No. $\frac{9}{1906}$

# HONGKONG.

## REPORT OF THE DIRECTOR OF THE HONGKONG OBSERVATORY, FOR THE YEAR 1905.

*Laid before the Legislative Council by Command of His Excellency the Governor.*

The comparison of weather-forecasts, issued daily about 11 a.m., with the weather subsequently experienced, has been conducted on the same system as heretofore (cf. Annual Report for 1896 § 5). The results are as follows :—

Success 56 per cent., partial success 33 per cent., failure 1 per cent., partial failure 10 per cent.

Following the method used in meteorological offices and taking the sum of total and partial success as a measure of success, and the sum of total and partial failure as a measure of failure, it follows that 89 per cent. of the weather forecasts were successful in 1905.

2. The China Coast Meteorological Register was printed every morning at the Observatory, and information regarding storms was telegraphed to Hongkong and exhibited on notice-boards as often and as fully as such information could be justified by the weather telegrams received. This happened on 90 days in 1905. The Red Drum alone was hoisted twice, the Red South Cone and Red Drum twice, the Red South Cone alone once, the Black Drum alone 4 times, the Black North Cone and Black Drum 3 times, the Black South Cone and Black Drum twice, the Black South Cone alone 4 times, and the Black South Cone and Black Ball 3 times. The typhoon gun was fired once. Printed bulletins for general distribution were issued once.

3. The thanks of the Government are due to the Telegraph Companies, who continue to forward meteorological telegrams from outports to Hongkong free of charge and also to the staffs of the Eastern Extension and Australasian Telegraph Company at Sharp Peak, Iloilo, Bacolod and Cebu, who make and transmit observations twice daily.

4. Telegraphic connection with Victoria was interrupted as follows :—February 19th 5.30 p. to 20th 7 a.; 21st 7 a. to 2.35 p.; 21st 6.26 p. to 22nd 4.10 p.; March 31st 9.30 a. to 3.30 p.; April 1st 10.15 a. to 11.34 a.; 3rd 10.10 a. to 3.15 p.; 9th 10.10 a. to 10th 10.40 a.; 10th 4.15 p. to 11th 7 a.; 11.25 a. to 2.30 p.; May 21st 4.10 p. to 22nd 10.7 a.; 30th 8 a. to 12.5 p.; June 15th 3.50 p. to 6.5 p.; July 21st 2.50 p. to 6.10 p.; 26th 11.50 p. to 27th 6.50 a.; 27th 6.55 a. to 29th 1.8 p.; August 30th 1 p. to September 1st 2.20 p.; November 20th 4 p. to 21st 10.26 a. Interruptions occurred therefore on 24 days, and of course, also during thunderstorms.

5. Telegraphic connection with Gap Rock was reported interrupted as follows :—January 24th 1 a. to 25th 1.50 p.; 27th 1 a. to 30th 11.41 a.; February 20th 4 p. to 21st 2.35 p.; March 31st 1 a. to 4.21 p.; June 14th 6.30 p. to 15th 10.13 a., 15th 10.15 a. to 16th 12.23 p.; 16th 9.50 p to 17th 2.30 p.; 17th 10 p to 18th 3 a.; 24th 1 p. to 27th 10.50 a.; July 26th 7 p. to August 10th 11.25 a.; 11th 10 p. to 12th 11.35 a.; 12th 10 p. to 13th 3 p.; 23rd 7 p. to 24th 2.26 p.; August 30th 1 p. to December 14th 12.20 p. Interruptions occurred therefore on 146 days, and of course, also during thunderstorms. As our warnings in connection with typhoons in the China Sea are based mainly on reports received from the Gap Rock lighthouse, it is of the utmost importance that the cable between Hongkong and Gap Rock should be always in working order.

6. During 1905 in addition to meteorological registers kept at about 40 stations on shore, 2,074 ship logs have been copied on board or forwarded by the captains. The total number of vessels, whose log-books have been made use of, was 259. The total number of days' observations (counting separately those made on board different ships on the same day) was 14,705.

7. The following is a list of ships, from which logs have been obtained in 1905. When not otherwise distinguished the vessels are steamships:—Abergeldie, Achilles, Ailsa Craig, Alavia, Alcinous, Aldgate, Algoa, Amara, Ambria, America Maru, Amigo, Anamba, Andrée Rickmers, Arabia, Aragonia, Arcadia, Ardova, Arratoon Apcar, Athenian, Auchenarden, Australian, Banca, Bancoora, Baralong, Barotse, Basilan (American Coast Guard Cruiser), Bencleuch, Bengal, Benlarig, Benledi, Benmohr, Benvenue, Blackheath, Bogor, Borneo, Breconshire, Brisgavia, Broholm, Brunhilde, Cadmus (H.M.S.), Calédonien, Candia, Capri, Carl Diederichsen, Carl Menzell, Catherine Apcar, Ceylon, Changsha, Charterhouse, China, Chingtu, Chi Yuen, Chowtai, Choysang, Chunsang, Chusan, Clavering, Coptic, Coromandel, Cranley, Dardanus, Derwent, Devawongse, Dilwara (H.M.T.), Doric, Dumbéa, Dundas, Eastern, Elizabeth Rickmers, Emma Luyken, Empire, Empress of China, Empress of India, Empress of Japan, Equador (4 masted sailing ship), Exe (H.M.S.), Fausang, Fenay Lodge, Ferdinand Laeisz, Fooshing, Franklyn, Fri, Germania, Giang Bee, Glaucus, Glenesk, Glenfarg, Glenlochy, Glenstrae, Gregory Apcar, Hailan, Hailoong, Haimun, Hainam, Halvard, Hangsang, Hans Wagner, Hardinge (H.M.T.), Hedwig Menzell, Heim, Hellas, Hinsang, Hohenzollern, Hohnstein, Holstein, Hongbee, Hongkong, Hopsang, Hyades, Ibadan, Indrani, Irene, Ischia, Isleworth, Ithaka, Iyo Maru, Jageid, Japan, J. B. Aug. Kessler, Kaiser Franz Joseph I. (H. A. M. S.), Kamor, Kansu, Kashing, Katanga, Kennebec, Kensington, Keongwai, Kilbrennan, Kish, Kohsichang, Korea, Kumsang, Kwangtah, Kwongsang, Laertes, Laisang, Lawhill (4 masted bq.), Lennox, Leviathan (H.M.S.), Lisa, Longships, Loongmoon, Loongsang, Loosok, Lothian, Loyal, Lydia, Madeleine Rickmers, Malacca, Malta, Manchuria, Manica, Maria Valerie, Mausang, Mazagon, Mercedes (H.M.T.), Minnesota, Mongolia, M. Struve, Namsang, Netherton, Nicomedia, Nippon, Numantia, Oceano, Onsang, Paklat, Pakling, Palamcotta, Palawan, Palma, Pekin, Pentakota, Pera, Persia, Petchaburi, Pem Yen, Pinna, Pit-anulok, Pleiades, Polynésien, Ponape (G. Gov. Schooner), Preussen, Prinz Eitel Friedrich, Prinz Heinrich, Prinz Regent Luitpold, Prinz Sigismund, Prinz Waldemar, Proteus, Pundua, Purnea, Queen Louise, Radnorshire, Rajaburi, Royalist, Rubi, Ruth, Samsen, Sandhurst, Segovia, Senegambia, Serbia, Shahzada, Shantung, Shimosa, Siberia, Sierra Blanca, Sierra Lucena (sailing ship), Sikh, Silesia, Simla, Skuld, Socotra, Specia, Stentor, Stettin, Strathnevis, Suisang, Taifu, Taiyuan, Taming, Tartar, Tean, Teenkai, Telemachus, Tientsin, Tingsang, Tjilatjap, Tjimahi, Tjipanas, Tholma, Tolosan, Tonkin, Trieste, Trimo, Triumph, Tsinan, Tsintau, Tydeus, Ula, Umballa, Vandalia, Venus, Verona, Volute, Waihora, Wallace, Willehad, Wongkoi, Wosang, Yatshing, Yiksang, Yuensang, Zafiro, Zaida, Zibenghla, Zieten, Zithonia, Zoroaster.

8. The entry of observations made at sea in degree squares for the area between 9° South and 45° North Latitude, and between the Longitude of Singapore and 180° East of Greenwich, has been continued by Miss DOBERCK and 295,538 in all have now been entered.

### Table I.

*Meteorological Observations entered in 10° Squares from 1893-1905 inclusive.*

| Square Number. | Jan. | Feb. | March. | April. | May. | June. | July. | August. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | 1 | 9 | ... | .. | 2 | ... | 5 | 1 | .... | ... | 1 | ... |
| 20 | 52 | 48 | 12 | 62 | 29 | 13 | 13 | 13 | 7 | 43 | 29 | 31 |
| 21 | 44 | 43 | 51 | 49 | 43 | 13 | 14 | 20 | 7 | 35 | 37 | 54 |
| 22 | 8 | 24 | 18 | 34 | 43 | 27 | 51 | 20 | 3 | 27 | 14 | 4 |
| 23 | 239 | 373 | 123 | 102 | 72 | 34 | 151 | 124 | 68 | 172 | 128 | 257 |
| 24 | 685 | 485 | 603 | 568 | 466 | 457 | 749 | 704 | 542 | 619 | 784 | 667 |
| 25 | 507 | 335 | 330 | 300 | 311 | 298 | 383 | 423 | 345 | 643 | 652 | 507 |
| 26 | 3339 | 2998 | 3579 | 3702 | 3816 | 3868 | 4060 | 4349 | 4030 | 4080 | 3565 | 3396 |
| 27 | ... | ... | 5 | 7 | 5 | 14 | 6 | 9 | 11 | 5 | 4 | 4 |
| 55 | 22 | 37 | 26 | 20 | 27 | 45 | 29 | 30 | 20 | 10 | 14 | 23 |
| 56 | 23 | 59 | 30 | 15 | 34 | 40 | 48 | 52 | 16 | 33 | 28 | 20 |
| 57 | 62 | 89 | 48 | 76 | 52 | 37 | 62 | 40 | 12 | 54 | 29 | 45 |
| 58 | 79 | 94 | 115 | 76 | 85 | 80 | 54 | 77 | 18 | 36 | 86 | 82 |
| 59 | 147 | 167 | 165 | 79 | 84 | 110 | 135 | 111 | 26 | 115 | 172 | 137 |
| 60 | 356 | 443 | 403 | 295 | 360 | 346 | 537 | 391 | 270 | 297 | 327 | 334 |
| 61 | 3960 | 3458 | 4006 | 3812 | 4317 | 4505 | 4713 | 4758 | 4592 | 4709 | 4375 | 4060 |
| 62 | 2005 | 1947 | 2200 | 2153 | 2323 | 2374 | 2225 | 2249 | 2288 | 2180 | 2083 | 2029 |
| 63 | 37 | 50 | 58 | 65 | 70 | 83 | 67 | 75 | 73 | 85 | 60 | 44 |
| 91 | 80 | 153 | 81 | 148 | 31 | 44 | 43 | 49 | 56 | 106 | 190 | 126 |

