observing hut, observations could not be made in November.

At other times during the year they have been made under the following conditions:—

May 12 and 13th: coolies cutting hillside with pick and shovel about 100 feet NW of the observing pier and about 25 feet below its level.

May 15th: same work in progress about 30 feet west of observing hut. The horizontal force observation was commenced but abandoned.

August 17th: during first quarter of observation coolies at work as above about 90 feet west of and about 25 feet below level of instruments.

December 11th, 12th, 13th, 14th, 15th and 18th: workmen engaged building outhouses 40 feet west of and 30 feet below level of instruments."

Dr. Doberck's repeated efforts to secure funds and staff for an expansion of the services of the Observatory were not outstandingly successful, and in 1906 he felt it necessary to remind Government that they were getting far more than they actually paid for:—

1906 "It should be remembered that this Government supports only the Observatory, and one other meteorological station (Gap Rock). All the other meteorological returns printed in the daily weather report are supplied free of cost by observers in surrounding countries, who are not in the service of the British Government, and of course, not subject to any regulations made by the British authorities. Several stations furnish reliable information, while the returns from others are more or less irregular. The barometric observations telegraphed from some stations in China are frequently erratic."

1906 "As our warnings in connection with typhoons in the China Sea are based mainly on reports received from the Gap Rock lighthouse, it is of the utmost importance that the cable between Hong Kong and Gap Rock should always be in working order. From Victoria Peak the direction of the wind and the reading of the anemograph are telegraphed every hour from 6 a.m. to 8 p.m. It is of importance that this service be continued during the night whenever required."

1906 was the year of the shocking typhoon disaster on 18th September. The Director comments as follows:

1906 "There were three instances when a strong gale occurred and the gun was not fired, but in each case the typhoon had been previously notified several hours in advance by notices and signals issued..... Twice the gun was fired too late. In the first case warning had been given some hours previously by the hoisting of signals, and in the second instance, that of September 18th, 1906, both signal and gun were late."

"Could earlier warning have been given it would doubtless have contributed to the saving of life and property as far as the boat population in the harbour is concerned. The damage in the Colony must in any case have been extensive, for apart from the suddenness with which this gale came on, it occurred at flood tide, which, owing to the typhoon, was of exceptional height and was responsible for a great deal of damage along the sea front, against which no precautionary measures would have prevailed, the damage being

An interesting, if abortive, attempt to record a very famous astronomical event was made in 1910:

1910. "In view of the possibility of Halley's Comet being visible during its transit of the sun on May 19th, a camera from which the lens had been removed was fitted to the Lee Equatorial, and adjusted so that a photographic plate was situated in the principal focus of the six-inch object glass. The computed time of ingress and egress, 11 hours 6 minutes and 12 hours 6 minutes, Hong Kong Mean Time, kindly communicated by Kiel, was received by telegram early in the morning.

The sky was partially cloudy but during breaks four exposures were made between 10h. 30m. and 10h. 25m., and during transit nine exposures between 11h. 21m. and 12h. 50m., after which the sky became entirely overcast. The plates were successfully developed by Mr. Jeffries. The sun's disc had a diameter on the plates of one inch only, but under magnification a fair amount of detail could be detected in a group of sunspots situated near its centre. A critical examination of the negatives, however, revealed no trace of the Comet."

Owing to the impending departures of both the Director, Mr. Figg, and the Chief Assistant, Mr. Plummer, a Director Designate, Mr. T. F. Claxton, formerly Director of the Royal Albert Observatory at Mauritius, was appointed. He became Director in 1912. Mr. C. W. Jeffries became Chief Assistant and Mr. B. D. Evans arrived from the Royal Observatory, Greenwich, as First Assistant.

In the same year, the term "Head Computer", which is still used, was mentioned for the first time. He appears to be, in category, a direct descendant of the former Second Assistant (e.g. he was always a local appointment).

