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The following report from the Director of the Observatory on the Typhoons of 1884 and 1 s published for general information.

By Command,

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REPORT ON THE TYPHOONS OF 1884 AND 1885.

(With six plates).

Typhoons as a rule originate E or SE of the Philippines in the trough of low pressure betwe wo high pressure areas in the North Pacific and in Australia, which region is characterised by hi urface temperature.

Their origin is not quite understood but appears to be connected with an abnormally high tempe nd humidity in some place in comparison wi... the neighbourhood. The hot air expands and a ver such a place and the heat liberated by the consequent condensation of aqueous vapour ena o rise still further. The air rising to a higher level in the atmosphere causes there an incre pressure, in consequence of which the upper air is set in motion towards the circumference of th n question. Thus a decrease of pressure near the surface of the earth in the hot and damp re ffected, and the surrounding air is impelled towards it. This motion of the air at the earth's s nto the area is of course contemporaneous with the escape of the air above out of the same area, urther increased by the greater pressure at the surface of the earth in the surrounding area can he outflow of air above. Thus it is seen that whenever a limited area is hotter and damper th eighbourhood, the wind must commence to blow straight in towards its centre, or rather in eac rom high towards low pressure in a direction vertical towards the isobar. But air in motion is orthern hemisphere deflected towards the right owing to the rotation of the earth except whe ery near the equator, and in consequence we have not traced typhoons nearer to the equato bout nine degrees. It is however possible that they may originate nearer than that to the equ urricanes have been encountered at a lower latitude. But at the equator the surrounding a uing to blow straight towards a barometric depression would soon fill it up. Owing flection towards the right the wind is caused to move in a curved path in towards the centre trifugal force, in consequence developed, still further deflects it from the centre of the low pr o the friction between the wind and the surface of the earth or the more or less disturb rface retards the entrance of air into the central depression, while the upper air, subject ction escapes from the upper high-pressure area. Thus we see that once a cyclonal motion is ends, to increase and to spread outwards.

Of course it is not thereby implied that a typhoon may not originate within an extensive pressure round which the air has already a gyratory motion inwards. But that such a condi sufficient to originate a typhoon is frequently instanced in the China Sea, when the wind alo thern coast of China is E, in Tonquin N, over the Philippines S and lower down in the Chi without being followed by a typhoon. That a typhoon may follow on similar circumstance r additional conditions are fulfilled, is instanced in case of Typhoon VI of 1885.

But that a typhoon in the beginning of its existence rather spreads from the centre outward everse, is made probable both by the similarity between a typhoon in a very low latitud waterspout (Comp. e. g. Typhoon IV of 1885) and by the subsequent expansion of the typh rogress. There is however the important difference between a typhoon and a tornado, t is taller than it is broad, while the height of the former does certainly not reach four mil its horizontal diameter may exceed a thousand miles. Moreover there is n ow, and it is rather unlikely, that the centre with the lowest pressure at any level abo ce of the earth is situated vertically above the lowest pressure at the earth's surface or ev ght line with the lowest pressure above and below its level, so that we are not entitled to a is in a typhoon.

The enormous energy exhibited by a typhoon must be traced to the radiation of the sun, the central area and effects the evaporation of water, to which the great humidity is due. gy is partly spent in overcoming friction between air and sea-surface and also between layer ng in different directions, but mainly in overcoming the former, and in raising quantities energy is partly recuperated by the heat generated through friction, by the condensation of a ur, and by the descent of air in the surrounding area. Whether part of the energy is draw omentum of the earth is not known for certain.

The high pressures surrounding the cyclone in a typhoon are plainly traced on our weather n although imperfect with regard to isobars, generally show the barometer to be rising from to about 1000 miles in front and to the right and left side of the cyclone, which rise is ac panied by clear and dry but hot weather and light winds of variable direction. It is muc

difficult to trace the existence of a high pressure area (anti-cyclone) behind the cyclone, simply be the barometer is in any case rising there. But apart from the question of the high pressure may be supposed to follow the cyclone, there does not generally exist a fine weather area behind the S and particularly SW winds blow there very fresh, accompanied by overcast, damp and frequ wet weather. Thunderstorms. likewise follow after a typhoon especially along the coast of sou China. This is easily explained in close analogy with land and sea breezes as for instance w typhoon has raged in the Formosa Channel and is followed there by overcast, wet and in conseq cool weather, while the fine and hot weather area continues to prevail in Tonquin, Hainan and part of the southern coast of China: the hot air will naturally expand and overflow the coole which will be drawn westward at the surface of the earth, thus generating a vortex motion rou horizontal axis. the recognized adjunct of a thunderstorm. The Easterly squalls occasionally here when a typhoon is passing northwards through the Formosa Channel are thus explained.

From observations made here it appears that within 150 miles of the centre of a typhoon th is densely overcast with nim. clouds accompanied by heavy rain and within 300 miles on an av 90 per cent. of the sky is covered with cum., R-cum or nimbus clouds. above which the different clouds are visible. Within 60 miles of the centre the rain generally pours down in torrents. North of the centre between 300 and 600 miles away the percentage is 50, the lower clouds being generally above which c-cum. predominate, and between 600 and 900 miles away it is 40, the lower clouds generally cum., above which c-cum. are usually seen. Southwest of the centre between 300 and miles away the average percentage is 60, the lower clouds being cum. or nim. and the upper gene c-cum. or c-str., and between 600 and 900 miles away it is 50, the lower clouds being generally cum-str. or nimbus (the latter predominate straight S of the centre) and the upper, c., c-cum. or c-s Cirrus clouds are found within 1200 miles on all sides of the centre of a typhoon. Thunder lightning are observed in the region covered by cum-str., but not elsewhere. In the small typh that pass South of Luzon lightning is seen nearer the centre.

The average temperature in Hongkong when a typhoon is more than 300 miles away is abou and it rises frequently much higher. Within 300 miles of the centre the temperature falls qu owing to the great amount of heavy clouds. The difference between the temperature at the Peal at the Observatory does not appear to be affected by the approach of a typhoon, but further observ is required to elucidate this point.—The dimensions here given must as far as the inner area is conc be much reduced in case of a typhoon in a low latitude, while above 30° latitude the circumst appear to be more irregular than farther south. Very near the centre the temperature at sea is gene about 76° and on shore about 78°.

Rain fallen during a typhoon is not accurately measured in a well exposed gauge as the str of the wind to a great extent prevents its falling into the gauge. More rain falls in sheltered spo where the force of the wind is broken by an obstacle.

The diameter of the bull's eye of a typhoon between 10° and 15° latitude is about 4 miles 25° latitude it appears to be occasionally as much as 30 miles in diameter, but bull's eyes of diameter have been found in case of typhoons crossing Japan. This area is characterised by very winds or perhaps occasionally by perfect calms. Generally the sea is mountainous but occasiona calms down to some extent together with the wind. A downrush of air in the bull's eye of a typ is out of the question as the sky there is covered with light clouds, but on the other hand it is ev from the clearing of the sky that the uprush of air has ceased or almost ceased.

That the centre of the bull's eye does not coincide with the centre of all the directions of the when projected on a diagram may to some extent be caused by the ellipticity and excentricity o isobars.

The gradients corresponding to a certain force of wind is somewhat uncertain particu when the force of the wind exceeds a whole gale, but it does not seem to be perceptibly affected b latitude. It should be remembered that the average temperature in the typhoon season does not ch much with the latitude in the area here under discussion: On an average a gradient of 0.02 inch 15 miles corresponds to a force of wind=6 on Beauforts scale, 0.03 to 7, 0.04 to 8, 0.05 to 9, 0. 10, 0.10 to 11 and where the gradient is above 0.10 it generally blows with full typhoon force low latitudes the gradient occasionally exceeds one inch in 15 miles.

The wind blows generally with the force of a strong breeze within 300 miles of the centre bet 20° and 25° latitude. but in 12° latitude it appears that it does not attain this force till within 100 miles of the centre. The force of the wind is however different in different azimuths. Near it is frequently very irregularly distributed. The wind blows in gusts in a typhoon. More da is however done to ships by the high cross seas always experienced near the centre, The swell i within from 300 to 500 miles of the centre but this depends of course upon the situation of the la

The angle between the direction of the wind and the direction of the gradient is on an av 43° in front of the centre and 53° behind the centre between 10° and 25° latitude,—65° in front 85° behind between 30° and 35° latitude,—and 49° in front and 62° behind between 10° and latitude. The angle appears to be smaller near the shore than on the open sea for offshore winds. far out at sea, the difference between the angle in front and behind the centre appears to be small

As the angle between the direction of the wind and the gradient does not change much wh wind is strong on approaching to or on receding from the centre, it follows that the air moves to the centre in logarithmic spirals or rather (as it is at the same times ascending) in screws horizontal projections are such spirals. This is quite correct in case of a stationary typhoon, but a typhoon changes its position, new portions of air are constantly set in motion while oth stopping behind, and an air particle describes therefore with variable speed a curve of double cur whose horizontal projection is a kind of curve of pursuit, its path being constantly directed tow point about half a rightangle distant from the centre of the typhoon, which may for a short pe supposed to move on a parabola.

As the deflection of the wind towards the right increases with the sine of the latitude, th south of the centre must ceteris paribus blow more straight in towards the centre than nort The difference between the amount of inblow north and south of the centre is proportional to the of the latitude of the centre, and is therefore largest in a low latitude, but it increases of cour together with the dimensions of the typhoon, and this is the reason, why by far the greater num typhoons move in a northerly direction and with increasing velocity on account of their expans

The path actually followed by a typhoon appears to depend upon the wind, that prevails time. Typhoon XVIII of 1884 was blown SWestward by the NE monsoon, while in the sum 1885 when the SW monsoon was strong, typhoons moved Northwards. Whence also typhoons upon the season of the year. This explanation likewise agrees with the fact that depressions motion onwards keep a permanent high pressure area on the right, with more or less steeper gr and stronger wind on that side. Probably the wind is on the whole stronger behind than in f the centre and it stretches farther away behind it. A typhoon moving SWestward is generally fo by strong NE wind that keeps blowing for some time, and when a typhoon has passed North is followed by strong and more or less persistent SW winds. Typhoons are likewise deflecte their previous course when exposed to strong winds blowing out of open channels in which c peed of the progress is frequently abruptly increased.

Very low clouds in a typhoon move with the wind. When clouds are observed at a highe the anterior semicircle their direction forms generally an angle with the gradient, that is abou nts larger than the angle between the wind and the gradient. But at some distance beh phoon they are frequently observed to move almost straight towards the centre.

It is probable, that the smaller angle which the wind forms with the gradient in front of the a not altogether depend upon the increased friction in case of offshore winds. The he air would account for it in case of a typhoon on the open sea. We have seen, that wh id rises after a calm, such as precedes a typhoon, the air must in the first instance blow strai rds the centre while the wind behind moving with less accelerated speed would have the o dency there. It would at first sight appear, that the wind in front, blowing more straight t centre, must cause the centre to be filled up in front and pushed backwards, but this wo pensated by the greater altitude of the disturbance behind the centre. If the vertical height hoon behind the centre is to the height in front in inverse proportion to the cosines sponding angles, no effect on the progressive motion of the typhoon would follow. ies probably much higher up behind, so that the centre is filled up quicker there than in fro entre is in consequence pushed forwards.