Table I,—*Continued.*

*Meteorological Observations entered in 10° Squares from 1893-1905 inclusive.*

| Square Number. | Jan. | Feb. | March. | April. | May. | June. | July. | August. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 92 | 88 | 174 | 82 | 131 | 39 | 19 | 31 | 25 | 38 | 73 | 174 | 137 |
| 93 | 74 | 132 | 65 | 77 | 10 | 27 | 5 | 28 | 37 | 69 | 118 | 115 |
| 94 | 71 | 63 | 87 | 104 | 77 | 98 | 74 | 38 | 34 | 30 | 162 | 75 |
| 95 | 101 | 137 | 90 | 118 | 123 | 69 | 100 | 81 | 72 | 127 | 91 | 144 |
| 96 | 2263 | 2081 | 2183 | 2091 | 2419 | 2384 | 2464 | 2327 | 2148 | 2364 | 2175 | 2110 |
| 97 | 965 | 978 | 1161 | 1016 | 1016 | 1129 | 1111 | 1092 | 1115 | 1164 | 1179 | 1089 |
| 98 | 318 | 291 | 298 | 324 | 389 | 385 | 417 | 419 | 401 | 404 | 401 | 363 |
| 127 | 233 | 109 | 181 | 148 | 138 | 174 | 200 | 207 | 212 | 209 | 169 | 138 |
| 128 | 263 | 135 | 206 | 190 | 182 | 222 | 239 | 285 | 252 | 271 | 205 | 179 |
| 129 | 293 | 165 | 282 | 266 | 218 | 270 | 255 | 331 | 290 | 294 | 290 | 239 |
| 130 | 821 | 619 | 829 | 719 | 848 | 846 | 956 | 955 | 745 | 873 | 873 | 801 |
| 131 | 628 | 595 | 610 | 656 | 670 | 732 | 793 | 913 | 622 | 680 | 642 | 565 |
| 132 | 1943 | 1760 | 2306 | 2687 | 2986 | 3050 | 3345 | 3072 | 2774 | 2854 | 2711 | 2033 |
| 133 | 2 | 2 | 129 | 137 | 164 | 186 | 189 | 143 | 144 | 176 | 150 | 29 |
| 163 | 312 | 245 | 287 | 349 | 318 | 359 | 372 | 420 | 328 | 363 | 329 | 275 |
| 164 | 478 | 326 | 464 | 514 | 461 | 581 | 578 | 599 | 543 | 547 | 458 | 403 |
| 165 | 531 | 362 | 477 | 486 | 565 | 619 | 627 | 631 | 598 | 564 | 516 | 460 |
| 166 | 158 | 142 | 170 | 154 | 208 | 228 | 256 | 183 | 249 | 203 | 189 | 181 |
| 167 | 19 | 17 | 25 | 67 | 92 | 131 | 180 | 167 | 107 | 76 | 62 | 20 |
| 168 | 1 | 7 | 4 | 14 | 12 | 12 | 12 | 8 | 7 | 14 | 14 | ... |
| 169 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 170 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 199 | 86 | 62 | 94 | 131 | 106 | 115 | 115 | 98 | 135 | 116 | 114 | 77 |
| 200 | 13 | 6 | 12 | 7 | 5 | 8 | 10 | ... | 29 | 8 | 22 | 1 |
| 201 | ... | ... | ... | ... | ... | ... | ... | ... | 2 | ... | ... | ... |
| 202 | ... | ... | ... | ... | ... | 4 | 2 | 1 | 5 | 1 | ... | ... |
| 203 | ... | ... | ... | ... | ... | 2 | 2 | 1 | 2 | ... | ... | ... |
| 318 | 1 | 21 | ... | 15 | ... | ... | 19 | ... | ... | ... | 3 | 7 |
| 319 | 55 | 43 | 64 | 27 | 6 | 13 | 2 | 4 | 1 | 30 | 11 | 33 |
| 320 | 15 | 26 | 52 | 56 | 49 | 100 | 66 | 31 | 36 | 70 | 47 | 33 |
| 321 | 6 | 61 | 47 | 79 | 49 | 70 | 61 | 74 | 84 | 70 | 103 | 70 |
| 322 | 124 | 64 | 85 | 109 | 143 | 140 | 133 | 147 | 169 | 129 | 161 | 128 |
| 323 | 592 | 353 | 481 | 349 | 332 | 320 | 405 | 361 | 357 | 333 | 448 | 458 |
| 324 | 572 | 408 | 320 | 211 | 132 | 168 | 285 | 269 | 407 | 552 | 634 | 543 |
| 325 | 502 | 403 | 490 | 590 | 521 | 617 | 793 | 853 | 863 | 681 | 509 | 466 |
| 326 | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... |
| | 23185 | 20599 | 23434 | 23385 | 24449 | 25467 | 27442 | 27258 | 25195 | 26594 | 25538 | 22992 |

9. As stated in the "Instructions for making Meteorological Observations, etc.," meteorological instruments forwarded by observers who regularly send their Registers to the Observatory, are verified here free of cost. During the past year 4 thermometers were verified. In addition several hundred barometers and aneroids on board ship were compared with our standard.

10. In 1905 the number of transits observed was 374. The axis of the transit instrument was levelled 176 times, and the azimuth and collimation errors, which are less liable to variation, were determined 35 times by aid of the meridian mark. During Mr. PLUMMER's absence on leave since 8th March, these observations have been made by Mr. FIGG.

The Standard Sidereal Clock by Dent was cleaned on November 30th. The other clocks have had no alterations effected during the year.

The errors of the Time-ball are given in Table II. The ball is not dropped on Sundays nor on Government holidays. There were no failures during 1905. The ball was not hoisted on six occasions, viz. :— on March 20th and 27th on account of thunderstorms ; on April 17th the line was out of order, the earth connection in the Police basin having parted ; on August 30th a strong gale was blowing ; and on August 31st and September 1st the line was under repair owing to damage caused by the gale of 30th August. The ball was dropped successfully 292 times in 1905. The probable error was in January ± $0^s.17$, in February ± $0^s.85$, in March ± $0^s.56$, in April ± $0^s.33$, in May ± $0^s.16$, in June ± $0^s.19$, in July ± $0^s.25$, in August ± $0^s.17$, in September ± $0^s.10$, in October ± $0^s.13$, in November ± $0^s.11$, in December ± $0^s.14$.

**Table II.**

*Errors of Time-Ball in 1905.*

− means too late. + means too early.

| Date. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *s.* | *s.* | *s.* | *s.* | *s.* | *s.* | *s.* | *s.* | *s.* | *s.* | *s.* | *s.* |
| 1 | ... | +0.6 | 0.1 | −0.3 | 0.1 | −0.3 | −0.5 | 0.1 | ... | ... | +0.2 | 0.1 |
| 2 | ... | +0.9 | +0.2 | ... | +0.2 | 0.1 | ... | 0.1 | 0.1 | +0.2 | 0.1 | 0.1 |
| 3 | ... | +1.1 | +0.2 | −0.3 | +0.3 | 0.1 | 0.1 | +0.2 | ... | +0.3 | 0.1 | ... |
| 4 | −0.2 | ... | +0.2 | −0.3 | +0.4 | ... | 0.1 | 0.1 | 0.1 | +0.5 | 0.1 | 0.1 |
| 5 | 0.1 | ... | ... | −0.2 | +0.6 | 0.1 | 0.1 | −0.2 | 0.1 | 0.1 | ... | 0.1 |
| 6 | 0.1 | ... | +0.4 | 0.1 | +0.7 | 0.1 | −0.2 | ... | 0.1 | 0.1 | 0.1 | 0.1 |
| 7 | +0.2 | +2.6 | +0.5 | −0.6 | ... | 0.1 | −0.2 | ... | 0.1 | +0.2 | 0.1 | 0.1 |
| 8 | ... | +2.8 | +0.6 | −0.6 | 0.1 | +0.2 | 0.1 | −0.2 | 0.1 | ... | 0.1 | 0.1 |
| 9 | +0.2 | +3.0 | +0.7 | ... | 0.1 | +0.5 | ... | 0.1 | −0.2 | −0.2 | ... | ... |
| 10 | +0.3 | +3.4 | +0.8 | −0.9 | 0.1 | +0.5 | +0.2 | 0.1 | ... | 0.1 | +0.2 | ... |
| 11 | 0.1 | +3.8 | +0.9 | −0.6 | 0.1 | ... | +0.2 | +0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| 12 | 0.1 | ... | ... | −0.7 | 0.1 | ... | 0.1 | +0.3 | 0.1 | +0.2 | ... | 0.1 |
| 13 | 0.1 | −0.3 | −0.2 | −0.6 | 0.1 | 0.1 | −0.2 | ... | 0.1 | 0.1 | 0.1 | +0.2 |
| 14 | +0.2 | 0.1 | −0.4 | −0.6 | ... | 0.1 | −0.3 | 0.1 | +0.2 | 0.1 | 0.1 | +0.3 |
| 15 | ... | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | +0.2 | 0.1 | ... | 0.1 | +0.5 |
| 16 | +0.3 | 0.1 | 0.1 | ... | 0.1 | 0.1 | ... | +0.2 | 0.1 | −0.2 | 0.1 | +0.7 |
| 17 | +0.3 | 0.1 | +0.2 | ... | 0.1 | 0.1 | 0.1 | +0.3 | ... | 0.1 | 0.1 | ... |
| 18 | +0.4 | 0.1 | +0.5 | +0.3 | 0.1 | ... | 0.1 | +0.4 | 0.1 | 0.1 | 0.1 | 0.1 |
| 19 | +0.4 | ... | ... | +0.4 | 0.1 | 0.1 | 0.1 | +0.5 | 0.1 | 0.1 | ... | 0.1 |
| 20 | +0.4 | 0.1 | ... | +0.6 | 0.1 | 0.1 | +0.2 | ... | 0.1 | +0.2 | 0.1 | 0.1 |
| 21 | 0.1 | 0.1 | +1.2 | ... | ... | +0.2 | +0.3 | 0.1 | −0.2 | −0.2 | +0.2 | 0.1 |
| 22 | ... | −0.2 | +1.5 | ... | −0.2 | +0.3 | +0.3 | −0.2 | 0.1 | ... | +0.4 | 0.1 |
| 23 | 0.1 | −0.5 | +1.7 | ... | 0.1 | +0.5 | ... | −0.3 | −0.2 | +0.2 | +0.2 | 0.1 |
| 24 | 0.1 | −0.5 | +2.0 | ... | ... | +0.6 | +0.2 | 0.1 | ... | 0.1 | 0.1 | ... |
| 25 | 0.1 | +0.5 | +2.2 | −0.3 | 0.1 | ... | +0.4 | 0.1 | 0.1 | 0.1 | +0.2 | ... |
| 26 | 0.1 | ... | ... | −0.2 | 0.1 | 0.1 | +0.5 | 0.1 | 0.1 | 0.1 | ... | ... |
| 27 | 0.1 | +0.7 | ... | 0.1 | 0.1 | 0.1 | +0.7 | ... | 0.1 | 0.1 | 0.1 | 0.1 |
| 28 | 0.1 | 0.1 | −0.5 | 0.1 | ... | −0.2 | +0.9 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 29 | ... | ... | −0.4 | 0.1 | −0.2 | −0.4 | +1.1 | +.3 | +0.2 | ... | 0.1 | 0.1 |
| 30 | +0.3 | ... | −0.3 | ... | −0.2 | −0.3 | ... | ... | 0.1 | 0.1 | 0.1 | +0.2 |
| 31 | +0.4 | ... | −0.3 | ... | −0.3 | ... | 0.1 | ... | ... | 0.1 | ... | ... |

11. The hygrometric tables generally used for calculating the Vapour tension and Dew point from observations of the Dry and Damp thermometers mounted in screens, are not quite suitable when the air temperature and temperature of evaporation are determined by means of rotating thermometers.