In 1912 an additional room was built onto the western end of the building, not a pendant as in the original plan. This became the Director's Office, releasing the former room for library and publications store. The six-inch Lee Equatorial, which had been dismounted for several years, was returned to the Royal Observatory, Greenwich.

The Director's Annual Report for 1912 states that in May of that year the "China Coast" code (of storm warnings) was modified so as to utilize 16 points of the compass in place of 8 when signalling the tracks of typhoons.

For the benefit of vessels taking shelter in Kowloon Bay and to the west of Stonecutters Island, arrangements were made early in 1912 with the military authorities and the Standard Oil Company respectively to repeat the local warnings at Lyceum and Lai Chi Kok.

It was in June 1912 that His Majesty King George the Fifth sanctioned the designation "Royal Observatory".

Further encroachment into the compound of the Observatory, which its first Director had described as "the best spot", occurred in 1913, when a playground for the "Kowloon British School" was cut into the western end.

By the beginning of 1913 times of observations of meteorological elements had been gradually increased until there were six barometer readings daily at 02, 06, 10, 14, 18 and 22 hours, and fourteen temperature readings daily at 01, 04, 07, 09, 10, 11, 12, 13, 14, 15, 16, 17, 19, 22 hours. In a manner similar to that of his predecessor, the new Director found it necessary to remind Government that they were receiving better service than their due:

1915. "The present Weather Forecast Service, which has become possible through the courteous co-operation of other Observatories in the Far East, and the Chinese Maritime Customs, who forward weather telegrams twice daily, was not included in the scheme (The Surveyor-General's scheme for the Observatory, May 1884)."

It should be appreciated that at that time a clear distinction was made between a Meteorological Service (Storm Warning) and a Weather Forecast Service. Meteorological Signals were in those days what are now called Typhoon or Storm Warning Signals.

The new Director, Mr. T. F. Claxton, brought into general use the international classification of clouds, making the following interesting reference thereto:

1917. "In former years, the type (of cloud) alto-stratus was not classified, alto-cumulus was called small cumulus, and strato-cumulus was entered under stratus and cumulus. The thunder cloud, cumulo-nimbus, was called cumulo-stratus, and nimbus from which no rain was seen to fall was called cumulo-nimbus. Strato-cumulus was called roll-cumulus."

Which-doctor proclivities, and the essential mystery attaching thereto, which have occasionally been ascribed to members of the meteorological

profession, evidently formed no part of the operations of the Observatory at this time. With no claim to copyright whatsoever, the Director announced:

1915 "The following are the principal rules on which the weather forecasts at Hong Kong are based:—

- (1) With a typhoon crossing Luzon in a W or WNW direction the weather will be fine in Hong Kong until the centre reaches within about 200 miles of Hong Kong, after which it becomes rainy and squally.
- (2) Very shallow gradients over Hong Kong are usually accompanied by fine weather.
- (3) Typhoons whose centres pass from 200 to 600 miles to the eastward produce very sultry though fine weather at Hong Kong.
- (4) When typhoons pass within 300 miles to northward on a westerly track heavy rain occurs at Hong Kong.
- (5) A trough of low pressure running east and west, either to the north or to the south of Hong Kong, indicates rain, and also thunderstorms in the summer and spring.
- (6) A rapid increase of pressure over China, with a moderate to steep gradient over Hong Kong, produces drizzling rain and a fall of temperature; principally from autumn to spring.
- (7) After the disturbance produced by (6), which may last from 6 hours to 2 days, the weather may become quite fine, though the weather map drawn from the meagre data available remains apparently unchanged.
- (8) A rapid decrease of pressure over China, is followed by a rise of temperature at Hong Kong with fine or rainy weather according to conditions not usually visible on the map.
- (9) While forming to the southwest of Hong Kong depressions produce showery weather, with squalls from the SE quadrant.
- (10) Pronounced kinks in the isobars near Hong Kong indicate rain and squalls; the latter more particularly if the gradient wind is in the SW quadrant.