When the centre has entered on dry land it frequently moves faster owing to the disturb case being much greater behind *i. e.* over the open sea.—Owing to the rotation of the e have a tendency to raise the air especially in low latitudes, which would on the whole con rease the disturbance behind the centre. The same tendency would cause the force of inds to be smaller than the force of E and NE winds for the same gradient.

hat the principal part of the disturbance is situated high above the surface of the earth is fact, that the centres of typhoons pass across mountains several thousand feet high, and rcumstance that the difference between the temperature at this Observatory and the Pea ibly affected by the approach of a typhoon, for we cannot well presume, that the average t of a vertical column of air is lower near the centre than outside the cyclone. That on th e cyclone does not attain the height of the cirrus clouds is made probable by the observa irection, although unfortunately it is impossible to see upper clouds near the centre and o f the upper clouds in the eye of a typhoon are a desideratum. Over the beginning of t area the cirrus back towards NE and they then sensibly preserve this direction. B of cirrus cloud preceeding a typhoon show that frozen water vapour is carried miles up ugh the action of a typhoon.

he average rate of progress of the centre of a typhoon in 11° latitude is 5 miles an hour. in 15° it is 8, in 20° it is 9, in 25° it is 11, in 30° it is 14 and in 32½° latitude it is 1 . The rate of progress does not vary perceptibly in case of typhoons south of 13° l more variable the farther north we go. In 32½° latitude it varies from 6 to 36 miles an h e typhoons while E or SE of the Philippines are found to move towards a direction b NNW. Subsequently they recurve and pass away in a direction between NNE and not all recurve, but about two thirds of them are found to do so. They recurve betw latitude and between 115° and 130° longitude. The average place of recurvature lies E about the position of the Middle Dog Light-house.

In *Observations and Researches made in 1884* (Appendix M.) I have suggested the division typhoons into four classes according to the paths which they usually follow. No doubt abnorm instances occasionally present themselves (Comp. Typhoon VI of 1885), in China as well as in oth countries but they are of rare occurrence.

The first class of typhoons occur at the beginning and end of the typhoon season. They cross t China Sea, and pass either in a WNW direction from the neighbourhood of Luzon towards Tonqu as Typhoon II of 1884, or, if pressure is high over Siam and Annam, they pass first Westward a subsequently SW, as Typhoon XVIII of 1884. They can generally be followed between 5 and days.

The second class of typhoons is the most frequently encountered, and their paths can be trac farthest. They generally move NW and either (*a*) strike the coast of China south of the Formo Channel before recurving as Typhoon IX of 1884, in which case they generally abruptly lose t character of tropical hurricanes, or (*b*) traverse the Formosa Channel as Typhoons I of 1884 and V of 1885 or (*c*) they strike the Coast of China north of Formosa as Typhoons IV of 1884 and V of 188 After recurving they generally cross Japan or the Sea of Japan. They occur from June to Septemb inclusive but are most common in August and September. More than a third of the typhoons of 18 and 1885 belonged to this class. They can be followed on an average 7 days, or rather betweer and 12 days.

Typhoons of the third class are probably the most numerous of all, but they are not encounter quite so frequently as typhoons of the second class and therefore their existence is sometimes unsu pected, although they no doubt influence the weather along the Eastern Coast of China through th high pressure area. They pass E of Formosa moving Northwards. After recurving they skirt t Southern Coast of Japan or cross Japan or traverse the Sea of Japan or enter Southern Siberia. Th prevail at the same season as the typhoons of the second class and they may be traced on an avera during 7 days or more correctly between 3 and 12 days. A typhoon of the third class frequent follows after one of the second class. When the latter has recurved, the former proceeds Northward This is explained by the circumstance, that the effective low pressure area in Asia, the precedi typhoon, is then in fact considerably E of its normal position. It is also well known, that depressio are attracted towards places, which have just been traversed by a depression.

Typhoons of the fourth class pass S of Luzon moving Westward or first in this direction and th SW. They occur at the beginning and end of the typhoon season namely in April and December, b they are very rare. I have not succeeded in following them for more than a day or two.

TYPHOONS OF 1884.

On the 25th June, 1884, the barometer rose along the Coast of China and in Formosa, and fell Manila, where a fresh breeze blew from SW with misty weather. The temperature was high, t humidity moderate and the weather cloudy along the Coast. Typhoon I appears to have been abo 17° N, 123° E at 10 a. on this day. Moderate SE winds and a heavy swell are reported from ship that were out in the China Sea at the time. At 4 p. the barometric pressure was 29.71 in Mani It blew a moderate SSW gale and the weather was overcast and wet. At 10 a. on the 26th the typho may have been about 18° N, 120° E. The barometer had risen in Manila and had begun to fall alor the SE Coast of China, but it remained steady in the North. Fine weather and light winds prevail along the Coast. At 10 a. on the 27th the typhoon may have been in 19½° N, 119° E, and the baromet was falling along the SE Coast, but had risen in Shanghai, where it however began to fall in t afternoon. At 10 a. on the 28th the typhoon may have been in about 21° N, 118° E. The cent appears to have recurved about a degree East of the Pratas Shoal. The barometer was still fallir slowly along the SE Coast and in Formosa. The air was comparatively dry. Light winds prevaile The layer of clouds stretched out at least 200 miles in front of the centre and it rained 100 miles front. But in fact cloudy weather, with drizzling rain in places, prevailed along the E Coast and Formosa, where the weather had been unsettled for the last few days with a heavy swell in the se In the evening it blew a fresh SE breeze at S. Cape. The weather was misty and the sky had threatening appearance.

In the early morning hours on the 29th it blew a whole gale in Takow, the wind shifting to N and back again very rapidly to SE probably owing to eddies round the hills. The squalls were heav In the Pescadores it blew a breeze from ESE and the wind backed and increased in force till 4 when it blew with typhoon force accompanied by heavy rain. At S. Cape it blew a fresh SW ga on the same afternoon. At 10 a. on the 29th the centre appears to have been in 22° 45′ N, 119° 3 E and its progressive velocity was then suddenly increased, thus furnishing another instance of the fa frequently observed, of a depression passing through or crossing the Formosa Channel at a great increased rate of progress. The energy of this typhoon appears however to have been to a great exte expended before it re-entered the Pacific. It was not felt in Foochow. At 10 a. on the 30th t centre may have been about 27° N, 123° E. Strong SSW breezes or a moderate gale are report from the Northern entrance to the Formosa Channel and from Northern Formosa.

The other typhoons in 1884 have been reported on in the Monthly Weather Reports for that yea but the publication of the paths was unavoidably delayed. They are represented on the first four the accompanying plates.

TYPHOONS OF 1885.

In the middle of April gradients were on the whole slight. They had indicated NE beginning to indicate SW winds. On the 21st the barometer rose along the Coast, the temper humidity decreased and gradients again indicated moderate NE winds. The barometer r maximum at 11a. on the 24th in Hongkong, the temperature increasing and the sky clearin same day. Fine weather and light winds prevailed along the Coast of China. At that time of Typhoon I was approaching Cebu from the East. The barometer reached its maximum Bolinao at 10 a. on the same day, falling to 29.76 at 4 p. on the 26th. At the latter epoch ov rainy weather set in over Luzon and the temperature and humidity increased along the Coast

On the 24th it was noticed in Iloilo (10° 50′ N, 122° 40′ E) that the barometer beg The temperature was excessively high and a fresh N wind blew during the day, the cloud from NNE. Towards afternoon the sky became overcast and it began to rain. At dayli morning the temperature had fallen to 80°. It still rained in squalls. The wind blew fres and the clouds, which were ragged and torn came faster from the same quarter. About 11 a 25th the wind had backed to NW and the clouds to NNW, the squalls were more frequent, t lower and the appearance of the weather very wild. In the afternoon the wind continued i in force with constant rain and very hard squalls. The clouds were very low and flying NNW. At 8 p. frequent flashes of lightning were observed to westward, the wind frequently a few points and some buildings were falling about 9 p. At 10 p. the barometer stood at 2 began to rise shortly after. The wind blew very hard from N. About the same hour loud heard from the volcano, which had lately emitted much smoke. At 11 p. the wind mode blew from different directions. Lightning had been seen in every direction but was now only towards about SSE. The rain ceased and the clouds rose higher up. At midnight the suddenly from SE with very violent squalls and constant heavy rain. At 1 a. on the typhoon was at its height, wind and cloud coming from SE at a furious rate, and more ho falling. At 4 a. the wind began to moderate, the barometer had reached 29.45, the tempera 74°, the clouds had risen higher and backed to ESE, and the squalls were losing force. At were some hard squalls and heavy rain. At 8 a. the wind had backed to ESE and the cloud and the barometer had risen to 29.56. The weather then brightened fast. At noon the w moderate from E with the barometer at 29.67 and the thermometer at 84°.

Assuming the progressive speed of the centre to have been about 6 miles an hour, it a have been in about 11° N, 124° E at 10 a. on the 25th and in about 10½° N, 121½° at 10 a. on The incurving of the wind amounted to nearly 45°. The clouds indicate less incurving of at a higher altitude. There appears to have been a fresh N breeze and clouds with light rain come up at a distance of 150 miles in front of the centre. Storm-force was reached about from the centre and typhoon force 15 miles therefrom, the steepest gradient being appare inches in 15 miles. The diameter of the central calm may not have much exceeded 6 miles, possible though not proved that it followed behind the lowest barometer. The small diam the accompanying electric phenomena are characteristic of a typhoon of the fourth class (Co *Ind Res. 1884, Appendix M).* The existence of this typhoon was not known to me at the t in any case warnings would have been out of place.

During the latter part of June, the barometer was falling along the Coast. The tempera humidity were high and gradients for SW winds moderate. On the 27th June, it became clo rainy in Luzon with fresh SW breezes. The barometer fell a few hundredths of an inch on the 2 wood at 29.84 at 10 a. on the 30th. The temperature 76° was remarkably low and the wea squally. At 9 a. on the same day the barometer stood at 29.62 at S. Cape (Formosa) and l ce. Moderate NW breezes on the previous day changed to light WSW breezes on the 30th and came densely overcast. At 3 p. on the same day the barometer had fallen to 29.61 at Stee (between Ningpo and Shanghai) with a moderate NW breeze, and fog with drizzling rain se came subsequently known, that Typhoon II had passed northwards. At 10 a. on the centre may have been about 18° N, 131° E, but it is by no means certain that the typhoon w developed at that time. At 10 a. on the 30th it was about 24° N, 128° E and appears to hav rthwards with an extraordinary velocity. At 10 a. on the 1st July, it was in 30° 50′ N, 1 d at 10 a. on the 2nd in 38° 40′ N, 139° 55′ E. The depression appears to have then dis wards NNE but its energy was evidently expended.

The Messageries Maritimes Steamer *Tanais* left Yokohama on the 28th June and had d ny weather and variable winds until the 30th. The steamer was then about 40 miles off C 1° 55′ N, 133° 15′ E), when the sky became lead coloured and of so bad an appearance, t utions were taken to ensure the safety of the vessel. The wind at this time was E by N avy sea running, while the air was very misty and at 12.20 p. the rain began to pour rents. At 1 p. the typhoon suddenly rose in all its fury the wind blowing from NW but imm ring to N and continuing to blow from NNE during the remainder of the day. At Noon th he barometer was 29.92. It fell to 29.72 at midnight.—In the early morning hours on

28.94 at 10 a. and reached its lowest reading 28.82 about 11.30 a. From 9.30 to 10.15 a. there wa heavy rain and the wind but not the sea moderated, but it blew again with typhoon force from 10 t 11.45 a. with seas from various directions. At Noon the vessel was in 31° 13′ N, 131° 13′ E. In th course of the afternoon the wind backed from NW at 1 p. to W in the evening and the weathe moderated. There was rain with the breeze in the afternoon but in the evening the horizon was rathe clear.

The typhoon was very heavy in Japan. The barometer fell to 28.86 near the centre. The isobar were rather elongated in about the line of the track. In front of the centre the wind appears to hav incurved somewhat less than usually occurs in a typhoon in the China Sea, but behind the centre th wind blew much more straight towards it. The steepest gradients appear to have been 12 millimeter in 1° or more.