With a view of calculating hygrometric tables adapted for use with the latter instruments, observations with Alluard's hygrometer and rotating thermometers have, at the instance of the Royal Society, been in progress here for some years whenever opportunity offered.

These observations have been made for the most part in the magnetic observing hut, a wooden building 16 feet by 12 feet. This building is provided with a door on the North and South sides and with two windows each on the East and West sides. In addition to the ordinary glass windows, louvres are fitted, and the latter have been found very convenient for permitting the amount of air motion through the building to be regulated to a great extent. Almost invariably the South door has been kept shut to avoid sunshine falling on the floor of the building and radiation from the ground outside, and the North door left open. The windows have also been kept open and the louvres closed, the slats being so regulated, according to the direction and force of the wind, as to permit of a free current of air passing through the building. By this arrangement also, direct light comes chiefly from the North, which is an advantage as strong light from all directions renders the observations very difficult. Partly owing to this cause observations made in the open air and in other situations have had to be rejected, as the results were so discordant as to make it doubtful whether the deposit of dew had been properly observed. Besides in the open air the variable air motion and radiation from the ground render the observations most unsatisfactory—the Alluard responding quickly to changes of dew point so caused, while the effect was often unnoticeable on the rotating thermometers.

The following method is followed in making the observations in the magnetic hut. The small table on which the hygrometer stands is placed as near as possible in the middle of the building, a small black screen being placed in front of the instrument at a distance of about two feet. The observer sits at a distance of about five feet from the instrument and evaporates the ether by means of a small hand bellows connected to the instrument by indiarubber tubing. When dew is observed on the gold plated face of the apparatus the thermometer is read off, and again when the dew disappears, care being taken to obtain only the very lightest deposit. To effect the latter it is necessary to work the bellows very gently on nearing the dew point, otherwise the plate suddenly becomes heavily charged with dew. The rotating thermometers are laid on the floor, which is of cement, in a corner of the hut, the damp bulb thermometer having been previously wetted so that it already reads near the evaporation point. They are then rotated round the Alluard apparatus, two or three separate readings being taken. The hygrometer is then again observed and the mean of this and the previous observation is taken as "a single observation." Usually three or four observations in the order named are taken and the mean of them is called "a set." As it is necessary to clean the dew plate of the hygrometer frequently, a set of observations takes from twenty minutes to half an hour. But when the air is extremely dry the time taken may be much longer owing to the difficulty of reducing the ether to the dew point. Occasionally the temperature of the ether has been reduced previously to being used by placing it in ice or in water considerably below the air temperature. But even so when the air is extremely dry and the difference between the dew point and air temperature great, considerable difficulty still exists as the reduction of temperature caused by evaporating the ether is to some extent counter-balanced by the rise caused by the temperature of the air passed through the instrument, the ether not being evaporated fast enough and at the same time maintained at a sufficiently high level in the apparatus. The aspirator furnished with the instrument was found to be useless whenever the air was moderately dry even, it being found quite impossible to reduce the temperature of the ether quickly enough by this means. A hand bellows for forcing air through the instrument was therefore substituted for it. The small tubes through which the air is passed are liable to get choked by small particles of the connecting rubber tubing finding their way into the tubes. They can only be cleaned thoroughly by taking the instrument completely to pieces which necessitates recementing tubes etc., to the ether container.

The number of sets of observations made in the various years was as follows:— 1887, 44; 1888, 15; 1889, 3; 1892, 18; 1893, 37; 1894, 13; 1895, 2; 1896, 30; 1897, 9; 1898, 39; 1899, 90; 1900, 48; 1901, 96; 1902, 162; 1903, 94; 1905, 112. In 1887 two sets were rejected as being palpably wrong, in 1892 eighteen sets and in 1893 twenty-two sets were rejected on account of being made mostly in the open air or in situations where light, radiation and air motion were uncontrolled.

These observations were all made by Mr. F. G. Figg.

The following table shows the provisional corrections, in degrees Fahrenheit, to be applied to the Dew-point determined by Rotating thermometers and Blanford's tables, in order to reduce it to that indicated by Alluard's hygrometer, for different heights of the damp bulb temperature and for various differences between the damp and dry thermometer readings.

It will be seen that the correction diminishes with increasing damp bulb temperature, with probably a change of sign at the highest readings of the damp bulb here shown. It increases with increasing differences between dry and damp thermometer readings as regards damp bulb temperatures below 60°, while above that point it seems probable that the change of correction in the same direction, is small.

The table still reveals many inequalities, and more observations are evidently required before a final discussion of the results will be possible. The opportunities for obtaining observations at the extreme points shown in the table are, however, by no means frequent.

Table III.

| Rotating Damp Ther. | Dry Ther.—Damp Ther. | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2°.5 | | 5° | | 7°.5 | | 10° | | 12°.5 | | 15° | | 17°.5 | | 20° | |
| | Corrn. | Sets. | Corrn. | Sets. | Corrn. | Sets. | Corrn. | Sets. | Corrn. | Sets. | Corrn. | Sets. | Corrn. | Sets. | Corrn. | Sets. |
| 37°.5 | ... | ... | ... | ... | ... | ... | +0°.90 | 2 | ... | ... | ... | ... | ... | ... | ... | ... |
| 40 | ... | ... | ... | ... | ... | ... | +1 .05 | 2 | +4°.23 | 6 | +4°.10 | 2 | ... | ... | ... | ... |
| 42.5 | ... | ... | ... | ... | ... | ... | −0 .35 | 2 | +4 .12 | 8 | +4 .64 | 7 | +5°.30 | 1 | ... | ... |
| 45 | ... | ... | ... | ... | +0°.50 | 1 | +2 .01 | 9 | +0 .40 | 2 | +3 .23 | 7 | +5 .57 | 3 | +6°.87 | 3 |
| 47.5 | ... | ... | ... | ... | ... | ... | +2 .05 | 2 | +1 .42 | 5 | +1 .88 | 20 | +4 .12 | 22 | +5 .60 | 1 |
| 50 | ... | ... | +0°.52 | 4 | +0 .77 | 7 | +1 .85 | 4 | +1 .55 | 12 | +2 .26 | 25 | +1 .11 | 7 | ... | ... |
| 52.5 | ... | ... | −0 .30 | 1 | +0 .77 | 9 | +1 .30 | 17 | +2 .05 | 15 | +1 .84 | 21 | +1 .47 | 3 | +3 .15 | 2 |
| 55 | ... | ... | +0 .11 | 7 | +0 .74 | 10 | +1 .01 | 10 | +0 .80 | 5 | +1 .95 | 14 | +2 .53 | 7 | +2 .92 | 5 |
| 57·5 | ... | ... | +0 .24 | 8 | +0 .60 | 6 | +0 .85 | 6 | +0 .46 | 7 | +0 .51 | 7 | +1 .53 | 10 | ... | ... |
| 60 | ... | ... | +0 .34 | 7 | +0 .76 | 5 | +0 .05 | 4 | +0 .57 | 8 | +0 .66 | 8 | −0 .60 | 1 | +1 .75 | 2 |
| 62.5 | ... | ... | ... | ... | +0 .78 | 6 | +0 .56 | 8 | +0 .50 | 10 | +0 .25 | 2 | +1 .30 | 1 | +0 .40 | 1 |
| 65 | +0°.45 | 2 | +0 .63 | 9 | +0 .80 | 8 | +0 .95 | 11 | +0 .74 | 10 | +0 .70 | 2 | +0 .95 | 2 | −0 .35 | 2 |
| 67.5 | +0 .35 | 2 | +0 .55 | 6 | +0 .39 | 14 | +0 .34 | 12 | +0 .02 | 14 | +0 .39 | 8 | −0 .50 | 4 | +0 .80 | 1 |
| 70 | ... | ... | +0 .10 | 2 | +0 .53 | 6 | +0 .31 | 14 | +0 .02 | 5 | +0 .20 | 6 | −0 .97 | 3 | ... | ... |
| 72.5 | +0 .10 | 1 | +0 .31 | 7 | +0 .32 | 16 | +0 .35 | 13 | +0 .42 | 4 | +0 .22 | 6 | −0 .52 | 5 | ... | ... |
| 75 | ... | ... | +0 .35 | 15 | +0 .34 | 22 | +0 .35 | 15 | +0 .18 | 13 | −0 .63 | 3 | +0 .30 | 1 | ... | ... |
| 77.5 | ... | ... | +0 .05 | 2 | +0 .18 | 45 | +0 .04 | 26 | −0 .13 | 3 | ... | ... | ... | ... | ... | ... |
| 80 | ... | ... | −0 .14 | 7 | −0 .14 | 13 | −0 .25 | 9 | +0 .20 | 2 | ... | ... | ... | ... | ... | ... |
| 82.5 | ... | ... | ... | ... | ... | ... | −0 .90 | 2 | ... | ... | ... | ... | ... | ... | ... | ... |

12. The following table shows the means of barometric pressure at the Observatory and at Gap Rock (32 miles S.S.W. of the Observatory) from five years' three-hourly observations (1900-1904 incl.) reduced to freezing point of water and mean sea level.

Table IV.

| Month. | Obs. | G. R. | Hour. | Obs. | G. R. |
|---|---|---|---|---|---|
| January, ......... | 30.170 | 30.147 | 1 a.m. | 29.974 | 29.951 |
| February, ......... | .222 | .200 | 4 „ | .954 | .942 |
| March, ............ | .045 | .024 | 7 „ | .986 | .963 |
| April, ............ | 29.957 | 29.940 | 10 „ | 30.013 | .993 |
| May, ............ | .872 | .861 | 1 p.m. | 29.961 | .950 |
| June, ............ | .752 | .745 | 4 „ | .924 | .912 |
| July, ............ | .737 | .726 | 7 „ | .953 | .934 |
| August, ......... | .724 | .711 | 10 „ | .991 | .967 |
| September, ...... | .873 | .857 | | | |
| October, ......... | .999 | .974 | Mean. | 29.969 | 29.951 |
| November, ...... | 30.111 | 30.087 | | | |
| December, ...... | .170 | .145 | | | |

The three-hourly means are represented by the following formulæ, where $t$ indicates mean time:

Observatory : $29.969 + 0.019 \sin(t + 7°) - 0.0315 \sin(2t - 28°) + 0.002 \sin(3t + 72°)$.