- (11) Winds blowing towards Hong Kong from different directions indicate rain.
- (12) Winds blowing away from Hong Kong in different direction indicate fine weather.
- (13) V-shaped depressions (rare at Hong Kong) are accompanied by rain.
- (14) In the winter and spring, when the NE monsoon is blowing, a decided fall of the barometer indicates fog along the coast.
- (15) Weather systems travel from west to east over China and Japan, into the Pacific.

Occasional "natural history" references in the records indicate that the first Director's appreciation of the site was carried on through the years, and the amenities of the Observatory compound, in spite of encroachments, were jealously guarded:

1915 "The growth of the blue grass (*ophiopogon*) planted in 1914, has been very slow. It has not spread sufficiently to prevent erosion."

1915 "Three snakes were killed in the grounds in the month of November; two six feet long and one five feet long. A fourth was seen, but escaped."

Most probably inspired by the famous researches of Sir Gilbert Walker on the relations between the weather of different seasons, the possibilities of "long-range forecasting" were studied in connection with Hong Kong's not infrequent affliction from droughts:

1916 "An investigation into the weather conditions in China, Siberia, India, South Africa and South America prior to winter droughts in Hong Kong, yielded no evidence of a correlation by which these droughts might be predicted."

From 1st January 1916, full 24-hourly observations of the main meteorological elements were begun.

A system of supplementary storm warnings was begun in 1916, an announcement being made in the following terms:—

1916 "For the benefit of native craft and passing ocean vessels a cone is exhibited at several outlying stations during the time that any of the day signals are displayed in the Harbour, to indicate that

there is a depression somewhere in the China Sea, and that a typhoon warning is displayed in the Harbour".

A wireless mast was erected in 1917 to the southwest of the main building on the site where the Director's quarters now stand. This interfered slightly with sunshine recording for a good part of the year. In 1921, an additional recorder was set up on the southwest corner of the roof, and although this was also interrupted, the interruption occurring as it did at a different time, the record could be accurately corrected.

By 1917 the varying significances of the storm warning systems had reduced to a fairly stable principle and alterations since have been only minor ones.

The small northeastern wing of the main building, used as a battery room, was enlarged in April 1918 to include space for a small workshop.

A service of wireless time signals was begun in September 1918. Visual time signals, three vertical white lights flashing seconds on a five-minute programme, were begun in the following year, and operated at 21 hours each evening.

As from 1st June, 1926, at the request of the Chamber of Commerce, the Hong Kong Government adopted the China Seas Storm Signal Code in place of the Hong Kong Non-Local Code introduced in 1917. As the China Seas Code included a time signal at the mast head, which formerly was reserved for the Local Storm Signals, it became necessary to select a new site for the latter. A committee appointed by the Governor included the Colonial Secretary, the Harbour Master, the Director of the Royal Observatory, the President of the Chamber of Commerce and representatives of Messrs. Jardine, Matheson and Co., Ltd., and Messrs. Butterfield and Swire. The Director of the Royal Observatory's suggestion that the Local Signals should be transferred to the Observatory Wireless Mast was adopted. Alterations were carried out by the Public Works Department and the old Equatorial dome was enlarged to accommodate the symbols.

At the request of the Director General of Observatories in India, arrangements were made with the Eastern Extension Telegraph Company for warnings to be sent to Simla whenever a typhoon was passing westward over Indo-China. It is recorded that this was necessary only once—8th November—during the first year of operation.