The following day, the barometer continued to rise along the Southern Coast of China. Gradient for SW winds were steep but decreased on the 5th. On the 3rd and the 4th the SW. monsoon reache the force of a moderate gale in the Formosa Channel. In Takow it rose even to a fresh SW gal Gradients for SW winds continued steep till the 10th. The temperature and humidity were high an the weather overcast. At 1 p. on the 11th July I wrote in the *China Coast Meteorological Register* "It is possible, that there is a typhoon in the Pacific, but it is not indicated with certainty. If so fin weather and light winds may be expected along the Coast of China." It now appears, that Typhoo III was at the time 1500 miles SE of Hongkong, and the weather cleared and the wind decreased o the following days. In Iloilo fine weather with moderate SW monsoon had prevailed in the beginnin of July. On the 8th and the 9th the barometer rose a few hundredths of an inch and began to fa distinctly on the latter day the evening of which was squally and wet. The weather became cloud and a gentle N breeze was registered on the 13th. The barometer reached its minimum on the 14t having then fallen a tenth of an inch since the 9th.

On the 11th of July the barometer was rising except in Southern Luzon. Light SE breezes, ble along the Southern Coast of China and in the Formosa Straits. Gradients (for SE winds) amounte to about 0.1 ins. in 11°. Light NE breezes prevailed North of Formosa. The weather was cloudy It may be surmised, that the centre of typhoon was in 8° N, 134° E at 10 a.

On the 12th the barometer behaved as on the previous day. Gradients (for NE winds) had no changed in amount. Light NE breezes prevailed in Southern China and over the China Sea. It wa raining in Hainan and Tonquin. At 10 a. the typhoon was about 9° N, 133° E.

On the 13th the barometer began to fall in Formosa and along the SE Coast of China. Gradient had not changed perceptibly. Gentle NE breezes blew over the China Sea, Southern China an Formosa, and a light N breeze was reported at 4 p. from Bolinao. Detached clouds prevailed in Chin Formosa and Luzon. It was still raining in Hainan and in Tonquin. At 10 a. the typhoon wa about 10° N, 131° E. The Captain of the steam-ship *Airlie* at 6 p. in 20° N, 128° E noticed a peculia colour in the clouds at sunset. The wind blew fresh from E, but the weather was fine.

On the 14th the barometer was falling with detached clouds and light breezes from various direc tions at all stations in the Far East, from which returns are received. Gradients (for N winds) ha not changed in amount. A light NE breeze blew at S. Cape and a N breeze at Bolinao. At 10 a. th typhoon was about 12° N, 130° E. The Captain of the steam-ship *Airlie* at 4 p. in 17½° N, 130 suspected bad weather to the SW. The weather too was squally with heavy rain. It blew a moderat gale from E by S.

On the 15th the barometer continued to fall, the sky had cleared particularly in the SE and ligh breezes blew from various directions. Over the China Sea gradients (for N winds) amounted now t about 0.1 in 5 degrees. A light NE breeze continued to blow at S. Cape and a light air from NW a Bolinao. At 10 a. the typhoon was about 15° N, 128° E. The steam-ship *Airlie* which at noon wa in 15° 31′ N, 132° 7′ E had rather fine weather but a lumpy sea from S and strong SSE breeze in th morning. It fell and veered to S in the afternoon with SW swell.

On the 16th the fall in the barometer was increased, the weather continued fine with light breeze from various directions. Gradients had not changed perceptibly. A gentle NW breeze was registere at S. Cape, a light air from W backing to SW at Bolinao. From Manila the lowest reading of th barometer 29.75 was reported at 4 p. The lowest reported from Bolinao on this and the following da was 29.71. At 10 a. the typhoon was about 18° N, 126° E. The steam-ship *Airlie* in 13° N, 135° had wind from WNW and swell from W with fine weather and the barque *Nicoya* in 14° N, 148° had ESE wind.

At 10 a. on the 17th the centre appears to have been in about 21° 23′ N, 124° 18′ E. Th barometer in Formosa had fallen about 0.2 ins. during the last 24 hours. Along the Southern Coast c China it had fallen 0.1, and 0.05 along the Yangtzekiang, but it had risen a few hundredths in Norther China. The temperature was high, the humidity comparatively low and the weather fine along th Coast. A fresh WNW breeze blew at S. Cape, where the weather was overcast and gloomy. A gentl

NE breeze was felt in Northern Formosa which increased to a fresh breeze in the afternoon. T appearance of the weather was threatening. Gradients appear to have amounted to about 0.04 ins. degree over Formosa and 0.02 between Hongkong and Formosa.

At 10 a. on the 18th the centre appears to have been in about 24° 13′ N, 122° 53′ E. T depression was perhaps at this time most completely developed. The barometer at S. Cape had fall to 29.50. It blew a moderate gale from WSW. At Tamsui the wind backed to NW and had increas to a strong gale in the early morning hours and blew a fresh gale at 10 a. Between Noon and 1.30 there was quite a lull in the wind. Then it freshened again and backed to SW, from which quart it blew a heavy gale with much rain (12.44 ins. on the 18th). The lowest reading of the barome on board the steam-ship *Hailoong* 29.44 occurred at 1 p. At Middle Dog Lighthouse it blew a fr N breeze in the early morning hours. It backed to WNW the following night.

About 10 a. on the 19th the centre appears to have been in 29° N, 120° E and to have entered t mainland about this time. It appears that the depression immediately began to fill up and the b meter was rising. At Ningpo it blew a light S, at Wuhu a light E and at Chinkiang a light SE bree and at N. Saddle a moderate SE veering to S breeze. In the Formosa Channel fresh SW breezes a cloudy weather with rain prevailed.

This typhoon does not appear to have developed much energy and its track is, for want of ob vations at sea, rather uncertain, but it was followed by a much greater disturbance, which has be well observed: Typhoon IV made its appearance ESE of Luzon as early as the 16th July, at 11 on which day the steam-ship *Airlie* had a falling barometer (about 30.0 ins.) and NW wind with swell and rain in 12° N, 135° E. At 1.30 the following morning the wind suddenly shifted to N and blew with stormforce, which was altogether unexpected as the day had been fine and calm. T greatest change in the barometer occurred between 3 a. and 5 a. when the mercury fell at least inch in 2 hours.

The lowest reading of the barometer 28.20 was recorded at 6.30 a, this was followed by a lull nearly half an hour's duration, from which we may conclude that the diameter of the central ca which appears to have followed somewhat behind the lowest pressure, was about 2 miles in diame at this early stage. Unfortunately it has not been ascertained whether the sky cleared during lull. Then the wind suddenly shifted to SE and blew again with full typhoon force. At 9 a. moderated and veered through S to SW and the barometer rose rapidly. Strong wind appears to h been confined to an area within about 60 miles of the centre.

At 10 a. on the 16th the centre of Typhoon IV was about 11° 45′ N, 137° 17′ E, on the 1 about 11° 57′ N, 135° 35′ E, on the 18th about 12° 18′ N, 133° 50′ E, on the 19th about 12° 58′ 131° 48′ E, and at 10 a. on the 20th about 14° 5′ N, 129° 38′ E.

The highest reading of the barometer (29.89) in Manila subsequent to the preceding typhoon w reported at 4 p. on the 18th. There was then a light air from NNW. On the 20th the barom had fallen 0.05 ins. over Luzon and risen about 0.1 in Formosa. Gradients for SW winds were mo ate, the barometer in Manila standing at 29.83 and in Hongkong at 29.73 at 10 a. It appears the re that the typhoon was at this time working its way towards NW in the trough between h ressures on both sides, being likewise preceded by an area with rising barometer. Gentle variable SW breezes prevailed in Southern China and Formosa where the weather was partly cloudy with li in. The temperature was high but the humidity comparatively low. It was misty in Luzon.

At 10 a. on the 21st the centre appears to have been in 15° 30′ N, 127° 25′ E. The barom d risen a few hundredths of an inch in China and in Northern Formosa, but had fallen 0.06 at S. C d more than this in Luzon. Gradients for NE winds were slight, the barometer standing at 29. Manila and 29.77 in Hongkong and at S. Cape. Gentle NE breezes and partly clouded weat evailed. Over Luzon the sky was clear and a light air from WSW was reported from Manila. ntle SW breeze and wet weather were recorded in Iloilo.

At 10 a. on the 22nd the centre appears to have been in 18° 0′ N, 125° 22′ E. The barom Manila had fallen to 29.67, the weather was overcast and rainy and a fresh WSW gale was repo m there. A gentle NNE backing to N breeze blew at S. Cape, where the barometer had fallen ab inches, but the weather continued fine. In Northern Formosa strong ESE and SE breezes were weather was squally and the sea high. Along the SE Coast of China the barometer had fallen ab 05 inches, the temperature remained high and the humidity comparatively low. The weather and the winds light. At stations along the Yangtzekiang the barometer had risen, the weat s fine and gentle NE breezes prevailed. Between Shanghai and Nagasaki moderate S breezes e weather were registered.

At 10 a. on the 23rd the centre appears to have been in 22° 0′ N, 124° 0′ E. SW breezes weather prevailed over the Philippine Archipelago. At S. Cape it blew a light air from NW, rometer (29.51) had fallen about 0.1 inches, and about the same quantity in Northern Formosa, wh derate NE breezes and overcast weather were registered. Fine weather with a slightly falling b er and light NE breezes prevailed along the SE Coast of China, while the barometer was ri

slowly along the Yangtzekiang. Gentle E or SE breezes and overcast weather with passing showers were registered between Shanghai and Nagasaki. During the previous night the steam-ship *Menmuir* in about 24° N, 123° E encountered a rapidly increasing E gale, which backed to NE at 3 a. and a rapidly falling barometer (29.70 at 2 a.) The weather was overcast and threatening and the sea increasing. At 2 p. in 22° 44′ N, 123° 40′ E the barometer had fallen to 29.15, the wind blew with typhoon force from N and the sea was tremendous. At 8 p. it blew a strong gale from W by S and the barometer had risen to 29.18. At one o'clock next morning it blew a fresh SW gale and the sea was still heavy. At noon on the 24th in 21° 10′ N, 126° 33′ E it blew a fresh SW breeze. It is evident that the disturbance had in the course of the week expanded and it is highly probable that the central depression was much less steep.

During the early morning hours on the 24th the steam-ship *Cicero* in 30° N, 126½° E experienced strong, increasing E wind and heavy squalls, which increased to a furious gale and high sea at 6 a. At 10 a. the centre appears to have been in 27° 5′ N, 124° 8′ E. The barometer had risen about 0.10 inches in Luzon. It read 29.84 in Manila and 29.72 in Hongkong. Light W breezes prevailed with rain in Luzon. The temperature continued high and the humidity moderate along the S Coast of China. It blew moderate NW gales and the weather was cloudy and squally in Formosa. In the Channel moderate NW breezes prevailed and the weather was fine. In Ningpo it blew a gentle NE backing to NW breeze with wet weather. Along the Yangtzekiang the barometer had fallen a few hundredths of an inch and moderate NE breezes and fine weather prevailed. At Port Hamilton there blew a gentle ENE breeze and the weather was cloudy and misty. The barometer, which had been rising up to 7 a. was just beginning to fall slowly. At 3 p. it blew a strong NW gale at S. Cape. This would seem to have been due to the high mountain range of Formosa confining the air, that had entered the Channel through the Northern entrance, which on finding an exit at the Southern extremity of the island, blew there with, under the circumstances, unusual force, seeing that the centre of the typhoon was long past. This feature is perhaps of some importance to the climate of this region, the air pent up in the channel increasing the frequency and force of E winds in Hongkong and W winds south of Formosa.

The steam-ship *Cicero* at 2 p. on the 24th in about 29° N, 125° E, finding it impossible to run any longer, hove to. The storm was then blowing from ENE and increasing in force till it blew a most terrific gale at 5 p. At this time the effect of oil on the water was tried and found to be of great service in calming the sea alongside the vessel. At midnight it blew a typhoon, and the barometer fell to 28.49 (reduced) at 1 a. on the 25th. Half an hour after, a rise was noticed. The greatest force of wind occurred at 6.30 a, when it blew with full typhoon force from W. At 8 a. the wind showed signs of moderating, but the sea ran with great force, subsequently the wind backed to SW.