Gap Rock : $29.951 + 0.017 \sin(t - 12°) - 0.0265 \sin(2t - 32°) + 0.003 \sin(3t - 64°)$.

The last term is quite uncertain. The formulæ show that the pressure observed at Gap Rock lags behind that registered at the Observatory and that the daily variation is smaller. This is due to friction of the mercury in the standard barometer at Gap Rock, whose tube is only half an inch in internal diameter while the tube in the barograph at the Observatory is much larger. The extremes of the bidiurnal variation occur 16 minutes too late at Gap Rock, and the diurnal variation, whose coefficient is smaller, lags still more.

13. The cisterns of the barograph and standard barometers are placed 109 feet above M.S.L. The bulbs of the thermometers are rotated 108 feet above M.S.L. and 4 feet above the grass. The solar radiation thermometer is placed at the same height. The rim of the rain-gauge is 105 feet above M.S.L. and 21 inches above the ground.

14. The Monthly Weather Reports are arranged as follows :—

Table I exhibits the hourly readings of the barometer reduced to freezing point of water, but not to sea level nor for gravity, as measured (at two minutes to the hour [mean time] named) from the barograms.

Tables II and III exhibit the temperature of the air and of evaporation as determined by aid of rotating thermometers. Table II exhibits also the extreme temperatures reduced to rotating thermometer by comparisons of thermometers hung beside them. Table III exhibits also the solar radiation (black bulb in vacuo), maximum temperatures reduced to Kew arbitrary standard.

Table IV exhibits the mean relative humidity in percentage of saturation and mean tension of water vapour present in the air in inches of mercury, for every hour of the day and for every day of the month, calculated by aid of Blanford's Table from the data in Tables II and III.

Table V exhibits the duration of sunshine expressed in hours, from half an hour before to half an hour after the hour (true time) named.

Table VI exhibits the amount of rain (or dew) in inches registered from half an hour before to half an hour after the [mean time] hour named. It exhibits also the observed duration of rain.

Table VII exhibits the velocity of the wind in miles and its direction in point. (1-32.) The velocity is measured from half an hour before to half an hour after the hour [mean time] named, but the direction is read off at the hours

Table VIII exhibits the amount (0-10), name (HOWARD'S Classification), and direction whence coming of the clouds. Where the names of upper and lower clouds are given, but only one direction, this refers to the lower clouds. With regard to the names of clouds, nimbus (nim) is entered only when the rain is seen to fall ; when no rain is seen to fall cumulo-nimbus (cum-nim) is entered. This name indicates clouds intermediate between cum and nim. Cumulo-stratus (cum-str.) is the well-known thunder cloud, while strato-cumulus (str-cum) signifies a cloud intermediate between stratus and cum. Sm-cum means alto-cumulus.

Table IX exhibits for every hour in the day, the mean velocity of the wind reduced to 4 as well as 2 directions, according to strictly accurate formulæ, and also the mean direction of the wind. Below this is printed a list of the phenomena observed.

15. The following annual Weather Report for 1905 is arranged as follows :—

Table V exhibits the mean values for the year (or hourly excess above this) obtained from the monthly reports. The total duration of rain was 663 hours. There fell at least 0.01 inch of rain on 145 days.

Table VI exhibits the number of hours during a portion of which at least 0.005 inch of rain (or dew) was registered.

Table VII exhibits the number of days with wind from eight different points of the compass. The figures are obtained from the mean daily directions in Table VII of the monthly reports. Days with wind from a point equidistant from two directions given, are counted half to one of these and half to the other, *e.g.*, half of the days when the wind was NNE are counted as N, and the other half as NE.

Table VIII exhibits the number of days on which certain meteorological phenomena were registered, and also the total number of thunderstorms noted in the neighbourhood during the past year.

Table IX shows the frequency of clouds of different classes.

Table X is arranged as last year.

Table XI exhibits the monthly and annual extremes.

Table XII contains fine-day means.

16. The observations of magnetic declination and horizontal force published in Tables XIII and XIV were made with magnet No. 55 on Kew pattern unifilar magnetometer Elliot Brothers, No. 55. The dips were observed with dip-circle Dover No. 71. The height above mean sea level at which the magnets are suspended is 116 feet.

The methods adopted in making the observations and in determining and applying the corrections are explained in Appendix G. of Observations and Researches made in 1885—"On the verification of unifilar magnetometer Elliot Brothers, No. 55." The value of $\pi^2 K$ used was 3.44914 at 25° Cent. The value of P was 8.032. The mean value of the magnetic moment of the vibrating needle was 571.53. From comparisons made between magnetometers No. 55 and No. 83 in the year 1898 it was shown that the correction to the horizontal force obtained by the former as given in Tables XIV and XV was +0.00052 (see "Observations and Researches made in 1898," page 19.)

The times of vibration exhibited in Table XIV are each derived from 12 observations of the time occupied by the magnet in making 100 vibrations, corrections having been applied for rate of chronometer and arc of vibration.

The observations of horizontal force given in Table XIV are expressed in C.G.S. units. The vertical and total forces have been computed by aid of the observed dips.

During the past year gangs of coolies have been at work excavating the hill-side to the West of the magnetic hut, and the erection of a church on the site thus formed has been in progress. The west side of the magnetic hut is now only 10 feet from the edge of the cutting which goes almost sheer down for over 30 feet.

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

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

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

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

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

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

17. An appendix about the occurrence of fogs along the coast of China illustrated by a diagram (Plate IV) is added, and also three plates (I, II and III) showing tracks of typhoons in 1905.

W. Doberck,
*Director.*

Hongkong, Observatory, 10*th March*, 1906.

## Table V.

*Mean Values and Hourly Excess above the mean of Meteorological Elements in 1905.*

| | 1 a. | 2 a. | 3 a. | 4 a. | 5 a. | 6 a. | 7 a. | 8 a. | 9 a. | 10 a. | 11 a. | Noon. | 1 p. | 2 p. | 3 p. | 4 p. | 5 p. | 6 p. | 7 p. | 8 p. | 9 p. | 10 p. | 11 p. | Midt. | Mean or Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pressure, | +.006 | —.006 | —.014 | —.018 | —.013 | —.000 | +.016 | +.030 | +.041 | +.043 | +.034 | +.016 | —.008 | —.028 | —.040 | —.044 | —.040 | —.020 | —.016 | +.001 | +.015 | +.022 | +.022 | +.015 | 29.847 |
| Temperature, | — 1.5 | — 1.6 | — 1.8 | — 2.0 | — 2.0 | — 1.9 | — 1.3 | — 0.3 | + 0.6 | + 1.4 | + 2.0 | + 2.4 | + 2.5 | + 2.4 | + 2.1 | + 1.6 | + 0.9 | + 0.2 | — 0.2 | — 0.3 | — 0.5 | — 0.6 | — 1.1 | — 1.3 | 71.6 |
| Diurnal Range, | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 8.1 |
| Humidity, | + 5 | + 5 | + 5 | + 5 | + 5 | + 4 | + 2 | 0 | — 3 | — 5 | — 6 | — 7 | — 8 | — 7 | — 6 | — 5 | — 3 | 0 | + 1 | + 2 | + 3 | + 4 | + 5 | + 5 | 80 |
| Vapour Tension, | +.009 | +.005 | +.002 | —.002 | —.006 | —.007 | —.006 | —.036 | —.009 | —.008 | —.009 | —.008 | —.010 | —.005 | —.007 | —.006 | —.003 | +.003 | +.007 | +.011 | +.013 | +.015 | +.014 | +.011 | 0.650 |
| Sunshine (Total) | ... | ... | ... | ... | ... | 22.6 | 104.7 | 151.9 | 169.4 | 183.2 | 189.2 | 189.1 | 188.3 | 180.8 | 175.2 | 162.2 | 110.3 | 24.5 | ... | ... | ... | ... | ... | ... | 1851.4 |
| Rainfall (Total), | 1.120 | 1.515 | 2.850 | 3.105 | 1.650 | 2.210 | 4.115 | 5.310 | 4.920 | 3.685 | 4.625 | 3.840 | 3.500 | 3.065 | 3.225 | 3.700 | 3.610 | 5.040 | 1.795 | 1.570 | 1.470 | 2.290 | 0.770 | 2.125 | 70.945 |
| Hours of Rain (Total), | 33 | 37 | 34 | 33 | 25 | 28 | 40 | 30 | 39 | 41 | 26 | 34 | 38 | 39 | 37 | 39 | 32 | 35 | 27 | 29 | 32 | 31 | 23 | 29 | 791 |
| Intensity of Rain, | 0.034 | 0.041 | 0.084 | 0.094 | 0.066 | 0.079 | 0.103 | 0.177 | 0.126 | 0.090 | 0.178 | 0.113 | 0.092 | 0.079 | 0.090 | 0.090 | 0.113 | 0.144 | 0.066 | 0.054 | 0.046 | 0.072 | 0.033 | 0.073 | 0.090 |
| Wind-Velocity, | — 1.3 | — 1.4 | — 1.2 | — 1.2 | — 1.4 | — 1.1 | — 0.8 | + 0.1 | + 1.1 | + 1.5 | + 3.5 | + 2.1 | + 2.1 | + 1.9 | + 1.8 | + 1.6 | + 0.5 | — 0.6 | — 0.9 | — 1.4 | — 1.0 | — 1.3 | — 1.3 | — 1.2 | 12.2 |
| Wind-Direction, | — 6° | — 4° | — 2° | — 5° | — 6° | — 9° | — 4° | — 4° | — 1° | + 4° | + 5° | + 7° | + 10° | + 10° | + 10° | + 9° | + 8° | + 4° | — 1° | — 4° | — 5° | — 8° | — 8° | — 7° | E 8° S |
| Cloudiness, | — 5 | ... | ... | — 5 | ... | ... | + 6 | ... | ... | + 4 | ... | ... | + 4 | ... | ... | + 1 | ... | ... | 0 | ... | ... | — 4 | ... | ... | 71 |
| Solar Radiation, | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 117.1 |
| Excess of do. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 41.1 |