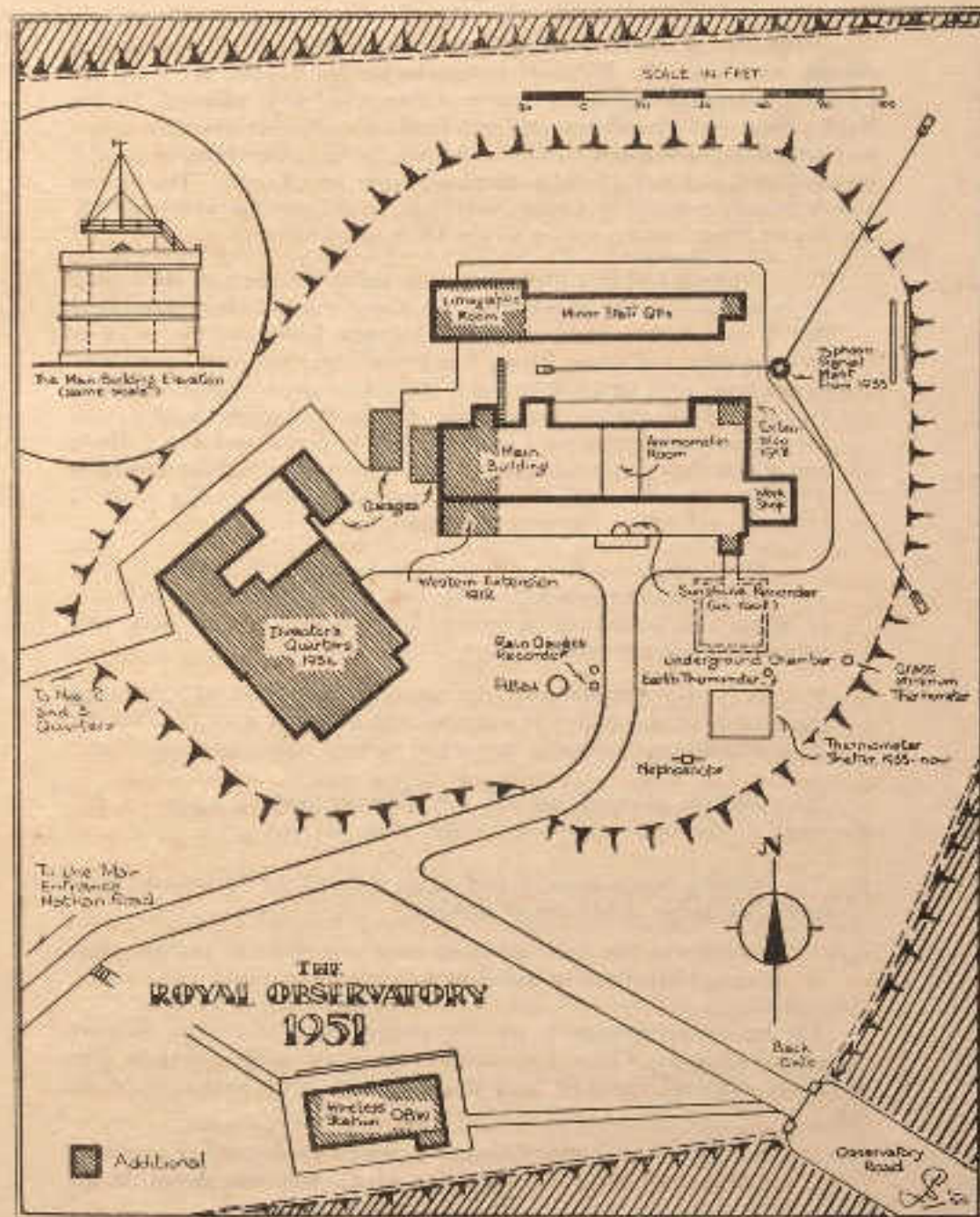


Figure 5: Sketch map of the Royal Observatory, 1951.