The British brig *Bessie* bound from Newchwang to Hongkong, encountered a furious ENE squall at noon on the 24th in 29° 9′ N, 123° 49′ E. At 4 p. the storm blew with great force from NE with terrific squalls and mountainous sea. At 10 p. the heaviest part of the typhoon, from N, occurred. It lasted 2 hours. The barometer fell to 29.20. Then the wind began to back. At noon on the 25th in 28° 21′ N, 123° 57′ E it still blew a strong breeze from WNW.

In the morning on the 24th a moderate ENE breeze, a slowly falling barometer and misty partly overcast weather were registered at N Saddle Lighthouse. In the afternoon squally weather set in and the wind backed and increased in force. It blew a fresh NE gale at 9 p. and with the same force from NNW at 3 a. on the 25th. At this hour the barometer reached its lowest reading 29.48 (corrected and reduced to sea level). In the afternoon the wind backed to NW and calmed down in the evening.

The P. & O. steam-ship *Kashgar* at noon on the 24th in 30° 25′ N, 126° 38′ E had a moderate breeze from E. The barometer was falling and the weather thick and rainy. In the afternoon the sea rose high, the sky was overcast and heavy rain fell and the wind backed towards SE and blew a fresh gale in the afternoon. At 1 a. it had reached SSE and increased to storm force and at 4 a. it blew with strong typhoon force from S. The barometer reached its lowest reading 28.50 between 6 a. and 8 a. The sea was mountainous and the rain poured down in torrents in heavy squalls. Thereafter the wind veered to SW and at noon on the 25th it still blew a whole gale from SW by W, and the weather was but slowly moderating, the barometer remaining still at 28.89. At 4 p. it blew a fresh gale from W with a high confused sea Then the wind began to back towards SW.

At 10 a. on the 25th the centre appears to have been in 31° 30′ N, 125° 58′ E. From Luzon light S breezes were reported. The barometer (29.90) continued to rise. The sky was clearing and the weather was improved. In Formosa and in Southern China light SW breezes prevailed. The barometer was rising (29.77 in Hongkong), the temperature had fallen and the humidity had increased. The sky was cloudy and thunderstorms occurred along the Coast. as often happens after a typhoon has passed northwards. The weather was fine with light variable winds along the Yangtzekiang, where the barometer was falling slightly. At Shanghai it blew a moderate NNW breeze. At Ningpo and at the lighthouses between that port and Shanghai it blew more or less fresh breezes from NW. Round the Gulf of Petchili the barometer had fallen a tenth of an inch. The breezes were variable and the weather fine. But at NE Shantung Promontory it blew a fresh NE breeze and the weather was partly clouded. In Wladivostock the barometer had risen to about 30.02 and the air was calm. In Northern Korea the weather was overcast and wet with a slowly falling barometer and a gentle N

breeze. In Fusan (SE Corea) gloomy and rainy weather had set in on the previous night. The wind rose to a strong breeze at midnight and increased to a whole gale at 10 a. with thick rain and heavy gusts. At Port Hamilton the wind had also risen about midnight and shifted from SE to N and it blew a whole gale from E in gusts at 10 a. In Kiusiu (Japan) it blew a strong ESE bree The barometer was falling and the weather cloudy and wet. The weather was squally and wet w a heavy swell for SE.

H. M. S. *Daring* steaming from Nagasaki towards Port Hamilton encountered in the early morni hours on the 25th a fresh NE gale and a heavy sea from NEastward with squally and wet weath which lasted the whole day. A cross sea got up at 6 a. The gale veered and increased in force a blew a strong E gale at 10 a. The barometer had fallen from 29.58 at 2 a. to 29.24 at 10 a. Abo noon the sea was heavy and confused and became mountainous at 3 p. About 7 p. the lowest readi of the barometer 28.55 was registered. Immediately before this, it had blown with stormforce from S by S. Then a lull was experienced and afterwards it blew a fresh gale from WSW. During t lull the sea calmed down too, which is unusual, and the sky cleared. The barometer rose steadi and was registered as 29.55 at 8 a. on the 26th.

The barometer fell on H. M. S. *Cleopatra*, then at anchor in Port Hamilton till 6 p. when it w registered at 28.62. At that hour it blew a whole gale from ESE. At 8 p. the barometer had ris to 28.79 and it blew a fresh gale from NNW. The wind veered and decreased in force during t evening and blew a gentle W breeze at midnight.

It appears that the centre of the typhoon after passing nearly over H. M. S. *Daring* altered i course, which up to that epoch had been about NNE, to NE and passed NW of Fusan about midnig on the 25th, at which time the height of the barometer was registered as 29.18. The wind which the afternoon had blown a whole gale from NE with thick rain veered to SW after midnight and th calmed down by degrees. The area with strong wind was much greater in Southern Korea than in t latitude of the Philippines extending some 250 miles away from the centre, but the violence of t wind was also smaller and did not exceed storm force at any station.

The typhoon appears then to have turned NNWestward the centre skirting the Coast but pr obably never leaving the land. At 10 a. on the 26th the centre may have been about 38° 22′ N, 12 2′ E. It blew now in Yuensan with storm-force from about NE The wind had risen rather sudden before 9 p. the previous evening to a fresh NE gale with wet weather. After midnight the sea br and overflowed the settlement. The lowest reading of the barometer 29.44 (uncorrected) w registered at noon on the 26th, the wind blowing then a NNE storm and the sea was very high. p. it suddenly fell calm and at 5 p. a light breeze rose from SSW, but the calm continued afterwar with a rising barometer but wet weather. It is evident that the SW gale was kept back by the hi mountains in Korea, while the NE winds blew with unimpeded strength as long as their cour y over the open sea. The typhoon passed northwards after passing close to the E of Yuensan a e centre being then surrounded by rugged land the disturbance soon lost its force.

At 10 a. on the 26th light SW breezes prevailed in Southern China, Formosa and the Philippine he weather was fine in some and overcast and wet in other places. The temperature was high, th umidity rather moderate and the barometer rising. Also in the North of China the weather was fi d the winds light except at Shantung promontory where it blew a fresh NE breeze. South of Kor blew a fresh SW breeze accompanied with occasional squalls.

About 7 a. on the 27th it blew a fresh SE breeze at Wladivostock. The weather was overca d wet and the barometer had fallen to 29.55. The typhoon appears to have been in the latitude adivostock the same morning passing about 4° westward of it. Light SW breezes prevailed in Chi the temperature and humidity were high.

At 10 a. on the 28th the highest reading of the barometer 29.94 was reported from Manila. Th ometer was rising generally and gradients rather great for SW winds. The barometer was high uthern Japan. At 10 a. on the 29th the barometer had fallen 0.05 inch in Manila but had ris 2 along the Yangtzekiang. The temperature was not unusually high but the humidity was ve at.

Already on the 27th Typhoon V made itself felt in the Pacific, and at 10 a. on that day its cent ears to have been in 21° N, 139° E. The Barque *Nicoya* in 20° N, 136° E on the 27th experienc alling barometer, W wind with severe squalls, a rising sea and heavy rain. The following day t backed through S to SE. The sea was high and there occurred hard squalls with heavy ra 10 a. on the 28th the centre appears to have been in 21° N, 137° E on the 29th in 22° N, 133° on the 30th in 22° N, 130° E. It therefore moved westward in the trough between the hi ssures in the North and in the South, and was preceded by an area with fine weather and a slig in the barometer.

At 10 a. on the 30th the barometer was still rising and the weather was fine in Shanghai but d fallen some hundredths of an inch and it rained occasionally in the South. The winds were ve ht except in the Gulf of Petchili, in which a storm travelling from NW towards E was felt. Betwe anghai and Nagasaki moderate E or SE breezes were experienced.

At 10 a. on the 31st the centre appears to have been in 24° N, 127° E. The barometer had fall fly 0.2 inch at Steep Island but was steady along the Yangtzekiang with a slight rise in Hanko

It had fallen a few hundredths of an inch in Northern Formosa and in Tonquin but risen as muc Luzon. Gradients over the China Sea were rather steep for SW winds and it was raining along SE Coast of China, which is frequently the case when a typhoon approaches Northern Formosa i the East. It blew a gentle NE breeze at Steep Island and a fresh WSW breeze at Tamsui.

The British Barque *Wallace* in about 25° N, 125° E encountered a heavy ENE gale in the a noon on the 31st. The barometer had been falling gradually for the previous twenty-four hours, about noon it was seen to fall rapidly with every appearance of a heavy storm. At 6 p. the wind blowing with a force impossible to describe. The sea was lifted up and driven in one continu foam over the ship. At 9 p. the barometer had fallen to 28.50 (uncorrected) or about an inch s 1 p. At 4 a. on the 1st August the wind began to veer through E and reached S at 8 a. The b meter having then risen to 28.86. At noon on the 1st the typhoon was still blowing with unab fury. The barometer stood about 29.10. It continued blowing a heavy gale till the 3rd. Barque lost its masts and sustained other damage and it is fortunate that it was not lost, no one b left to tell the tale.

At 10 a. on the 1st August the centre was about 26° N, 124° E. The barometer was falling Luzon and along the Coast of China but had risen slightly in Kiukiang and stations West thereof also in Pakhoi and Haiphong. In Manila the height of the column was 29.83, in Haiphong 29.67 moderate SW winds with rain prevailed along the Southern Coast of China, while the sky was c over Luzon. The temperature was moderate and the humidity great. The weather was fine al the Yangtzekiang. Moderate SE breezes were registered in the Yellow Sea. A moderate SW was blowing in Northern Formosa. Moderate ENE breezes blew and the air was misty betw Shanghai and Haiphong. A swell from about. SE, and c-str. from N were observed on board H. M *Rambler*.

At 10 a. on the 2nd the centre must have been about 27° 10′ N, 122° 45′ E having apparently chan its position very slowly during the previous 24 hours. The barometer had risen E and NE of centre but fallen in China, Tonquin and Luzon. In Southern China and the Philippines the weat was much the same as on the previous day. Fresh SW breezes blew in the Formosa Channel a moderate SW gale at its Northern entrance. A moderate N gale blew at Wenchow and moderate gales between Shanghai and Ningpo. Moderate SE breezes were felt in the Yellow Sea.

The centre appears by this time to have taken a NNW course, evidently influenced by the tr of the Coast, and at 10 p. on the 2nd it appears to have been in 28° 52′ N, 122° 12′ E. Ships Taichow (28½° N, 121½° E) report having experienced fresh NW gales that increased to very str W gales at 10 p. At Steep Island it blew a typhoon from ENE at midnight and the weather was m with drizzling rain. H. M. S. *Rambler* anchored W of Napier Island, (30° 40′ N, 122° 24′ experienced a strong ENE gale with squalls and drizzling rain. In Shanghai it blew a fresh E gale. The weather was overcast and gloomy. At Ningpo it blew a fresh N gale.

The centre now turned towards NW and crossed Ningpo about 2 a. on the 3rd. About 6 a. it SW of Shanghai. The barometer fell to 29.16 at Zikawei and it blew a strong NE gale, but nei on shore nor at sea was the rain anything like typhoon-rain in a lower latitude.

At 10 a. on the 3rd the centre appears to have been in 31° 0′ N, 120° 18′ E. The barometer fallen everywhere in China except round the Gulf of Petchili. The temperature and humidity high. Light SW winds prevailed in the China Sea, strong SSW breezes in the Formosa Channel strong SE breezes between Ningpo and Shanghai. A fresh SE gale was registered at Zikaw moderate NE gale at Chinkiang and a gentle N breeze at Wuhu. At 10 p. the centre must have b situated between Chinkiang and Wuhu. It blew a fresh N breeze and it rained in Wuhu and a m rate ENE gale with drizzling rain in Chinkiang. At 3 a. on the 4th it blew a strong SW breez Wuhu and a fresh SE breeze in Chinkiang. The centre was moving NWestward but the violenc the wind had decreased and the depression was evidently filling up.