## Table VI.

*Number of Hours during a portion of which it rained for each Month of the year 1905.*

| Month. | 1 a. | 2 a. | 3 a. | 4 a. | 5 a. | 6 a. | 7 a. | 8 a. | 9 a. | 10 a. | 11 a. | Noon. | 1 p. | 2 p. | 3 p. | 4 p. | 5 p. | 6 p. | 7 p. | 8 p. | 9 p. | 10 p. | 11 p. | Midt. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January, | 2 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 20 |
| February, | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 2 | 2 | 3 | 3 | 5 | 3 | 2 | 2 | 3 | 0 | 3 | 1 | 3 | 2 | 1 | 1 | 1 | 41 |
| March, | 7 | 4 | 2 | 5 | 6 | 4 | 6 | 5 | 5 | 6 | 4 | 6 | 7 | 8 | 6 | 7 | 10 | 7 | 6 | 7 | 7 | 5 | 4 | 4 | 138 |
| April, | 4 | 4 | 3 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 0 | 1 | 2 | 4 | 3 | 2 | 4 | 4 | 3 | 4 | 3 | 2 | 2 | 4 | 56 |
| May, | 0 | 3 | 4 | 3 | 3 | 1 | 5 | 3 | 4 | 3 | 2 | 2 | 4 | 1 | 3 | 3 | 1 | 2 | 3 | 2 | 3 | 3 | 0 | 0 | 58 |
| June, | 3 | 5 | 6 | 6 | 4 | 6 | 7 | 5 | 7 | 8 | 7 | 6 | 7 | 7 | 6 | 7 | 6 | 6 | 3 | 3 | 3 | 5 | 2 | 3 | 128 |
| July, | 5 | 4 | 2 | 4 | 3 | 4 | 4 | 4 | 8 | 3 | 2 | 4 | 3 | 3 | 5 | 4 | 2 | 2 | 1 | 1 | 3 | 4 | 3 | 2 | 80 |
| August, | 3 | 5 | 4 | 4 | 4 | 3 | 8 | 4 | 6 | 9 | 4 | 7 | 8 | 8 | 7 | 6 | 3 | 3 | 4 | 4 | 3 | 3 | 5 | 4 | 119 |
| September, | 3 | 4 | 5 | 4 | 2 | 4 | 2 | 1 | 2 | 4 | 2 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 3 | 2 | 3 | 4 | 3 | 4 | 65 |
| October, | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 |
| November, | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 1 | 0 | 0 | 1 | 2 | 1 | 2 | 19 |
| December, | 3 | 2 | 3 | 2 | 1 | 3 | 5 | 3 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 4 | 47 |
| Total, | 33 | 37 | 34 | 33 | 25 | 28 | 40 | 30 | 39 | 41 | 26 | 34 | 38 | 39 | 37 | 39 | 32 | 35 | 27 | 29 | 32 | 31 | 23 | 29 | 791 |

## Table VII.

*Number of Days with wind from eight different points of the Compass during each month of the year 1905.*

| Month. | N. | NE. | E. | SE. | S. | SW. | W. | NW. |
|---|---|---|---|---|---|---|---|---|
| January, ...... | 2 | 2 | 17 | ... | 3 | 4 | 2 | 1 |
| February, .... | 5 | 5 | 14 | 1 | ... | ... | 1 | 2 |
| March,........ | 4 | 2 | 25 | ... | ... | ... | ... | ... |
| April, ......... | 2 | 2 | 19 | 2 | 4 | 1 | ... | ... |
| May, .......... | ... | 1 | 16 | 2 | 1 | 6 | 4 | 1 |
| June, ......... | 1 | 2 | 11 | 3 | 6 | 6 | 1 | ... |
| July, .......... | ... | 1 | 9 | 3 | 4 | 7 | 5 | 2 |
| August........ | ... | 1 | 8 | 7 | 3 | 6 | 4 | 2 |
| September, ... | 3 | 1 | 15 | 3 | 1 | 2 | 4 | 1 |
| October, ...... | 4 | 4 | 22 | ... | ... | ... | ... | 1 |
| November, ... | 2 | 4 | 22 | ... | ... | ... | 1 | 1 |
| December, ... | 5 | 2 | 19 | 1 | ... | ... | 1 | 3 |
| Sums,.... | 28 | 27 | 197 | 22 | 22 | 32 | 23 | 14 |

## Table VIII.

*Total Number of Days on which different Meteorological Phenomena were noted and Total Number of Thunderstorms during each month of the year 1905.*

| Month. | Fog. | Electric Phenomena. | Lightning. | Thunder. | Thunderstorms. | Unusual Visibility. | Dew. | Rainbows. | Lunar Halo. | Lunar Corona. | Solar Halo. | Solar Corona. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January, ............................. | 12 | 2 | 2 | 2 | 2 | ... | 1 | ... | 1 | ... | ... | ... |
| February, ............................ | 7 | 1 | 1 | 1 | 1 | 1 | ... | ... | ... | ... | ... | ... |
| March,.................................. | 9 | 12 | 12 | 10 | 10 | 3 | ... | ... | ... | ... | ... | 1 |
| April,.................................... | 14 | 3 | 3 | 2 | 2 | ... | 2 | ... | ... | ... | ... | ... |
| May, .................................... | 4 | 10 | 10 | 6 | 5 | 1 | 7 | 1 | 6 | ... | 3 | ... |
| June,.................................... | 4 | 16 | 15 | 12 | 9 | 2 | 7 | 4 | 3 | 1 | 2 | ... |
| July, ................................... | 4 | 17 | 16 | 13 | 10 | 5 | 12 | 4 | 2 | ... | 2 | ... |
| August.................................. | ... | 12 | 11 | 7 | 4 | 4 | 20 | 6 | 6 | ... | 5 | 3 |
| September, .......................... | 1 | 15 | 15 | 2 | 1 | 5 | 12 | 3 | 5 | ... | 2 | ... |
| October, ... ......................... | ... | 3 | 3 | ... | ... | 4 | 10 | 1 | 3 | 1 | 1 | 1 |
| November,............................ | ... | ... | ... | ... | ... | 1 | 7 | 1 | ... | ... | ... | ... |
| December,............................. | 7 | 3 | 3 | 2 | 2 | 7 | 3 | ... | ... | ... | ... | ... |
| Sums,.............................. | 62 | 94 | 91 | 57 | 46 | 33 | 81 | 20 | 26 | 2 | 15 | 5 |

## Table IX.

*Total Number of Times that Clouds of different forms were observed in each month of the year 1905.*

| Month. | c. | c-str. | c-cum. | sm-cum. | cum. | cum-str. | str. | r-cum. | cum-nim. | nim. |
|---|---|---|---|---|---|---|---|---|---|---|
| January, ...... | ... | 5 | 18 | 45 | 151 | ... | 16 | 1 | 7 | 8 |
| February, .... | ... | ... | ... | 15 | 86 | ... | 58 | ... | 13 | 42 |
| March,......... | ... | 3 | 4 | 19 | 80 | ... | 27 | ... | 50 | 83 |
| April,.......... | ... | 1 | 1 | 27 | 120 | ... | 26 | ... | 31 | 43 |
| May, .......... | 1 | 66 | 10 | 80 | 145 | ... | 3 | ... | 14 | 20 |
| June, .......... | ... | 50 | 14 | 45 | 147 | 1 | 1 | ... | 28 | 39 |
| July, .......... | ... | 50 | 26 | 49 | 177 | 1 | ... | ... | 18 | 20 |
| August, ...... | 1 | 100 | 2 | 29 | 157 | 6 | 7 | ... | 10 | 37 |
| September, ... | ... | 50 | 15 | 44 | 168 | 1 | 3 | 3 | 14 | 25 |
| October, ...... | ... | 23 | 13 | 45 | 130 | ... | 10 | ... | 11 | 8 |
| November, ... | ... | 12 | 5 | 62 | 92 | ... | 5 | ... | 10 | 10 |
| December,.... | ... | 11 | 3 | 59 | 104 | ... | 20 | ... | 39 | 21 |
| Sums,...... | 2 | 371 | 111 | 519 | 1557 | 9 | 176 | 4 | 245 | 356 |

## Table X.

| 1905. | Barometric Tide. | Mean Diurnal Variability of Temperature. | Weight of Aqueous Vapour. | Rainfall. | | Hourly Intensity of Rain. | Mean Direction of Clouds whence coming. | | | Number of Days with Clouds below. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean (20 years.) | 1905. | | Lower. | Upper. | Cirrus. | 2000 ft. | 1000 ft. |
| January, ... | 0.108 | 2.08 | 5.36 | 1.32 | 1.800 | 0.106 | S 13° E | W 8° S | ... | 8 | 0 |
| February, . | 0.100 | 2.48 | 4.20 | 1.86 | 1.100 | 0.017 | E 29° S | W 13° S | ... | 18 | 4 |
| March, ...... | 0.099 | 2.18 | 4.96 | 2.63 | 11.485 | 0.078 | E 8° S | SW | ... | 24 | 5 |
| April, ...... | 0.096 | 3.26 | 6.42 | 5.56 | 1.235 | 0.019 | S 25° E | W 14° S | ... | 16 | 3 |
| May, ....... | 0.086 | 1.31 | 8.41 | 13.43 | 6.825 | 0.152 | S 6° W | W 2° N | WNW | 10 | 2 |
| June, ...... | 0.064 | 1.39 | 9.27 | 16.80 | 19.695 | 0.212 | S 19° E | N 41° W | ... | 12 | 1 |
| July, ....... | 0.073 | 0.95 | 9.33 | 13.32 | 9.015 | 0.215 | S 2° E | N 40° W | ... | 5 | 2 |
| August, .... | 0.077 | 1.28 | 9.43 | 14.22 | 12.115 | 0.189 | S 10° E | N 39° E | ... | 9 | 2 |
| September,. | 0.076 | 1.07 | 8.85 | 8.21 | 3.195 | 0.071 | E 15° S | N 42° E | ... | 2 | 1 |
| October, ... | 0.088 | 1.32 | 6.94 | 4.73 | 1.830 | 0.122 | E 2° N | W 33° S | ... | 2 | 0 |
| November,. | 0.099 | 1.63 | 5.07 | 1.71 | 0.280 | 0.016 | E 4° N | W 28° S | ... | 3 | 0 |
| December, . | 0.098 | 1.81 | 5.50 | 1.03 | 2.370 | 0.045 | E 2° S | W 36° S | ... | 10 | 3 |
| Mean or Total,... | 0.089 | 1.73 | 6.98 | 84.82 | 70.945 | 0.106 | E 44° S | W 15° N | WNW | 119 | 23 |