When on leave in England during 1920 the Director was requested to discuss with the Air Ministry meteorological provisions for aviation. Facilities for obtaining the necessary information were afforded by Sir Napier Shaw and his officers, and as a result, the Director upon his return to Hong Kong submitted to Government a fairly comprehensive request for equipment and staff needed to carry out upper air research. The scheme was drastically reduced by Government, who would sanction no extra staff, Sir Napier Shaw having written to the Director as follows:—

" I cannot find that there is any immediate prospect of developing air routes on the line of which Hong Kong will lie. It is quite clear that if routes were to be developed between Japan and Australia or between India and Japan, Hong Kong would be a centre of information of the most vital importance, but I am not aware that projects of that kind are being actively prosecuted. We have therefore to deal with the general meteorological importance of the position of Hong Kong and of that there can be no question, and what will be useful for aviation when it materialises will be in the meantime useful for the study of cyclones and other atmospheric visitations of Hong Kong.

" While therefore I cannot say that aviators will forthwith claim your assistance, meteorologists will look to you as the natural centre of information for the region between Calcutta and the Philippines and between the equator and latitude 50°.

" It is very desirable that you should be equipped with means of exploration of the upper atmosphere and provided with facilities for acquiring information from a network of stations in the region specified."

Pilot balloon observations for the determination of velocities and directions of the upper winds were first made in 1921.

Too frequent resignations of staff again induced the Director to make an appeal for better conditions of service:

1921 "Government has been asked to make the scale of pay for these telegraphist-observers sufficient to attract and retain good men."

An interesting comment on the danger from the formation of "secondaries" in the China Sea, which exists to the present time in spite of greatly increased reporting from ships, appears in the annual report for 1921:

1921 "The attention of meteorologists is drawn to these three typhoons (during the year). No indication of the first was shown on the

weather map. This Observatory had no knowledge of its existence until nearly eight months later, when the log of the "Ananiba" was received..... Both of the others absorbed the primary cyclone and one formed in the southern portion of it while the other formed in the north-east portion. They were evidently analogous to the typhoon which caused so much damage to Hong Kong on September 18th 1906."

"The formation of these secondaries in the China Sea where there are no observing stations adds to the difficulty of the weather forecaster, and emphasizes the importance of wireless weather telegrams from ships."

The magnetic tent was moved at the end of 1920 to a point approximately 133 feet north of its original position in order to make room for the erection of two houses for the expatriate staff on the western hillside. These were completed in September 1921. As for the amenities of the Observatory itself:

1921 "Gas-fires in all rooms and two geysers were installed in November".

The first evidence of educational visits to the Observatory, which are welcomed and encouraged at the present time, occurs in the report for the year 1922 when it was stated that:

1922 "50 members of the Chinese Y.M.C.A. were shown over the Observatory on March 18th. A class of 35 boys of the Diocesan School on March 28th and another class on March 29th. 30 students of the Union Middle School, Canton, were shown over on October 30th, and 15 students from St. Stephen's College, Hong Kong, on December, 7th."

Lithographic operations, principally for the production of the daily weather map, were begun in 1922, a lithographer and a printer being added to the staff.

Co-operation from British ships in the area suffered an inexplicable decrease in 1923 and evoked the following comment by the Director:

1923 "It will be seen that while the number of foreign ships sending weather reports by radio telegraphy has increased by 17%, the number of British ships has decreased by 30% (compared with the previous year). This is a serious matter which is engaging the attention of the Government."

The following year he was able to report as follows :

1924 "The question of regular observations from ships by wireless telegraphy was taken up vigorously by the Chamber of Commerce, with the gratifying result indicated in the above table."

The "above table" showed a total of 665 British ships for 1924 against 166 for 1923! It would be interesting to know the technique adopted by the Chamber of Commerce but the records are silent on the point.

A recommendation that routine earthquake observations should be made at the Observatory having received Government's approval, an underground chamber, a little to the south of the eastern end of the main building, was constructed in 1924. In addition to housing the seismographs, this room also contained the clocks, which thereafter were subjected to considerably less temperature variation with a consequent improvement in their rates.