At 10 a. on the 4th the centre was about 33° N, 117° E. The barometer had risen at nearly the stations. SW breezes with overcast and wet weather prevailed except in Luzon, where the wea was fine. A gentle SE breeze was registered at Chinkiang, a moderate SW breeze at Wuhu, a l W breeze at Kiukiang, fresh S breezes between Shanghai and Ningpo and moderate SE breezes in Yellow Sea. Gentle SE breezes blew at Shantung Promontory and a gentle NE breeze at Taku which latter place the barometer appears to have been rising. Although this typhoon did a g deal of damage at sea it does not appear to have been so severe as typhoons in a lower latitude gener are. Gales appears to have blown within 240 miles of the centre while at sea, but in Ningpo within 150 miles of the centre. The sky was overcast within 240 miles of the centre. It was follo by thunderstorms south of its track with heavy rainfall (10.03 inches were measured at Amoy at on the 4th).

On the 5th a rather shallow depression travelling northwards struck the Coast of Southern Nip (Japan).

On the 6th and the 7th light SW breezes and fine weather prevailed in Southern China. On 8th light NE breezes and fine weather prevailed but fresh W and SW winds blew in the Southern of the China Sea E of the Gulf of Siam. It is almost certain that there was a typhoon in the Pa on those days but no reports have been received. On the 9th it blew a fresh W gale with over

and wet weather E of the Gulf of Siam, NE breezes and fine weather prevailed in Southern Ch Formosa and moderate SE breezes North of Ningpo. On the 11th it blew a moderate ENE g the weather was wet between Ningpo and Chinkiang. The barometer was falling a little in S China and rising along the Yangtzekiang. On the 12th the barometer was rising in Luzon an the whole extent of the China Coast. On the 13th gentle NE breezes prevailed in Southern Ch cloudy weather, but early in the morning it blew a fresh gale in Hongkong in rain squalls o duration. Light SW breezes blew over Luzon and WSW breezes in the China Sea between Lu Cochin-China. SE breezes prevailed in Northern China. The winds were rather fresher on th

At 10 a. on the 15th gentle SE breezes blew over Luzon, where the weather was cloudy barometer had risen in Iloilo where the breeze was SWesterly. SW winds blew in the Ch between Iloilo and Saigon and variable W or SW winds accompanied by heavy rainshowers up latitude, while at 18° latitude the wind was Westerly. It appears that Typhoon VI was for about 16° N, 115° E. For several days the wind had been circulating along the coasts and surrounding the China Sea, at the same time blowing towards a slight barometric minimum th have been situated between the Philippines and the Gulf of Siam.

At 10 a. on the 16th the centre appears to have been in 18° 11′ N, 115° 18′ E. T *Marcia* in 17° N, 113½° E encountered squally weather, strong N sea and variable W wind, t *Camorta* in 18½° N, 114° E a fresh NNE gale and confused sea. The barometer on the lati (29.66) had not fallen much, the temperature was 78°, it was overcast and heavy rain was The S.S. *Orestes* in 19° N, 114° E had a strong NE breeze, a confused sea and heavy rain. S breeze with drizzling rain was reported from stations in Luzon, where the barometer had risen at 10 a. in Manila). In the Formosa Channel and along the South Coast of China it blew m to fresh NE breezes and the barometer had fallen slightly. It had risen in Ningpo and light S prevailed North of that station. At S. Cape (Formosa) there blew a light ENE breeze. In the E of Luzon far from the Coast, where for several days the breeze had been S it now began to blo E and after few days the next typhoon appeared in about 11° N, 136° E. In the evening of th the sky assumed a threatening appearance in Hongkong similar to the appearance presented by on the West Coast of Ireland and in other places before a storm.

At 10 a. on the 17th the centre appears to have been in 21° 24′ N, 114° 18′ E. The ba had fallen in Hongkong and also along the Yangtzekiang but risen along the Coasts of the F Channel and in Luzon. The weather was cloudy, the humidity great and the temperature Hongkong, where it was blowing a strong E breeze. The S.S. *Camorta* about 40 miles W the centre experienced a NW whole gale with fearful squalls (barometer 29.59 corrected) an rain. At 8 a. it was noticed that the sky became very bright towards NE for about 10 minu then overcast again, and again at 10 a. the sky got clearer towards SE. The sea was very hig

The S.S. *Marcia*, south of the centre reported strong WSW wind, strong swell and overc gloomy weather. Strong S breezes and wet weather were experienced in 20° N, 119° E.

OBSERVATIONS MADE DURING THE TYPHOON OF 17TH AUGUST, 1885.

Date.	Hour.	Macao.						Hongkong.						Ca	
		Bar.	Ther.	Hum.	Wind.		Nebulos.	Bar.	Ther.	Hum.	Wind.		Nebulos.	Bar.	
					Dir.	Force.					Dir.	Force.			D
6, ...	4 a.	29.737	81	85	NNE	1	6	29.740	80	85	NE	2	8	29.74	
	10 a.	.764	84	71	NE	1	7	.770	82	66	E	4	4	.78	
	4 p.	.677	87	68	E	1	6	.676	82	73	E	4	10	.72	
	10 p.	.729	82	75	E	1	9	.730	80	78	ENE	5	10	.73	
7, ...	4 a.	.650	81	78	ENE	3	10	.650	77	91	NE	3	10	.72	
	10 a.	.617	79	91	NE	2	10	.623	80	89	E	6	10	.70	
	11 a.	.605	...	...	NNE	...	...	.610	81	87	E	6	...	...	
	Noon.	.570	...	...	NNE	...	...	.573	81	85	E	7	...	.68	
	1 p.	.524	81	87	NNE	4	9	.551	80	91	E	8	10	...	
	2 p.	.492	80	91	NNE	4	10	.523	80	85	SE	8	...	...	
	3 p.	.446	80	91	N	4	10	.528	79	87	SSE	9	...	.65	
	4 p.	.366	80	93	N	5	10	.567	79	84	SSE	7	10	...	
	5 p.	.371	80	91	WSW	4	10	.586	78	90	S	7	...	...	
	6 p.	.495	78	97	SW	6	10	.625	79	80	SSE	7	...	.60	
	7 p.	.578	77	100	SSW	7	10	.651	78	89	S	6	10	...	
	8 p.	.621	78	95	SSW	9	10	.684	79	87	S	5	...	...	
	9 p.	.673	78	95	SSW	5	10	.709	79	86	S	4	...	.59	
	10 p.	.693	78	93	SSW	2	10	.733	79	86	S	3	10	...	
8, ...	4 a.	.710	79	91	S	1	10	.734	80	77	S	3	10	.71	
	10 a.	.793	78	95	S	1	9	.824	77	88	S	4	10	.77	
	4 p.	.807	78	95	S	1	10	.828	78	91	S	1	10	.77	
	10 p.	.829	78	95	SW	1	9	.857	80	84	SSE	4	10	.81	

At 10 a. on the 18th the centre appears to have been about 23° 20′ N, 110° 35° E. The bar meter was rising at all the stations along the Coast and in the Philippines except Pakhoi, Hoiho and Manila. Moderate SW breezes prevailed in China, and the weather was wet in Southern Chin At Pakhoi it blew a gentle W breeze accompanied by rain. The depression appears to have lost t character of a typhoon as soon as it entered the mainland, and on the whole to have been shallow a of short duration. On the mainland it did not blow strongly till the centre was within 40 or 50 mile but at sea strong winds were felt within 100 miles. The clouds stretched as far as 200 miles in fro of the centre.

At 10 a. on the 18th Typhoon VII. appears to have been about 12° N. 135° E. The Britis barque *Mount Lebanon* in 15° N, 131° E had a light NNW breeze (the wind having backed fro E.N.E. the previous day), and the barometer (29.90 corrected) began to fall. At Iloilo the barome was rising and the day was fine and calm. A light wind from NE was registered at 1 p.

At 10 a. on the 19th the centre appears to have been about 12½° N. 134° E. The *Mount Leban* in 15° N, 129° E had a moderate NW breeze, squally weather and the barometer had fallen nearly 0 inch. The barometer had also fallen in Iloilo, where the air was calm and detached clouds we observed. The barometer was rising along the Coast of China and light SW breezes prevailed. T temperature and humidity were rather high and the sky clouded in the South, where local squal connected with thunderstorms were observed. The sky was on the whole clear in the North.

At 10 a. on the 20th the centre appears to have been in about 14° N, 133° E. The *Mount Leban* in 15° N, 127° E had still a moderate NW breeze and squally weather. The barometer had fallen 29.75. The British schooner *Linnet* in 19° N, 127° E had a strong N breeze and cloudy and squal weather. The barometer had fallen at all stations in China and Luzon. The sky was overcast along t Southern Coast, where the temperature and humidity continued high. Gentle S breezes prevailed alon the whole extent of the Coast. Over Luzon the sky was blue and gentle to fresh NNW breezes we reported. In Iloilo the barometer was beginning to fall. The weather was fine and calm. At times light SW breeze was felt. At 4 p. a fresh NW breeze was reported from Bolinao.

At 10 a. on the 21st the centre appears to have been in 15° N, 131° E. The *Mount Lebanon* 15° N, 127° E had a fresh W breeze, squally weather and the barometer had fallen to 29.58. T *Linnet* in 18° N, 124° E reports a strong N breeze and cloudy weather. In Iloilo it blew a gentle S breeze. The weather was calm and cloudy. The barometer had fallen here and in Luzon as well in Southern China but had risen in Northern China. It blew a moderate to strong NW breeze and t sky was blue over Luzon. In China the temperature and humidity continued high. The weather w fine with detached clouds and light variable breezes.

At 10 a. on the 22nd the centre appears to have been about 16° 52′ N, 128° 43′ E. The *Mou Lebanon* in 15° N, 128° E was experiencing a whole gale from W, and the weather was very rough. T barometer fell to 29.22 at 1 p. and the wind began then to back towards S. The *Linnet* in 18° 124° E had a NNW gale. It blew a moderate NW gale at Bolinao during the previous night wit squally weather accompanied by thunder and lightning. In Iloilo it was squally, the breeze was S and the barometer reached its minimum in the afternoon. Gentle NE breezes blew in Formosa and the Channel and the barometer had fallen there as well as along the SE Coast of China and in Luzo It had risen in Tonquin and along the Yangtzekiang. Along that river and in Northern China an Corea light S breezes prevailed and the weather was fine there as well as in Southern China. In th evening it blew in furious squalls and it was raining very heavily at Bolinao, but this appears to b due more to a local thunderstorm than to the typhoon.

At 10 a. on the 23rd the centre appears to have been about 19° 10′ N, 125° 40′ E. The *Mou Lebanon* in 16° N, 129° E had a strong S gale and rough weather. The barometer had risen to 29.4 The *Linnet* in 18° N, 125° E encountered a hard gale. The weather was squally and wet and the se was heavy. The ship was drifting towards East. The weather was squally. with a SW breeze i Iloilo. In Manila it blew a fresh WSW breeze. The air was misty. The barometer was 29.59, th lowest reported. At Bolinao it blew a moderate W gale with furious squalls and heavy rain. Abo Northern Formosa it blew a fresh NE breeze, at S. Cape a gentle NNW breeze, and along th Southern Coast of China the weather was remarkably fine and the breezes light and variable. Gentl SE breezes prevailed in Northern China. The barometer had fallen south of the Yangtzekiang, an risen along and North of that river. In the evening on the same day it blew a moderate NE gale nort of Formosa, a moderate N gale in the Channel and light variable breezes at S. Cape. The weather wa misty but fine. A moderate W gale was reported from Bolinao, where it was showery.