## Table XI.

*Monthly Extremes of the Principal Meteorological Elements regis'ered during the year 1905.*

| Month. | Barometer. | | Temperature. | | Humidity. | Vapour Tension. | | Rain. | | Wind Velocity. | Radiation. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Min. | Max | Min. | Daily Max. | Hourly Max. | Max. | Sun Max. |
| January, ....... | 30.388 | 29.615 | 79.3 | 46.8 | 47 | 0.713 | 0.234 | 0.970 | 0.280 | 35 | 131.1 |
| February, ...... | 30.283 | 29.671 | 73.5 | 42.8 | 38 | 0.735 | 0.177 | 0.465 | 0.165 | 35 | 109.9 |
| March, ......... | 30.319 | 29.527 | 77.0 | 47.2 | 49 | 0.661 | 0.239 | 2.145 | 0.980 | 49 | 125.1 |
| April, ............ | 30.139 | 29.571 | 84.2 | 51.8 | 34 | 0.852 | 0.200 | 0.235 | 0.205 | 40 | 134.8 |
| May, ............ | 30.001 | 29.525 | 89.4 | 68.4 | 47 | 0.953 | 0.488 | 3.080 | 0.710 | 36 | 148.5 |
| June, ............ | 29.828 | 29.364 | 88.6 | 69.8 | 36 | 1.027 | 0.405 | 7.955 | 2.800 | 32 | 146.3 |
| July, ............ | 29.844 | 29.190 | 91.3 | 73.8 | 51 | 1.069 | 0.637 | 1.490 | 0.860 | 34 | 147.5 |
| August, ......... | 29.856 | 29.124 | 90.5 | 73.0 | 56 | 1.007 | 0.694 | 2.515 | 1.240 | 65 | 146.8 |
| September, .... | 29.976 | 29.530 | 89.6 | 71.3 | 53 | 1.009 | 0.510 | 0.995 | 0.245 | 47 | 142.9 |
| October, ......... | 30.101 | 29.735 | 85.7 | 59.7 | 30 | 0.840 | 0.238 | 1.740 | 0.560 | 36 | 147.1 |
| November, ...... | 30.269 | 29.702 | 84.5 | 59.2 | 24 | 0.663 | 0.239 | 0.100 | 0.065 | 33 | 138.1 |
| December, ...... | 30.229 | 29.752 | 80.4 | 53.4 | 35 | 0.729 | 0.245 | 1.065 | 0.350 | 43 | 134.0 |
| Year, ...... | 30.388 | 29.124 | 91.3 | 42.8 | 24 | 1.069 | 0.177 | 7.955 | 2.800 | 65 | 148.5 |

## Table XII.

*Five-Day Means of the Principal Meteorological Elements observed at Hongkong in 1905.*

| Five-Day Periods. | Barometer. | Temperature. | Humidity. | Vapour Tension. | Wind Velocity. | Nebulosity. | Sunshine. | Rain. |
|---|---|---|---|---|---|---|---|---|
| Jan. 1- 5 | 30.172 | 63.4 | 71 | 0.429 | 11.8 | 6.0 | 4.5 | 0.000 |
| „ 6-10 | .000 | 64.2 | 78 | .470 | 12.6 | 3.5 | 6.9 | 0.000 |
| „ 11-15 | .013 | 63.3 | 81 | .473 | 16.6 | 5.6 | 6.5 | 0.000 |
| „ 16-20 | 29.900 | 67.9 | 84 | .578 | 9.8 | 7.9 | 3.5 | 0.000 |
| „ 21-25 | .723 | 72.9 | 82 | .665 | 10.9 | 8.6 | 5.0 | 0.000 |
| „ 26-30 | .879 | 56.4 | 79 | .370 | 7.9 | 9.0 | 2.2 | 0.360 |
| „ 31- 4 | 30.031 | 52.8 | 87 | .348 | 6.6 | 10.0 | 0.0 | 0.003 |
| Feb. 5- 9 | .050 | 52.0 | 88 | .349 | 9.5 | 10.0 | 0.0 | 0.017 |
| „ 10-14 | .158 | 49.8 | 73 | .263 | 9.3 | 6.5 | 4.2 | 0.010 |
| „ 15-19 | .037 | 56.0 | 82 | .399 | 13.6 | 9.9 | 0.1 | 0.008 |
| „ 20-24 | 29.856 | 61.5 | 94 | .520 | 20.0 | 9.7 | 0.7 | 0.045 |
| „ 25- 1 | .959 | 56.4 | 80 | .367 | 11.0 | 9.6 | 0.3 | 0.169 |
| Mar. 2- 6 | 30.162 | 52.4 | 81 | .330 | 8.2 | 10.0 | 0.0 | 0.045 |
| „ 7-11 | .070 | 57.7 | 79 | .387 | 19.3 | 9.8 | 0.9 | 0.005 |
| „ 12-16 | 29.864 | 64.8 | 92 | .569 | 15.1 | 8.2 | 4.1 | 0.493 |
| „ 17-21 | .912 | 58.5 | 91 | .451 | 20.4 | 9.9 | 0.0 | 0.870 |
| „ 22-26 | .891 | 59.9 | 92 | .477 | 16.3 | 9.8 | 1.2 | 0.567 |
| „ 27-31 | .731 | 61.4 | 93 | .510 | 27.0 | 10.0 | 0.0 | 0.280 |
| Apr. 1- 5 | .884 | 58.9 | 85 | .432 | 9.0 | 10.0 | 0.0 | 0.020 |
| „ 6-10 | 30.009 | 62.2 | 70 | .392 | 20.6 | 9.1 | 1.9 | 0.040 |
| „ 11-15 | 29.779 | 69.6 | 95 | .690 | 12.5 | 10.0 | 0.6 | 0.102 |
| „ 16-20 | .737 | 73.7 | 82 | .684 | 16.6 | 8.5 | 4.9 | 0.033 |
| „ 21-25 | .930 | 66.1 | 91 | .587 | 23.5 | 8.7 | 2.9 | 0.052 |
| „ 26-30 | .806 | 76.0 | 85 | .763 | 8.3 | 5.2 | 9.8 | 0.000 |
| May 1- 5 | .834 | 75.4 | 83 | .732 | 13.5 | 7.1 | 5.5 | 0.018 |
| „ 6-10 | .886 | 76.6 | 84 | .770 | 9.1 | 2.9 | 10.6 | 0.060 |
| „ 11-15 | .880 | 77.2 | 81 | .759 | 10.4 | 6.0 | 9.1 | 0.002 |
| „ 16-20 | .771 | 80.2 | 82 | .852 | 6.0 | 9.3 | 4.0 | 0.004 |
| „ 21-25 | .689 | 81.3 | 80 | .856 | 10.4 | 7.4 | 6.7 | 0.238 |
| „ 26-30 | .772 | 78.5 | 77 | .753 | 11.1 | 6.5 | 6.5 | 0.487 |
| „ 31- 4 | .762 | 79.0 | 89 | .883 | 8.1 | 8.4 | 2.7 | 2.228 |
| June 5- 9 | .606 | 80.9 | 86 | .907 | 9.3 | 9.8 | 0.8 | 1.061 |
| „ 10-14 | .545 | 82.9 | 83 | .941 | 6.2 | 8.0 | 8.1 | 0.128 |
| „ 15-19 | .481 | 82.0 | 69 | .753 | 14.0 | 7.7 | 5.0 | 0.032 |
| „ 20-24 | .687 | 78.1 | 87 | .837 | 20.8 | 9.8 | 0.6 | 1.096 |
| „ 25-29 | .681 | 81.7 | 84 | .907 | 9.8 | 4.9 | 10.0 | 0.008 |
| „ 30- 4 | .478 | 83.3 | 72 | .828 | 7.1 | 5.6 | 9.2 | 0.188 |
| July 5- 9 | .724 | 80.7 | 83 | .869 | 6.8 | 7.6 | 6.2 | 0.512 |
| „ 10-14 | .759 | 82.6 | 77 | .853 | 7.1 | 6.1 | 9.4 | 0.003 |
| „ 15-19 | .640 | 83.3 | 77 | .883 | 4.9 | 3.5 | 10.7 | 0.014 |
| „ 20-24 | .569 | 82.3 | 83 | .918 | 9.4 | 6.7 | 6.7 | 0.371 |
| „ 25-29 | .439 | 82.2 | 85 | .938 | 12.3 | 9.2 | 3.9 | 0.702 |
| „ 30- 3 | .717 | 79.5 | 88 | .884 | 9.2 | 6.8 | 6.5 | 1.028 |
| Aug. 4- 8 | .719 | 81.9 | 81 | .888 | 7.1 | 3.3 | 10.8 | 0.000 |
| „ 9-13 | .696 | 82.3 | 82 | .903 | 7.0 | 6.6 | 8.3 | 0.195 |
| „ 14-18 | .651 | 81.3 | 85 | .905 | 7.6 | 7.6 | 6.4 | 0.183 |
| „ 19-23 | .687 | 80.4 | 87 | .897 | 8.0 | 7.8 | 6.2 | 0.337 |
| „ 24-28 | .657 | 82.5 | 81 | .903 | 5.2 | 6.4 | 8.8 | 0.224 |
| „ 29- 2 | .466 | 81.2 | 82 | .877 | 18.4 | 7.0 | 5.1 | 0.473 |
| Sept. 3- 7 | .709 | 81.5 | 85 | .915 | 16.6 | 7.2 | 7.4 | 0.023 |
| „ 8-12 | .808 | 80.6 | 83 | .867 | 6.7 | 5.9 | 8.3 | 0.199 |
| „ 13-17 | .729 | 81.6 | 80 | .858 | 7.0 | 7.0 | 5.5 | 0.044 |
| „ 18-22 | .757 | 76.8 | 73 | .678 | 24.8 | 7.9 | 5.0 | 0.209 |
| „ 23-27 | .844 | 79.8 | 78 | .797 | 18.0 | 5.0 | 7.0 | 0.057 |
| „ 28- 2 | .889 | 77.9 | 86 | .823 | 17.8 | 8.4 | 3.3 | 0.460 |
| Oct. 3- 7 | .944 | 76.5 | 69 | .634 | 8.9 | 6.5 | 4.3 | 0.004 |
| „ 8-12 | .907 | 77.3 | 69 | .648 | 13.1 | 1.5 | 10.5 | 0.000 |
| „ 13-17 | .888 | 78.4 | 81 | .787 | 14.5 | 4.7 | 7.6 | 0.007 |
| „ 18-22 | .939 | 72.8 | 60 | .508 | 9.6 | 4.3 | 6.6 | 0.000 |
| „ 23-27 | .830 | 75.4 | 73 | .645 | 16.4 | 4.9 | 7.0 | 0.000 |
| „ 28- 1 | .820 | 74.3 | 67 | .575 | 11.5 | 5.5 | 5.2 | 0.000 |
| Nov. 2- 6 | .992 | 71.0 | 48 | .365 | 10.5 | 2.7 | 9.4 | 0.000 |
| „ 7-11 | 30.071 | 68.9 | 62 | .440 | 14.3 | 1.6 | 10.2 | 0.000 |
| „ 12-16 | .082 | 70.3 | 70 | .524 | 14.6 | 5.9 | 6.5 | 0.000 |
| „ 17-21 | .115 | 68.2 | 70 | .485 | 10.5 | 5.1 | 6.5 | 0.017 |
| „ 22-26 | .002 | 68.3 | 76 | .529 | 10.1 | 8.4 | 3.0 | 0.026 |
| „ 27- 1 | .113 | 67.3 | 71 | .478 | 14.5 | 4.8 | 6.6 | 0.013 |
| Dec. 2- 6 | 29.997 | 68.6 | 80 | .564 | 13.6 | 5.9 | 5.9 | 0.000 |
| „ 7-11 | .850 | 70.6 | 85 | .641 | 8.1 | 6.9 | 4.0 | 0.000 |
| „ 12-16 | 30.037 | 62.7 | 80 | .460 | 16.8 | 9.3 | 1.1 | 0.072 |
| „ 17-21 | .060 | 63.3 | 69 | .406 | 8.9 | 4.2 | 7.8 | 0.001 |
| „ 22-26 | .054 | 64.4 | 81 | .498 | 19.3 | 9.4 | 1.7 | 0.298 |
| „ 27-31 | .001 | 61.6 | 83 | .458 | 12.5 | 9.2 | 0.9 | 0.103 |