The labour troubles of 1925 do not appear to have interfered with the department to any great extent, the only reference to it being as follows :

1925 "On leaving the Observatory on June 25th the printer and his assistant were assaulted by intimidators, so failed to attend on June 27th and 28th. In consequence the weather reports for those days were not issued until June 29th when the printers returned to duty. This was the only interruption caused by the strike so far as the routine work of the Observatory was concerned."

Mainly for the purpose of expediting the reception of ships' reports, a wireless station (OBW) was built in November 1926 in the southern part of the compound.

Another item of interest during that year is given below :

1926 "On November 23rd, Professor Woodman of New York University, in charge of 300 undergraduates on an eight month's cruise on board the ss "Kynham" came to the Observatory to obtain information on the Climate of Hong Kong for educational purposes."

A hint of the enormous emphasis on aviation meteorology which was to arise in the subsequent decade occurs in the report for 1927 :

1927 "On November 24th, Flying Officer R. Vaughan Williams, R.A.F., came to interview the Director in connection with the establishment of an air route to Shanghai."

Supply and transport difficulties during the year were reported as follows :

1927 "By the end of April our stock of hydrogen (for pilot balloons) was exhausted owing to leakage from the cylinders, and no funds were available for a further supply."

"Transport to Au Tau (Magnetic Station) has been mainly furnished by the Railway Department during the year, but this is not entirely satisfactory as a car cannot always be obtained at short notice."

Arrangements were made early in 1927 for the more rapid dissemination of typhoon warnings by telephone. The Royal Observatory warned 6 stations, 3 of which were distributing stations. Of these, 4 warned 7 stations, 3 of which were distributing stations. One of the latter warned 11 stations, 2 of which were distributing stations. In all, 86 stations and officials were at that time being warned.

An important item of information in the same year will be of particular interest to all who still know and respect that great meteorological enthusiast of the Far East referred to therein :

1927 "Father Gherzi, of the Zikawei Observatory, after patient experiment and with the utmost goodwill, has recently inaugurated a short wave broadcast service, by which we obtain at 9h. 45m. the 6h. observations from 7 stations on the Yangtze and North China. The thanks of all concerned are due to Father Gherzi for these valuable observations."

A new magnetic station, remote from the interference of ferrous materials in surrounding buildings which for several years had been encroaching upon the Observatory site, was constructed at Au Tau, 1.7 miles as the crow flies northwest of the Observatory, and completed in March 1927. Regular continuous anemographic records were begun on 31st January 1928.

In the same year the time-ball tower at Blackhead's was heightened 20 feet for greater visibility from the harbour.

There is a strong likelihood that the gentlemen referred to in the next extract is the same as the one concerned in the inauguration of the air route to Shanghai, 1927. The Englishman's notorious inefficiency with the names of visitors is probably to blame :

1928 "Flying Officer R. Vaughan Fowler, R.A.F., came to interview the Director in connection with the meteorological needs of a proposed civil aviation company for Hong Kong."

The Royal Air Force was also concerned in what were apparently the first experiments in rain-making to be carried out in the Colony:

1929 "The water shortage having become very serious, on June 18, R.A.F. planes from the R.A.F. Base Kai Tak, dropped 6½ cwts of powdered kamin on cumulus cloud, with a view to producing rain.

The experiments were suggested by a Hong Kong resident and were sanctioned by the Naval Authorities at the request of the Hong Kong Government, not with any hope of producing rain, but to satisfy the public. The results were as expected."

Reference to advancing techniques in radio telegraphy is made in an extract from 1931, although it is clear that the Observatory was not permitted to take part in those particular experiments:

1931 "The Postmaster General was unable to accede to my request that watch should be kept for the experimental short wave transmission from Paris on June 11, 18 and 28."

Another well-known Far Eastern meteorologist is mentioned in the records of 1931, apparently for the last time:

1931 "The Rev. Father Louis Froc, S.J., for many years Director of Zikawei Observatory, passed through Hong Kong on August 18 on retirement, and was welcomed by the Rotary Club of Hong Kong."