At 6 a. on the 24th the centre appears to have been in 21° 43′ N, 122° 0′ E. A moderate W gal was reported from Bolinao. At South Cape, where a light W breeze had been registered, a fresh NW breeze sprung up. The weather became overcast and misty, but only drizzling rain was registere although the centre of the typhoon shortly after passed close to the north of the lighthouse. Th *Faugh a Ballaugh* in 22° 35′ N, 119° 54′ E experienced a NNW wind blowing with full typhoon forc although this German barque was twice as far from the centre as the S. Cape lighthouse, a circumstanc which must be attributed to the influence of the high chain of mountains. At Fisher Island it wa blowing a furious N by W gale with heavy squalls of wind and rain. An increasing N gale had i fact been felt the whole of the previous day. In Northern Formosa and in the Northern entrance t the Channel it blew a strong NE gale and wet weather set in about this time.

At 9 a. the centre appears to have been in 22° 2′ N, 121° 19′ E and at 10 a. in 22° 9′ N, 12 E. It blew a fresh W gale at Bolinao, where the weather was overcast and squally. A light breeze was registered at Iloilo. It blew a strong S breeze to the Eastward of Luzon. At S. C blew a strong WNW gale and drizzling rain was falling. North of Formosa it blew a NE storm a NW typhoon at Fisher Island and as far north as Steep Island it was blowing a strong NE b Moderate NW breezes prevailed along the SE Coast of China. It was raining in the Formosa Ch but the weather was fine elsewhere, detached clouds covering Southern and Eastern China. temperature was high and the humidity rather low along the Coast. The barometer had fallen in mosa and to a less extent along the SE Coast. It was steady in Tonquin and had risen in Luzon also at stations north of Shanghai.

At noon on the 24th the centre appears to have been in 22° 27′ N, 120° 43′ E at 3 p. in 23° 120° 28′ E and at 6 p. in 24° 4′ N, 120° 23′ E. Between these hours it was moving northwards the western slope of the chain of mountains. The fact that the centre of this typhoon, which is s have been an unusually widespread disturbance, was able to cross heights of about two thousan and that the centre for hours remained on high mountainous ground, deserves to be noted in conne with the fact that a disturbance so suddenly calms down, when the centre enters the main This typhoon, while its centre was situated on the Island of Formosa was however surrounded b sea, from the dampness of which its store of aqueous vapour was recruited, while a typhoon o mainland is generally surrounded by dry land. The fact that the centre's situation on the moun did not cause a decrease in the violence of the storm indicates likewise that the nucleus of the di bance is in tropical hurricanes situated at a considerable height above the ground, a fact that is p by various other considerations.

When the centre crossed the parallels of Takow and Anping (Taiwan-fu) it caused a N b to W typhoon in those places with heavy rain.

About 6 p. the centre turned NW and WNW and crossed the Channel, which cau furious N veering NE typhoon to be felt north of the centre and a W typhoon at Fisher Island. N and NE gales at the Northern entrance to the Channel did not veer as quickly as the progr the centre would have led one to expect. They blew with the steadiness pointed out in pre reports as characteristic of that locality, but began to veer towards E shortly after the passage o centre. To the energy of these N gales the fact of the centre turning Westward at 6 p. mu attributed.

At 9 p. the centre appears to have been in 24° 39′ N, 119° 42′ E. at midnight in 24° 54′ N, 56′ E and at 3 a. on the 25th in 25° 25′ N, 118° 17′ E. At midnight the force of the disturbance much decreased, the lighthouses and vessels between which it passed registering only strong gale a whole E gale blew still between Foochow and Tamsui and a SW storm was experienced by the *a Ballaugh* in 22° 8′ N, 120° 2′ E. At 3 a. it blew a whole SE gale at Foochow and a stron a breeze about Swatow. In the middle of the Formosa Channel it blew fresh SSW gales.

The amount of cloud was rather irregularly distributed round the centre of this typhoon was on the whole densely overcast within 200 miles in front of the centre. Of course the c extend always much farther behind the centre, where the wind blows from S and SW. The r was also irregular. There fell 8.5 inches at Takow, 4.3 inches at Fisher Island and nearly as between Foochow and Keelung but only 1.7 inches at S Cape. The strong wind was likewise ir larly distributed as it blew in some places far from the centre with greater force than in others near centre. The area with strong wind was unusually extensive, and this characterised this typhoon its first appearance in the Pacific till it was lost. It is on account of the uncertainty of the inde rections and for other reasons impossible to ascertain the gradients corresponding to each win but the following appear to be on the whole nearly correct: A gradient of 0.08 inches in 15 miles c ponded to force 11, 0.05 inches to force 9, 0.03 inches to force 6 and 0.02 inches to force 4. average the angle between the wind and the gradient amounted to 39° in the semi-circle in front centre and to 45° behind the centre. The temperature was about 77° near the centre and 8 distance of 500 miles from the centre.

At 10 a. on the 25th the centre appears to have been about 26° 15′ N, 117° 5′ E. The baro had risen over Luzon (Manila at 10 a. reported 29.86), where the weather was hot and rather Strong S breezes blew round Northern Luzon. Round the Gulf of Tonquin it blew gentle W b The barometer had fallen at Pakhoi and risen slightly at Haiphong. Moderate S gales and weather prevailed in the Formosa Channel. At Foochow it blew a whole gale from SE; midway between Foochow and Ningpo it blew a whole gale from E. and between Ningpo and Sha it blew a strong breeze from ESE. Along the Yangtzekiang the barometer had fallen. At Chin the sky was blue and it blew a strong E breeze, but at Kiukiang it blew a moderate NE gale an weather was overcast and showery. The weather was foggy in places in the Yellow Sea. The meter was rising slightly in Korea and the weather there was fine.

At 10 a. on the 26th the centre may have been in about 30° N, 115° E. that is about m between Hankow and Kiukiang. Moderate to fresh SW breezes prevailed over the Southern Chin over the China Sea. The barometer had risen and the temperature and humidity were mod Thunderstorms were frequent to the south of the centre of the typhoon. Moderate SE breeze

fine weather prevailed east of it. At Kiukiang the wind had calmed down on the previous day and light SE breeze was registered. The weather was dull and threatening with occasional light shower At Hankow a light NE breeze was registered and at both stations the height of the barometer w 29.64. The following days moderate S winds, high temperatures and humidities and overcast an wet weather prevailed in Southern China. The centre of the typhoon appears to have been movin NNW on the 26th but the depression had filled up and the disturbance had lost the character of tropical hurricane already during the night following the 25th. Several storms moving Eastwar subsequently crossed the Sea of Japan but there is nothing to show that any of them was connecte with the past typhoon.

The following are the most important observations made during this typhoon. They have bee reduced and corrected as far as possible:—

DATE.	LAMOCKS.					SWATOW.					BREAKER POINT.					HONGKONG.				
1885. August	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.
24th, 3 a.	29.62	82	W	4	cm.	29.54	81	NW	1	b.	29.56	80	SW	2	c.	29.60	78	W	4	c.
6 a.	.56	84	NW	4	„	...	...	...	...	...	.57	83	WNW	„	„	.58	78	„	3	...
9 a.	.56	86	WNW	5	„	.51	84	WNW	2	o.	.49	89	NW	4	„	.59	81	„	4	...
10 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.59	83	„	„	b.
11 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.56	83	„	„	...
Noon	.53	86	„	„	„	...	...	...	...	...	.46	94	„	5	„	.54	84	„	„	...
1 p.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.51	85	„	„	b.
2 p.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.48	86	„	„	...
3 p.	.44	81	W	5	orm.	.38	86	NW	3	„	.39	93	W	2	„	.47	87	„	„	...
4 p.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.46	86	„	3	o.
5 p.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.46	86	„	„	...
6 p.	.37	78	„	„	„	„	...	...	...	...	.35	87	„	„	omr.	.45	86	„	2	...
7 p.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.45	86	„	„	o.
8 p.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.46	85	„	„	...
9 p.	.36	76	WSW	6	„	.39	82	WNW	1	„	.35	84	WSW	3	„	.47	84	„	„	...
10 p.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.47	86	WNW	„	o.
11 p.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.46	86	„	„	...
Midt.	.28	76	„	7	„	...	...	...	...	...	.31	84	W	2	„	.44	84	„	„	...
25th, 1 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.42	84	„	„	o.
2 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.40	84	„	3	...
3 a.	.20	73	„	8	„	.29	78	NW	6	or.	.26	80	WSW	5	„	.39	84	W	„	...
4 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.38	84	„	„	o.
5 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.39	84	WNW	„	...
6 a.	.20	76	SW	8	„	...	...	...	...	...	.23	78	„	6	„	.40	83	W	2	...
7 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.42	83	WSW	„	o.
8 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.42	84	W	„	...
9 a.	.26	76	„	„	„	.35	78	SW	5	or.	.30	76	SW	5	„	.44	85	„	1	...
10 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.45	86	WSW	2	o.

DATE.	SOUTH CAPE.					TAKOW.					ANPING.					FISHER ISLAND.				
1885. August	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.
24th, 3 a.	29.15	78	W	2	om.	29.12	82	N	4	...	...	...	...	...	...	29.25	79	NNW	8	cm.
6 a.	28.97	78	NW	5	omd.	.05	81	„	8	...	...	...	...	...	...	29.21	79	„	9	cm.
9 a.	.92	78	WNW	9	„	.02	82	„	9	d.	...	78	...	...	or.	29.13	78	NW	10	omr.
10 a.	...	...	...	...	...	29.01	„	„	„	„	...	...	...	...	...	.13	...	„	„	„
11 a.	...	...	...	...	...	28.98	„	„	„	„	29.00	...	N	...	„	.09	...	„	„	om.
Noon,	28.93	78	WNW	10	om.	.94	81	„	„	„	28.95	...	„	...	„	29.01	77	„	„	omr.
1 p.	...	...	...	...	...	.89	80	N by W	10	r.	.89	...	„	...	„	28.92	...	„	„	„
2 p.	...	...	...	...	...	.85	79	NW	11	„	.85	...	„	...	„	.89	...	„	„	„
3 p.	29.04	77	WSW	10	omd.	.85	78	WNW	11	„	.85	...	„	...	„	.87	76	„	„	„
4 p.	...	...	...	...	...	.86	„	W	12	„	.84	79	WNW	...	„	.85	...	„	„	„
5 p.	...	...	...	...	...	.89	„	W by S	„	„	.84	...	„	...	„	.82	...	W	10	„
6 p.	.14	78	SW	9	„	.93	„	„	„	„	.85	...	„	...	„	.81	75	„	„	„
7 p.	...	...	...	...	...	.96	„	WSW	„	„	.89	...	„	...	„	.82	...	„	„	„
8 p.	...	...	...	...	...	28.99	„	„	11	„	.92	80	SW	...	„	.84	...	„	„	„
9 p.	.31	78	SW	8	„	29.06	„	SW	„	„	28.98	...	„	...	„	.89	75	„	„	„
10 p.	...	...	...	...	...	.12	„	„	„	„	...	...	...	...	...	.92	...	„	„	„
11 p.	...	...	...	...	...	.13	„	SW by S	„	„	...	...	...	...	...	28.94	...	„	9	„
Midt.	.37	81	SSW	7	om.	.17	„	„	10	„	...	...	...	...	...	29.02	75	SW	„	„
25th, 1 a.	...	...	...	...	...	.20	„	SSW	9	„	...	...	...	...	...	.03	...	„	8	„
2 a.	...	...	...	...	...	.22	„	„	9	„	...	...	...	...	...	.09	...	„	„	„
3 a.	.44	82	„	„	„	.23	„	S by W	8	„	...	...	...	...	...	.15	75	SSW	„	„
4 a.	...	...	...	...	...	.25	„	S	8	„	...	...	...	...	...	.18	...	„	7	„
5 a.	...	...	...	...	...	.29	„	„	7	„	...	...	...	...	...	.25	...	„	„	„
6 a.	.54	82	„	6	„	.34	80	„	7	d.	...	...	...	...	...	.29	77	SSE	„	cmd
7 a.	...	...	...	...	...	.39	81	„	7	„	...	...	...	...	...	.32	...	„	„	cm.
8 a.	...	...	...	...	...	.43	82	„	7	„	29.40	80	S	...	„	.34	...	„	8	omr.
9 a.	.64	82	„	„	„	...	...	...	...	...	...	...	...	...	...	.36	75	„	„	omr.
10 a.		...	...	...	...	...	...	...	...	...	...	...	...	...	...	.40	...	„	„	omr.