## Table XIII.

*Observations of Magnetic Declination and Dip.*

| 1905. | H.K.M.T. | Declination East. | Observer. | H.K.M.T. | Dip North. | Needle No. | Observer. |
|---|---|---|---|---|---|---|---|
| February, .............. | 16d. 2h. 50m. p. | 0° 11′ 2″ | J.I.P. | 13d. 3h. 26m. p. | 31° 8′.57″ | 3 * | J I.P. |
| | | | | 14 2 53 p. | 6 .69 | 3 | „ |
| | | | | | 7 .31 | 4 | „ |
| May, .................... | 13 3 6 p. | 0 8 30 | F.G.F. | 12 3 19 p. | 5 .69 | 4 * | F.G.F. |
| August, .............. | 14 2 44 p. | 0 7 32 | „ | 15 3 19 p. | 8 .01 | 3 | „ |
| | | | | | 7 .31 | 4 | „ |
| | 16 2 44 p. | 0 6 16 | „ | 17 3 21 p. | 9 .47 | 3 * | „ |
| December, .............. | 11 2 45 p. | 0 9 17 | „ | 12 3 11 p. | 4 .53 | 3 | „ |
| | | | | | 2 .45 | 4 | „ |
| | 14 2 40 p. | 0 9 31 | „ | 15 3 22 p. | 7 .40 | 4 * | „ |

* Observed in two azimuths differing 90°.

## Table XIV.

*Observations of Horizontal Magnetic Force.*

| 1905. | H.K.M.T. | Time of one Vibration. | Temperature Cent. | Log $mX$. | Value of $m$. | H.K.M.T. | Distance in Centimetres. | Temperature Cent. | Deflection. | Log $\frac{m}{X}$ | Value of X. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| February,. | 15d. 2h. 51m. p. | 3s. .6488 | 16°.7 | 2.32535 | 572.03 | 15d. 2h. 14m. p. | 30 | 16°.7 | 6° 35′ 53″ .8 | 3.18948 | 0.36977 | J.I.P. |
| | | | | | | | 40 | | 2 46 1 .8 | | | |
| | | | | | | 3 44 p. | 30 | 17 .0 | 6 35 47 .5 | | | |
| | | | | | | | 40 | | 2 46 5 .7 | | | |
| February,. | 17 2 47 p. | 3 .6498 | 16 .8 | 2.32513 | 571.99 | 17 2 11 p. | 30 | 16 .4 | 6 35 52 .5 | 3.18964 | 0.36961 | „ |
| | | | | | | | 40 | | 2 46 13 .8 | | | |
| | | | | | | 3 37 p. | 30 | 16 .9 | 6 35 46 .3 | | | |
| | | | | | | | 40 | | 2 46 12 .5 | | | |
| August, .... | 11 3 26 p. | 3 .6613 | 29 .35 | 2.32461 | 570.83 | 11 2 50 p. | 30 | 29 .1 | 6 32 50 .0 | 3.18840 | 0.36991 | F.G.F. |
| | | | | | | | 40 | | 2 44 45 .6 | | | |
| | | | | | | 4 7 p. | 30 | 29 .9 | 6 32 37 .5 | | | |
| | | | | | | | 40 | | 2 44 46 .9 | | | |
| August, .... | 18 3 28 p. | 3 .6598 | 29 .15 | 2.32493 | 571.36 | 18 2 53 p. | 30 | 28 .5 | 6 33 12 .5 | 3.18890 | 0.36985 | „ |
| | | | | | | | 40 | | 2 45 2 .5 | | | |
| | | | | | | 4 6 p. | 30 | 28 .1 | 6 33 28 .7 | | | |
| | | | | | | | 40 | | 2 45 6 .2 | | | |
| December, | 13 3 6 p. | 3 .6551 | 20 .1 | 2.32441 | 571.45 | 13 2 24 p. | 30 | 19 .7 | 6 35 36 .2 | 3.18956 | 0.36934 | „ |
| | | | | | | | 40 | | 2 45 58 .7 | | | |
| | | | | | | 3 45 p. | 30 | 19 .8 | 6 35 43 .8 | | | |
| | | | | | | | 40 | | 2 45 38 .8 | | | |
| December, | 18 3 1 p. | 3 .6527 | 21 .5 | 2.32522 | 571.52 | 18 2 25 p. | 30 | 20 .9 | 6 34 37 .5 | 3.18884 | 0.36999 | „ |
| | | | | | | | 40 | | 2 45 38 .8 | | | |
| | | | | | | 3 42 p. | 30 | 20 .9 | 6 34 32 .5 | | | |
| | | | | | | | 40 | | 2 45 28 .7 | | | |

## Table XV.

*Results of Magnetic Observations made in 1905.*

| Month. | Declination East. | Dip. North. | Magnetic Force. | | |
|---|---|---|---|---|---|
| | | | X | Y | Total. |
| February, ............ | 0° 11′ 2″ | 31° 7′ 31″ | 0.36969 | 0.22323 | 0.43187 |
| May, .................. | 0 8 30 | 31 5 41 | ... | ... | ... |
| August, ............ | 0 6 54 | 31 8 16 | 0.36988 | 0.22346 | 0.43214 |
| December, ............ | 0 9 24 | 31 4 48 | 0.36967 | 0.22282 | 0.43163 |
| Mean .................. | 0 8 57 | 31 6 34 | 0.36975 | 0.22317 | 0.43188 |

**APPENDIX.**

# FOGS ON THE COAST OF CHINA,

BY

F. G. FIGG.

The occurrence of fog on the China coast has been investigated from observations made at the Treaty Ports and lighthouse stations along the coast during the five years 1901 to 1905 inclusive.

The following table shows the mean percentage of days in each month when fog was noted at the various stations for the five years named. Whenever a station recorded fog at any period of the day it has been counted as a day of fog occurrence at that station.

The stations are arranged in the table according to latitude, Hoihow being the most southern and Taku the most northern.

### Table I.

*Mean Percentage of Days in each Month when Fog was noted at various Stations along the China Coast during the five Years 1901-1905, inclusive.*

| Month. | Hoihow. | Pakhoi. | Hongkong. | Breaker Pt. | Lamocks. | Swatow. | Chapel Island. | Amoy. | Ockseu. | Turnabout. | Middle Dog. | Foochow. | Wenchow. | Pei-yu-shan. | Ningpo. | Steep Isl. | Gutzlaff. | North Saddle. | Shaweishan. | Woosung. | SE Shantung Promy. | NE Shantung Promy. | Chefoo. | Howki. | Taku. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January, | 17 | 6 | 19 | 5 | 11 | 5 | 10 | 7 | 19 | 17 | 19 | 5 | 22 | 16 | 9 | 14 | 15 | 12 | 15 | 7 | 2 | 5 | 4 | 13 | 10 |
| February, | 9 | 4 | 13 | 6 | 6 | 4 | 5 | 1 | 5 | 8 | 6 | 4 | 8 | 8 | 8 | 5 | 6 | 4 | 6 | 5 | 4 | 5 | 2 | 3 | 2 |
| March, | 18 | 8 | 23 | 21 | 27 | 7 | 23 | 8 | 27 | 32 | 32 | 2 | 7 | 44 | 6 | 36 | 34 | 34 | 26 | 11 | 10 | 13 | 4 | 17 | 5 |
| April, | 7 | 1 | 21 | 29 | 39 | 13 | 46 | 16 | 53 | 54 | 55 | 3 | 11 | 60 | 7 | 55 | 41 | 35 | 31 | 11 | 12 | 19 | 5 | 15 | 2 |
| May, | 1 | 0 | 6 | 10 | 27 | 2 | 28 | 7 | 40 | 41 | 37 | 0 | 2 | 48 | 2 | 48 | 36 | 43 | 31 | 7 | 23 | 32 | 2 | 15 | 3 |
| June, | 1 | 0 | 4 | 9 | 15 | 0 | 10 | 1 | 13 | 15 | 17 | 0 | 1 | 37 | 3 | 49 | 31 | 36 | 24 | 3 | 32 | 41 | 1 | 17 | 1 |
| July, | 0 | 0 | 4 | 1 | 6 | 1 | 3 | 0 | 1 | 5 | 12 | 0 | 1 | 15 | 2 | 28 | 12 | 15 | 5 | 1 | 31 | 48 | 6 | 45 | 2 |
| August, | 0 | 0 | 7 | 3 | 8 | 1 | 3 | 0 | 1 | 0 | 3 | 0 | 0 | 4 | 4 | 11 | 5 | 6 | 0 | 0 | 10 | 28 | 1 | 17 | 0 |
| September, | 0 | 0 | 9 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| October, | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 4 | 8 | 2 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 3 |
| November, | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 4 | 0 | 0 | 3 | 5 | 1 | 3 | 4 | 3 | 11 | 0 | 2 | 3 | 3 | 4 |
| December, | 4 | 1 | 12 | 3 | 3 | 2 | 1 | 1 | 4 | 5 | 5 | 1 | 7 | 4 | 5 | 3 | 4 | 3 | 3 | 8 | 0 | 0 | 2 | 1 | 3 |
| Mean Monthly | 5 | 2 | 10 | 7 | 12 | 3 | 11 | 4 | 14 | 15 | 16 | 1 | 5 | 20 | 5 | 21 | 16 | 16 | 12 | 6 | 10 | 16 | 3 | 12 | 3 |

It will be noticed that the ports record much less fog than the lighthouse stations in their respective neighbourhoods. But it must be remarked that observations are usually recorded every six hours at the ports whereas they are made every three hours at the lighthouses. Nevertheless it would appear that much more fog is found a few miles seaward of the river mouths than at the ports on rivers a little inland. For instance taking the three ports, Swatow, Amoy and Foochow, we find that the mean monthly percentage for the year is 2.5 whereas grouping Lamocks, Chapel Island, Ockseu, Turnabout and Middle Dog results, we obtain a mean annual percentage of 13.5. We get almost the same result if we compare Chefoo with the Shantung Promontory and Howki lighthouses, but the difference is not so great when Ningpo and Woosung are compared with the adjacent lighthouse stations

When the mean percentage of the whole of the stations is taken, April proves to be the foggiest month, 25 per cent. of the days being foggy, and September has the least fog, viz., 1 per cent. But the time of the occurrence of the maximum varies with the latitude. the S. coast recording the maximum in March, and Shantung and the Gulf of Pechili between June and July. To show this, the time of maximum and the annual variation generally, it is convenient to arrange the stations in groups for the different parts of the coast. This has been done and the resulting figures are given in the following table. To represent the S. coast the mean of the results at the stations, Hoihow, Pakhoi, Hongkong and Breaker Point have been taken, those from Lamocks to Wenchow inclusive to embrace the Formosa Channel area, those from Pei-yu-shan (Hieshans) to Woosung inclusive as representing the Chusan Archipelago and the estuary of the Yangtze, and the remainder to include the Shantung Promontory and the Gulf of Pechili.