Mr. T. F. Claxton retired from the Directorship in 1932 and was succeeded by Mr. C. W. Jeffries. Mr. B. D. Evans was appointed Assistant Director and Mr. G. S. P. Heywood arrived from England as Professional Assistant. The last two titles were new in the department.

An entirely new post which was introduced into the department the same year was that of "Lady Assistant and Translator", later called "Office Assistant and Translator", although the incumbent remained a female European. The work of translation required was in connection with scientific publications, received on an exchange basis from other countries, particularly from French and German speaking ones.

The dropping of the time-ball ceased on 30th June, 1933 "with the approval of the Naval Authorities and the Hong Kong General Chamber of Commerce, the opinion being expressed that in comparison with radio-telegraphy and telephony the method had become obsolete".

During 1933 the wireless mast (typhoon signal mast) was removed from its original position to make way for quarters for the Director. It was set up a little to the northwest of the main building. The house was completed in February 1934. The first floor rooms of the main building thus released were converted into additional office and library accommodation.

A conference on Storm Warning Procedures between the Directors of the Weather Services of Hong Kong, Shanghai (Zikawei) and the Philippines was held in Manila in April 1934. As a consequence a uniform code (containing four international symbols) was adopted in Hong Kong and the Philippines from 1st January, 1935. Zikawei had already adopted a more extended code which included the Philippines-Hong Kong symbols.

An increase of Professional staff to meet the growing needs of meteorological services for aviation having been approved by Government, Mr. L. Starbuck joined the staff as Professional Assistant in April 1935. This was the appointment first requested by the Director, Mr. T. F. Claxton, in 1921. A limited aviation forecasting service was in consequence begun in 1937, the Director reporting as follows:

1937 "Commencing on 18th May, a Senior Officer and a Chinese Assistant have been stationed at Kai Tak aerodrome daily during the forenoon. A synoptic chart of the Far East, on which is also all available information concerning upper winds, is prepared and exhibited in the aerodrome, and the officer is available for consultation by departing pilots. An hourly weather report is broadcast daily, usually from 0600 to 1600 Hong Kong Standard Time, and is communicated directly to the Imperial Airways plane during its weekly flight from Indo-China to Hong Kong. A route forecast is also furnished to the pilot on his return flight to Indo-China."

The year 1937 was remarkable for a typhoon of exceptional severity. Fortunately, adequate warning was able to be given, the No. 1 signal having been hoisted 26 hours before gales blew in the Colony:

1937 "The typhoon (of September 2nd) passed close to the south side of Hong Kong Island on a WNW track between 3 and 4 a.m. At the Observatory the minimum barometer reading reduced to mean sea level was 28.258 (ms. 958.2 mbs.), which is the lowest recorded since observations commenced in 1884. Several gusts exceeded 125 m.p.h. and it seems probable that the typhoon was the most violent that has ever visited the Colony."

Pilot Balloon observations, first begun in 1921, were made more and more frequently until two ascents per day were made whenever the cloud base was above the Peak (1800 feet). In 1938 667 balloon ascents were made. Throughout the same period, meteorological flights were undertaken occasionally by Royal Navy and R.A.F. planes, as many as 60 being flown in 1928. A daily meteorological flight, undertaken by the Far East Flying Training School, was instituted on 1st April 1939.

At the same time a newer and more effective method of upper air sounding was being developed:

1939 "Whilst in England the Director was afforded opportunities by the Director of the Meteorological Office and the Superintendent of the Kew Observatory to study the operation of the Thomas and Vaisala radio-sondes. These instruments are practical and reasonable in price, but a shortage of supplies for manufacture, etc., will prevent their extensive use, until the termination of hostilities."

Accommodation for a meteorological office at the new Kai Tak Terminal Building was allowed for, and this came into operation in 1939. Two additional Professional Assistants, approved for January 1939 and January 1940 for the purpose of extending the aviation meteorological services, were later withdrawn owing to the rapidly deteriorating international situation at that time.