DATE.	TAMSUI.					KEELUNG.					CHAPEL ISLAND.					AMOY.			
1885, August	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.
24th 3 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	29.44	85	NNW	3
6 a.	29.24	79	NE	10	or.	29.24	83	NNE	7	or.	...	...	...	...	...	.44	86	„	3
9 a.	.09	78	„	11	„	...	...	...	...	...	...	...	...	...	...	.42	87	„	4
10 a.	29.03	75	„	10	„	...	...	..	...	...	...	...	...	...	...	.41	88	N	„
11 a.	28.93	76	„	„	„	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Noon.	.89	77	„	„	„	...	...	...	...	...	29.35	...	N	5	om.	.37	91	„	5
1 p.	.88	79	„	9	„	28.95	83	„	„	or.	.29	...	NNW	6	„	...	...	...	...
2 p.	.87	79	„	8	„	...	...	...	...	...	.21	...	„	„	„	.26	91	NNW	„
3 p.	.87	79	„	„	„	...	...	...	...	...	.15	...	„	8	„	...	...	...	...
4 p.	.83	78	„	„	„	...	...	...	...	...	.15	...	NW	„	„	.21	90	„	„
5 p.	.80	78	„	„	cp.	...	...	...	...	...	.10	...	„	7	„	...	...	...	...
6 p.	.87	78	„	9	„	...	...	...	...	...	.07	...	„	„	„	.14	86	„	„
7 p.	.92	78	„	10	„	29.01	84	ESE	11	or.	.03	...	„	8	odm.	...	...	...	...
8 p.	28.98	78	„	11	„	...	...	...	...	...	29.00	...	WNW	„	orm.	.11	83	W	7
9 p.	...	...	...	...	...	...	...	...	...	...	28.97	...	„	„	„	...	...	...	...
10 p.	...	...	...	...	...	...	...	...	...	...	.95	...	„	9	„	.08	84	NW	4
11 p.	...	...	...	...	...	...	...	...	...	...	.98	...	„	„	„	...	...	...	...
Midt.	29.09	76	„	11½	„	...	...	...	...	...	.96	...	W	8	„	.06	81	„	6
25th, 1 a.	...	...	...	...	...	...	...	...	...	...	.97	...	„	„	„	...	...	...	...
2 a.	...	...	...	...	...	...	...	...	...	...	.99	...	SW	„	„	29.01	82	W	4
3 a.	...	...	...	...	...	...	...	...	...	...	.99	...	...	„	„	...	...	...	...
4 a.	...	...	...	...	...	...	...	...	...	...	.97	...	„	„	„	28.96	80	„	4
5 a.	...	...	...	...	...	...	...	...	...	...	28.98	...	„	„	„	...	...	...	...
6 a.	...	...	...	...	..	...	...	...	...	...	29.02	...	„	7	odm.	29.08	79	SW	3
7 a.	.49	81	SE	8	„	29.40	85	SE	6	omr.	.13	...	„	„	„	...	...	...	...
8 a.	...	...	...	...	...	...	...	...	...	...	.18	...	„	6	„	.16	80	S	„
9 a.	...	...	...	...	...	...	...	...	...	...	.21	...	SSW	„	„	...	...	...	...
10 a.	...	...	...	...	...	...	...	...	...	...	.25	...	„	„	„	.28	80	„	4

DATE.	OCKSEU.					TURNABOUT.					MIDDLE DOG.					FOOCHOW.			
1885, August	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.	Weather.	Bar.	Th.	Wind. Dir.	Wind. Force.
24th, 3 a.	29.20	77	NNE	8	omr.	29.22	...	N	8	omr.	29.45	80	NE	8	omr.	...	...	N	5
6 a.	.17	77	„	„	„	.14	...	„	„	„	.37	77	NNE	9	cmq.	29.30	...	NNE	7
9 a.	.08	77	„	„	omd.	.12	...	„	9	„	.34	77	„	10	omqd.	.23	...	...	...
10 a.	.05	...	„	9	...	.08	...	„	10	„	.32	...	„	„	„	.20	...	„	9
11 a.	29.04	...	„	„	...	29.02	...	„	„	„	.30	...	„	„	„	...	...	...	...
Noon.	28.95	80	N	10	...	28.94	...	„	„	„	.26	79	„	„	om.	.15	...	„	„
1 p.	.85	...	„	„	...	.90	...	„	„	„	.20	...	„	„	omqr.	..	...	NE	„
2 p.	.79	...	NNE	„	...	.85	...	„	11	„	.16	...	„	„	omqd.	.10	...	NNE	„
3 p.	.75	77	„	„	...	.80	...	„	„	„	.10	77	„	„	omqr.	.07	...	„	„
4 p.	.71	...	„	„	...	.74	...	„	„	„	.07	...	„	„	„	.05	...	NE	„
5 p.	.67	...	„	„	...	.74	...	„	„	„	.07	...	ENE	„	„	29.02	...	„	11
6 p.	.65	76	„	„	...	.74	...	„	„	„	.02	76	„	11	„	28.99	...	„	„
7 p.	.63	...	„	„	...	.69	...	NNE	11	„	.02	...	ESE	10½	„	.98	...	„	„
8 p.	.60	...	„	„	...	.65	...	NE	„	„	29.00	...	„	11	„	.98	...	„	„
9 p.	.61	77	„	„	...	.64	..	ENE	„	„	28.95	76	„	„	„	.98	...	„	„
10 p.	.67	...	„	„	...	.68	...	„	„	„	.95	...	„	„	„	.98	...	„	„
11 p.	.68	...	NE	9	...	.69	...	„	„	„	.96	...	„	„	„	.97	...	„	„
Midt.	.71	77	„	„	...	.70	...	„	10	„	28.97	75	„	10½	„	28.95	...	„	„
25th, 1 a.	.66	...	ENE	8	...	.80	...	„	„	„	29.01	...	„	10	„	...	...	SE	„
2 a.	.70	...	„	„	...	.82	...	„	9	„	...	...	...	...	...	...	...	...	...
3 a.	.73	76	ESE	„	omd.	.84	...	„	„	„	.08	75	„	„	omr.	...	...	...	...
4 a.	28.76	...	SSE	7	...	.91	...	ESE	„	„	...	...	...	...	...	...	...	„	„
5 a.	...	...	...	...	...	28.97	...	„	„	„	...	...	...	...	...	...	...	...	...
6 a.	29.00	75	„	6	...	29.06	...	„	8	„	.19	77	„	9	„	29.10	...	...	...
7 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	„	9
8 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.16	...	...	...
9 a.	29.18	75	„	7	...	29.19	—	„	„	„	.32	77	SE	10	„	...	...	...	...
10 a.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	„	„

At 10 a. on the 29th it was noticed that the barometer was beginning to fall in the East a[nd] risen in the West. The temperature was moderate, the humidity great and the weather overc[ast] wet. The winds were very light. W breezes prevailed in the China Sea and S breezes in t[he] Formosa Channel and farther north. The American barque *Amy Turner* in 17° N, 138° E had [a] wind, which increased during the night accompanied by a heavy NW swell. This was due to T[yphoon] VIII, which appears to have been at the time in about 15° N, 139° E.

At 10 a. on the 30th the centre was in about 16° N, 137° E. The barometer was falli[ng] Luzon, Formosa and along the SE Coast. It was rising in Tonquin and along the Yangtzekiang. W breezes and fine weather were registered in the China Sea. Light NW breezes and fine [weather] were reported from Luzon. Along the S and SE Coast of China light S breezes prevailed a[nd] NE breezes North of Formosa. The temperature was low, the humidity high and the weather o[ver]cast and wet.

At 10 a. on the 31st the centre appears to have been about 17° 22′ N, 135° 15′ E. The barometer was falling slowly in Luzon and Formosa and was steady along the SE Coast. but had risen elsewhere i China and in Korea. The temperature and humidity were rather high but the weather was improving Light NW breezes were reported from Luzon. Light SW breezes prevailed along the China Coas The barque *Amy Turner* had experienced strong wind and heavy squalls veering first to ENE an then backing through N to W at 6 a. on the 1st. The barometer remained at that hour still at its lowe reading (29.10 uncorrected) and began to rise slowly. The following day it blew very hard from SW But the weather cleared up and the wind moderated at midnight on the 1st. The sea was compara tively smooth while the *Amy Turner* went through the typhoon.

At 10 a. on the 1st the centre appears to have been in 19° 20′ N, 133° 45′ E. The barometer had fallen in Luzon and in Southern China. The temperature was rather high, the humidity rathe low and the weather fine. Very light SW breezes prevailed in China and light airs from NW i Luzon and Formosa.

At 10 a. on the 2nd the centre may have been about 21° N, 132° E. The barometer had falle at all stations in the Far East except Haiphong. The temperatures and humidities were rather high i China and the weather cloudy and wet. Light W airs and fine weather were reported from Luzon light NW airs and fine weather were registered in Formosa and gentle SW breezes prevailed i Southern and SEastern China.

At 10 a. on the 3rd the centre may have been about 24° N, 131° E. The barometer was fallin in Formosa and along the SE Coast of China, but had risen in Luzon, in Tonquin, in Northern Chin and in Southern Korea. Gentle SW breezes and fine weather prevailed in Luzon and in the China Se At Middle Dog it blew a fresh NE breeze, at Foochow the weather was squally and wet and at Ste Island it blew a moderate NNE breeze.

At 10 a. on the 4th the centre appears to have been in 27° N, 129° E. The barometer had risen all the stations except those in Formosa, in SWestern Japan and at the lighthouses between Ningpo an Shanghai. The temperature was rather high and the humidity moderate along the SE Coast of Chin Gentle SW breezes prevailed over the China Sea, gentle NE breezes in Northern Formosa and in th Channel. Moderate E breezes blew between Nagasaki and Shanghai but a short deep swell with peculiar irregular appearance was observed near the Coast of Japan and a moderate NNE breeze wa registered at Steep Island. In the course of the day the barometer began to fall slightly in Kiusi (SW Japan) but rose elsewhere in Japan. The winds were N and E and the weather fair on th whole, but in the evening an E gale blew SW of Japan.

At 10 a. on the 5th the centre appears to have been in 29° 22′ N, 128° 25′ E. The barometer ha fallen slightly over Japan, and Southern Korea and along the Yangtzekiang as far as Kiukiang. had risen a few hundredths of an inch outside this area. The temperature was high, the humidi moderate, the weather cloudy and light W airs prevailed round the China Sea. Gentle N breezes we registered about the Northern entrance to the Formosa Channel and also in Shanghai. It blew a fres NNW breeze at Steep Island, where the barometer had fallen about a tenth of an inch. At Nagasa the barometer had fallen a quarter of an inch and a fresh NE breeze was reported from there. Alon the Southern shore of Korea the barometer had fallen about a fifth of an inch and it blew a moderate fresh E breeze. At Fusan it blew a strong NE breeze the barometer had not fallen a tenth, but th weather was overcast, gloomy and wet. Lightning had been observed up to the previous midnig and was seen in the Korea Straits in the morning. Between Quelpart and Nagasaki it blew a fres NE gale and between SW Japan and the centre of the typhoon a whole gale from E was reported H. M. S. *Cleopatra*. The sea was very heavy and confused from Eastward, the squalls were heavy an spoondrift was flying very thickly so as to obscure every object at two ship's lengths distance.

At 2 p. on the 5th the centre appears to have been in 30° 20′ N, 128° 11′ E. The barometer h fallen over Japan, the lowest reading being reported from Kagoshima, where it blew an E gale. N an E winds and clear weather prevailed in S Nippon but it was cloudy elsewhere with rain in Kiusi The temperature had fallen much except near the inland sea. A strong NE gale blew in the Kor Strait. It blew a strong N breeze at Steep Island where the air was misty but not overcast. H. S. *Cleopatra* about 60 miles ENE of the centre of the typhoon encountered a whole gale from E wi heavy and sudden squalls, a mountainous and confused sea from E and continuous rain. At Po Hamilton it blew a fresh NE breeze, with passing showers of rain.

At 9 p. on the 5th the centre appears to have been in 31° 2′ N, 128° 2′ E. H. M. S. *Cleopat* about 40 miles E of the centre experienced a SE storm. The barometer had fallen to 28.48, the lowe reading reported. The barometer had fallen in Korea and in W Japan but risen in SW Kiusi Strong E winds prevailed with mostly overcast weather and rain in the West. The temperature h risen in Southern Japan but fallen elsewhere in that country. Strong NE gales were reported fr Southern Korea. In the Yellow Sea H. M. S. *Pegasus* experienced a strong NE breeze and a falli barometer. It blew moderate NE breezes in Northern Korea and at the Shantung Promontory.— 10 p. and midnight the Austrian Gun-boat *Nautilus* about 90 miles WNW of the centre encountered N storm with a very high N sea. The barometer had fallen to 28.95.

At 1 a. on the 6th the centre appears to have been in 31° 35′ N, 127° 55′ E. The ships referr to above report still stormforce of wind. It had risen to a whole gale in Southern Korea.

At 6 a. on the 6th the centre appears to have been in 32° 42′ N, 127° 10′ E. The constant gale blowing out at the Korea Straits was evidently now deflecting the typhoon from the path it hitherto followed and causing its course to be turned NWestward, thus furnishing an analogy to effect so frequently, though not invariably, produced by a heavy NE gale in Northern Formosa typhoon proceeding northwards in the Channel. Nagasaki reported the lowest reading 29.41 barometer in Japan and a S gale. SE winds prevailed with rain in the west. Strong NE gales in Southern Korea, but the rain that fell during this typhoon does not appear to have been as heav in tropical hurricanes. From 9 a. on the 5th till 9 a. on the 7th there fell 3.72 inches in Fusan 1.40 in Yuensan.

At 10 a. on the 6th the centre appears to have been in 33° 12′ N, 126° 7′ E. A strong S b blew at Nagasaki, a fresh SE gale in Southern Korea, a strong ENE breeze in Northern Korea a fresh NNE gale in the Yellow Sea SE of the Shantung Promontory, at which a strong NE b was registered. Between Chinkiang and Ningpo fresh NW breezes were registered. Light br and partly clouded weather prevailed in Southern China, where the barometer was nearly steady. had risen over Formosa and also over Luzon.

At 2 p. on the 6th the centre appears to have been in 34° 42′ N, 125° 12′ E. Being shel towards NE by the mountainous land of Korea, it had resumed its course towards the north. A SSE breeze was registered in Southern Korea. strong S breezes in SW Japan, moderate WSW between Shanghai and Nagasaki, a fresh W breeze at Steep Island and fresh NE gales at Shan and at Yuensan in Northern Korea.

On the 5th and the 6th the isobars were very nearly circular. The radius of the isobar corresp ing to 29.60 was about 285 miles, the radius corresponding to 29.50 was about 230, to 29.40 a 180, to 29.30 about 120, to 29.10 about 100 and to 28.90 about 80 miles. It appears that on whole a gradient of 0.02 inches in 15 miles corresponded to force 6, a gradient of 0.03 to force gradient of 0.05 to force 8, a gradient of 0.07 to force 9, a gradient of 0.10 to force 10 and a gra of 0.20 to force 11. Full typhoon force was not reported. The radius of the area with windfor least 6 was about 310 miles.

The average angle between the direction of the wind and the gradient was 70° in the left f 89° in the right front, 76° in the left back and 77° in the right back quadrant. The greater incurv of the wind in the right front quadrant was due to the wind there blowing from the mountai shores, being thus subject to great friction and also to the steady NE wind in the Korea Strait w evidently caused the typhoon to avoid the Strait. The mean of the other quadrants is 74° or 7 front of and 77° behind the centre.

The rain that fell in connection with this typhoon does not appear to have been so heavy rule in a tropical hurricane, nor was it surrounded by a well defined area of fine weather and ky. It was raining within 200 miles of the centre on the 5th and during the following nigh utside of this limit showers fell in many places, and about 10 a. on the 6th the rain at Port Ham ased to be continuous although the centre was within about 70 miles.

At 9 p. on the 6th the centre appears to have been in 37° 15′ N, 124° 25′ E. The N win E Shantung Promontory had reached the force of a strong gale and the barometer had fall 29.48, the lowest reading reported. The weather was overcast, squally and wet. At Newchwa lew a gentle NE breeze. At Yuensan it blew a NE storm with hurricane-like gusts. The we as bad as in Shantung. About 3 p. the sea had broken in and had overflowed the settlement ued from 2 p. on the 6th till 3 a. on the 7th. Then fog set in and lasted till 10 a. after which ather remained overcast and gloomy. In Southern Korea it blew a moderate SW gale at 9 p. on the

At 10 a. on the 7th the centre appears to have been about 39° 30′ N, 124° 10′ E just a ering the land, but the depression was filling up and the wind had calmed down except at Shan montory where a W gale was registered. The weather was overcast and wet with drizzling he north and also overcast, gloomy and damp in Southern China, where gentle SW breezes ed with a rising barometer. It blew a fresh SW breeze in Southern Korea.

At 10 a. on the 8th the centre may have been about 44° N, 127° E. It blew a strong SE b Vladivostock, where the weather was overcast and rainy. At 3 p. the lowest reading of the b er 29.69 was reported from there. It was then blowing a moderate SE gale. At Newchwang ometer was steady at 29.86. The wind had backed through W to S. but it was nearly calm. owing day the barometer had risen at these stations. On the morning of that day a moderate was reported from Wladivostock.

Between 5 p. and 6 p. on the 5th September the P. M. S. S. *City of Rio de Janeiro* in about N, 148° 37′ E passed through the centre of a storm. The wind shifted from SSE to NNW, ch quarter a storm was experienced when the centre was past. The lowest reading of the b er reported was 28.75.

On the 9th of October the barometer began to fall in Luzon. Gradients were moderate for ds and increased during the following days. The humidity continued moderate over the Philip in SEastern China. The weather was fine. On the morning of the 13th the lowest readi barometer was registered at Iloilo. It was blowing moderately from SW, which continued d next few days, and the weather was squally. At 10 a. the centre of Typhoon IX may about 16° N, 132° E. At 4 p. the lowest reading of the barometer 29.77 was reported ila. It blew a gentle NW breeze accompanied by detached clouds between there and Bolinao

At 10 a. on the 14th the centre may have been about 21° N, 131° E. A fresh N breeze accompanied by detached clouds was reported from Bolinao. The weather was fine and dry but very hot both in Manila and in SEastern China. Strong N breezes were felt along the E Coast of China.

At 10 a. on the 15th the centre was in 27° N, 132° E. At the time the British barque *Areola* was situated within a few miles of the centre. The barometer fell to about 27.4 (uncorrected). Heavy rain and full typhoon force of the wind were encountered before the centre. The S.S. *City of Peking* bound from Yokohama to Hongkong encountered a terrific NE typhoon, with heavy confused sea and thick rain at 1 a. on the 16th, when the lowest reading 29.05 of the barometer was registered. The wind backed to NW in the course of the morning and calmed down to a fresh breeze. The S.S. *Bellona* bound from Kobe to Shanghai ran into the NE quadrant of the typhoon and encountered a NE gale increasing to typhoon force at 10.30 p. accompanied by a terrible sea. The lowest reading of the barometer 28.82 (uncorrected) was registered at 1 a. on the 16th. Subsequently the wind backed to NW and decreased in force.

At 10 a. on the 16th the centre appears to have been in 35° N, 141° E. The force of this typhoon was felt on shore in Japan as reported in the Tridaily Weathermaps of the Tokio Observatory.

In the beginning of November several deep depressions accompanied by violent storms travelling eastward passed across Northern China, Korea and the Sea of Japan. On the 5th the barometer began to fall over Southern China and the Philippine Islands, but it was rising in the north, so that gradients for NE winds increased. Moderate NNE gales were encountered by ships near Cochin-China and fresh N breezes in the Mindoro Sea. At 10 a. on the 6th the centre of Typhoon X appears to have been about 13° N, 126° E. Light airs and fine weather were reported from Luzon. The air was very dry along the SE Coast of China but damp in Luzon. In the afternoon the inhabitants of Camarines Nortes (14° N, 122° E) became aware of the approach of the typhoon, though the barometer was registered 29.80. In the evening it blew in strong gusts from the NE and the wind began to back towards N. The barometer fell quickly in the course of the night and it blew a storm from NW. At 8h 35m next morning the wind calmed down for about 2 minutes and the sky cleared.—The S.S. *Whampoa* at the time in the Mindoro Sea experienced a fresh N breeze, a NE swell, very hot and cloudy weather and passing showers of rain.—Cloudy and wet weather with a S breeze and falling barometer were registered at Iloilo.

At 10 a. on the 7th the centre appears to have been in 14° 22′ N, 122° 38′ E. During the preceding hour the wind had backed to W in Camarines Nortes. The lowest reading of the barometer 28.19 was registered at 10.15 a. The wind blew then with great force from SW and after 11 a. from S but calmed down after 2.15 p. At 10 a. a moderate NW breeze and overcast squally and wet weather was reported from Manila (barometer 29.74). During the day it backed towards W a moderate WNW gale was reported at 4 p. and it blew a fresh W gale at 7 p. The lowest reading of the barometer 29.47 was registered about 6 p.—At Bolinao it blew a fresh NNE gale at 4 p. and a heavy swell was observed in the sea. At 9 p. it blew a strong NNW gale. The barometer had then fallen to 29.53. At sea NW of Luzon it blew heavily from the N with a high NNE sea.—In the evening the centre entered Northern Luzon and crossed it during the night with most disastrous consequences to the inhabitants.

At 10 a. on the 8th the centre appears to have been about 19° N, 121° E. Light winds and fine and dry weather prevailed along the Coast of China. In Luzon it was overcast and light rain fell, while light S and SW breezes were reported from Manila and Bolinao. At S. Cape it blew a strong NE breeze in the afternoon, the weather became overcast and misty, drizzling rain fell and the mercury in the barometer descended to 29.68 at 9 p. On the same morning it blew a moderate NE gale at Keelung, but the barometer fell only a few hundredths. It appears therefore now most likely that the centre of this typhoon took a NE course. At 10 a. on the 9th it may possibly have been about 23° N, 126° E, but for want of observations it is impossible to follow this typhoon.

Comparatively little reference to observations made on board ship has been made in the preceding pages. Unequalled facilities are offered here for collecting such and if all the observations forwarded by commanders of men-of-war or merchant vessels or copied from the logbooks of ships passing through the harbour were to have been inserted, the size of this report would have exceeded the limits. Nor has as a rule any reference been made to the damage caused by typhoons on board or on shore, the description of which lies outside the subject of meteorology proper and may be read in the newspapers. Were all this to have been included, the report would have swelled into a stout volume.

The paths of the typhoons are represented on the following six plates copied by a native photolithographer from the original drawings, the four first of which were finished more than a year ago. The different portions of the curves are of very different degrees of accuracy as will appear from the text. Where the path for want of sufficient observations is not known beyond doubt, the curve is dotted. The year and numbers of the typhoons are printed in the corner. The months are printed at the beginning of or elsewhere near the curve and the dates are inserted at the position of the centre at 10 a. on each day. On the first plate the names of the months in which the first and the second typhoons appear have been entered erroneously. The first typhoon should have June not July affixed. and the second should have July not June affixed.

Hongkong Observatory, 31st August. 1886.

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Government Astronomer.

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