The Far Eastern conflict broke out on 8th December 1941 and the Colony fell to the Japanese forces on Christmas Day.

The Observatory was used, rather casually, as a meteorological station during the Japanese occupation of Hong Kong, 1941 to 1945, but the more important activities of the compound appear to have been the operation of two anti-aircraft guns similar to the familiar British 4.7s. The buildings fortunately suffered only superficial damage, but almost the whole of the equipment was removed and no records survive of any observations taken during the period. The three senior officers (Mr. C. W. Jedries had died suddenly in June 1941) were interned. On their liberation they took over the Observatory from the Japanese and one of them remained until he was able to hand over to the Fleet Meteorological Officer.

During the military administration of Hong Kong, the Observatory was operated by a joint Royal Navy and Royal Air Force cadre, no skeleton staff having arrived for the department with the relieving force as was the case with most other departments. By the time the Civil Administration

took over the Colony on 1st May 1946, there were two European officers available for duty at the Observatory and ten former Chinese staff members had reported for duty.

The Director, Mr. B. D. Eccles, did not return to the Colony after his recuperation leave, and Mr. Heywood was appointed Director with effect from the resumption of Civil Government. To meet the enormously expanded needs of aviation meteorology, two additional professional assistants had been approved. This made four professional vacancies in the department. Mr. C. S. Ramage arrived on 27th April 1946. The R.A.F. forecasting centre was removed to Kai Tak in June of that year. The remainder of the work at the Observatory was gradually taken over from services personnel and completed by the end of July. Mr. B. W. Thompson, Professional Assistant, joined the staff in November 1946.

At the beginning of August 1947, complete responsibility for the aviation weather service, both for civil and air force requirements, was taken over by the Observatory. In the early stages, lack of accommodation at Kai Tak severely hampered operations. A third Professional Assistant, Mr. R. C. Baumisser, arrived in June 1947, and a fourth, Mr. N. Lawrence, in the following month. In September 1947, the whole of the department's forecasting services were transferred to a specially constructed Meteorological Office at the Kai Tak Airport.

Developments in the department since the war and up to this time had been almost exclusively in the direction of aviation meteorology. The rapid advance of aviation in the Colony immediately after the re-occupation had enormously increased the meteorological commitments of the department. Two additional Professional Assistants were approved by Government and some intermediate appointments, long overdue, that helped to bridge the gap between the professional officers and the computing staff. A further most welcome addition to the staff was the appointment of a Marine Liaison Officer, who could take over the whole of the very important operations in connection with weather reports from and to shipping.

Universal meteorological codes, agreed upon by a 67-nation Conference of Directors of the International Meteorological Organisation, held at Washington in September 1947, were introduced on 1st January 1949.

Daily meteorological flights to a height of 12,000 feet were resumed from 1947 and continued until the installation of radio-sonde equipment under direction of an expert from the Air Ministry in the autumn of 1949.

The recommendations of a Conference on Storm Warning Procedures, held in Manila in May, 1949, for the purpose of unifying and bringing into line with international practice the procedures of the various services, brought into effect revised codes on 1st January 1950. The principles remained the same but more definition was allowed for in location, direction and speeds of the storms signalled.

With the arrival of Mr. G. J. Bell in July 1949, and Mr. J.E. Peacock in April 1950, prospects for the resumption of the non-meteorological operations of the department were considerably brighter, but unfortunately in February 1950, Mr. Bannister resigned to take up an appointment with the Meteorological Service of Fiji.

A time service, based on a specially designed master clock ordered in October 1946 and eventually received in 1950, was resumed in April of that year. The clock is ruled on radio time signals, the transit circle, removed by the Japanese, never having been replaced.

Full details of the operations of the Royal Observatory since the re-occupation are contained in the Annual Reports of the Director which are readily obtainable.