### Table II.

*Mean Percentage of Days in each Month when Fog was noted at groups of Stations along the China Coast during the five Years 1901-1905, inclusive.*

| Month. | Hoihow to Breaker Pt. | Lamocks to Wenchow. | Pei-yu-shan to Woosung. | Shantung Promontory and Gulf of Pechili. |
|---|---|---|---|---|
| January, | 12 | 13 | 13 | 7 |
| February, | 8 | 5 | 6 | 3 |
| March, | 18 | 18 | 27 | 10 |
| April, | 15 | 32 | 34 | 11 |
| May, | 4 | 20 | 31 | 15 |
| June, | 3 | 8 | 26 | 18 |
| July, | 1 | 3 | 11 | 27 |
| August, | 2 | 2 | 4 | 11 |
| September, | 2 | 1 | 1 | 1 |
| October, | 1 | 1 | 3 | 1 |
| November, | 1 | 1 | 4 | 2 |
| December, | 5 | 3 | 4 | 1 |

The means thus arrived at have been plotted on a chart (Plate IV) which is attached. This shows at a glance the mean percentage of days in each month when fog was recorded in the four sections of the coast above mentioned.

As to the conditions under which fog is produced, it is found that the existence of areas of low pressure over the Continent and adjacent waters are the chief factors. In Spring the normal high pressure over the Continent is gradually disappearing and from time to time low pressure areas take its place. The North-east Monsoon under the latter condition becomes light or ceases altogether. At the same time there is an inflow of warm humid air from equatorial regions. We thus frequently have a surface current of light NE winds blowing along the coast of a relatively low temperature as compared with the warm moisture laden current coming from the South, the latter however not necessarily being surface currents but of low altitude. This is frequently seen by the wind records at Victoria Peak (1,816 feet above M.S.L.) and from the direction of the lower clouds. In such cases it is found that the vertical temperature gradient ordinarily obtaining between sea level and the Peak is diminished or even reversed, the Peak sometimes having a higher temperature than that at sea level. And it is in March that the least mean difference between the air temperature at the signal station and that at the Observatory (109 feet above M.S.L.) is found, the April difference being very little greater. The intermixture of these two currents of air of quite different temperatures is the chief factor in the production of fog along the coast.

The temperature of this air mixture is too low to enable it to contain all the water vapour present, hence it results that a part of the water vapour is condensed into fog or mist. The difference in these terms is one of degree only. In fog the water vesicles are smaller and more closely packed than in mist. Thus objects are visible at a greater distance when mist prevails than when fog prevails.

From what has already been stated it appears that fog is liable to occur whenever a warm humid air current coming from sea areas impinges on the much colder air lying over the coast, and that the occurrence of fog will practically cease as soon as the temperature of the air over the coast areas has attained a temperature more in accord with the air currents coming from equatorial regions. And on consulting the marine data furnished in the meteorological logs supplied by shipmasters, it is seen that fog rarely occurs in the China Sea at any considerable distance from the coast. Cases where fog was encountered beyond 100 miles from the coast are rare. But it more frequently happens that vessels run into fog on approaching the coast within about 50 miles.

A reference to the chart indicates that this is the case. We see the fog occurrence reaching its maximum in March on the S. coast and then slowly declining in April. A rapid descent is then shown by the diagram coinciding with the partial establishment of the hot weather conditions in the South by the middle of May. Thereafter very little fog is noted, although the absolute minimum is not shown till October.

The diagrams for the other districts show much the same sequence of fog occurrence, the maximum however, occurring later as we go North. Thus we see that in June when fogs have practically ceased in the South, the maximum has not yet been reached around Shantung. Although the absolute maximum occurs both in the Formosa Channel area and the Yangtze area in April, the decline is a rapid one in the former while the latter has a prolonged period of fog extending towards the end of June before any rapid decrease takes place. The diagram shows the Chusan Archipelago and the estuary of the Yangtze to be the foggiest part of the coast, not only as to the absolute maximum but as to the length of time a large percentage of fog is recorded.

With the complete establishment of the hot weather condition over the Continent fog practically ceases to occur, except the purely local fogs, which occasionally occur at individual stations in the summer, and which are usually caused by the cooling of the ground by radiation. This class of fog occurs usually in the evening or early morning hours and is quickly dissipated by the warming up of the air after sunrise.

It might be assumed that in autumn when the NE monsoon sets in a second period of foggy weather would result. But this is not the case. For while the change, commencing in spring, from winter to summer conditions is a gradual process, that commencing in autumn to the opposite condition is comparatively abrupt. Moreover the extreme dryness of the air, as yet of a relatively high temperature, which now comes from the Continent, does not favour the formation of fog, and in fact we see by the chart that it is at this time of year—September and October—that the minimum occurs along the coast, perhaps slightly earlier in the North than in the South.

Towards the end of the year fog begins to increase again. The air over the Continent has now become much colder and any inrush towards the coast of relatively warm air, such as happens when a depression forms inland, is liable to cause fog.

There is a slight secondary maximum in January and a dip in the curve in all districts in February. This tends to show that areas of low pressure were more frequent over the Continent in January than in February, or that the anticyclonic condition was more marked in the latter month. A rapid survey of the pressure conditions prevailing in these two months indicates that this was the case. For although the central areas of anticyclones in Northern Europe are usually characterized by fog, the effect in this respect, of the passage eastwards over the coasts of N. China of such areas, appears to be small. But the outflow of air here comes from a vast continental area, the air accordingly being exceedingly dry, while in N. Europe it passes to a great extent over sea areas.

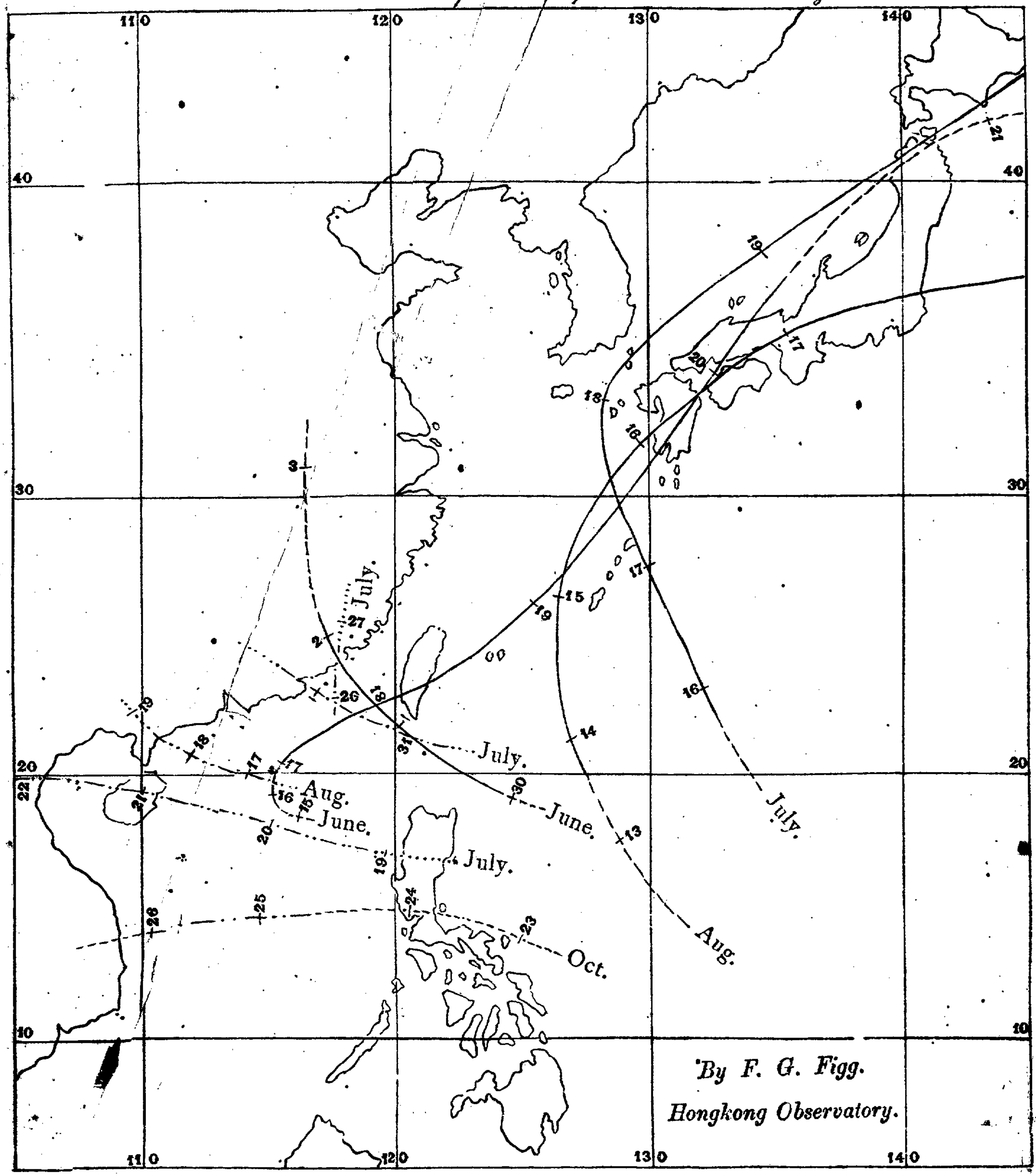
To the navigator the practical importance of the results arrived at is this, that about the beginning of the year whenever it is known that low pressure areas exist over China or adjacent waters he may expect to find more or less fog along the coast, its occurrence becoming more and more frequent and its character probably denser, until the period of the year when the maximum of fog obtains, is reached on the different parts of the coast.

On the other hand when China is covered by high pressure areas he may be tolerably sure, that he will not meet with fog along the coast, but he will, at times, find a good deal of haze. For example, in February, 1905, during the period 8th to 17th inclusive, anticyclonic conditions prevailed over China, and not a single station on the coast recorded fog. The mean height of the barometer in Hongkong for the period named will be a sufficient index as to pressure conditions over China. It was 30.26 or 0.11 inch above normal. From the 18th to 25th fogs were general over the S. coast of China, the Formosa Channel and the E. coast as far North as the Chusan Archipelago, corresponding to a period of low pressure, over S. China and the Eastern Sea. The mean height of the barometer in Hongkong for this period was 29.93 or 0.17 below the normal.

# Typhoon Tracks of 1905

## in three plates

*Dated at the noon position of the centre each day.* Plate. I




*Typhoons thus* ————————

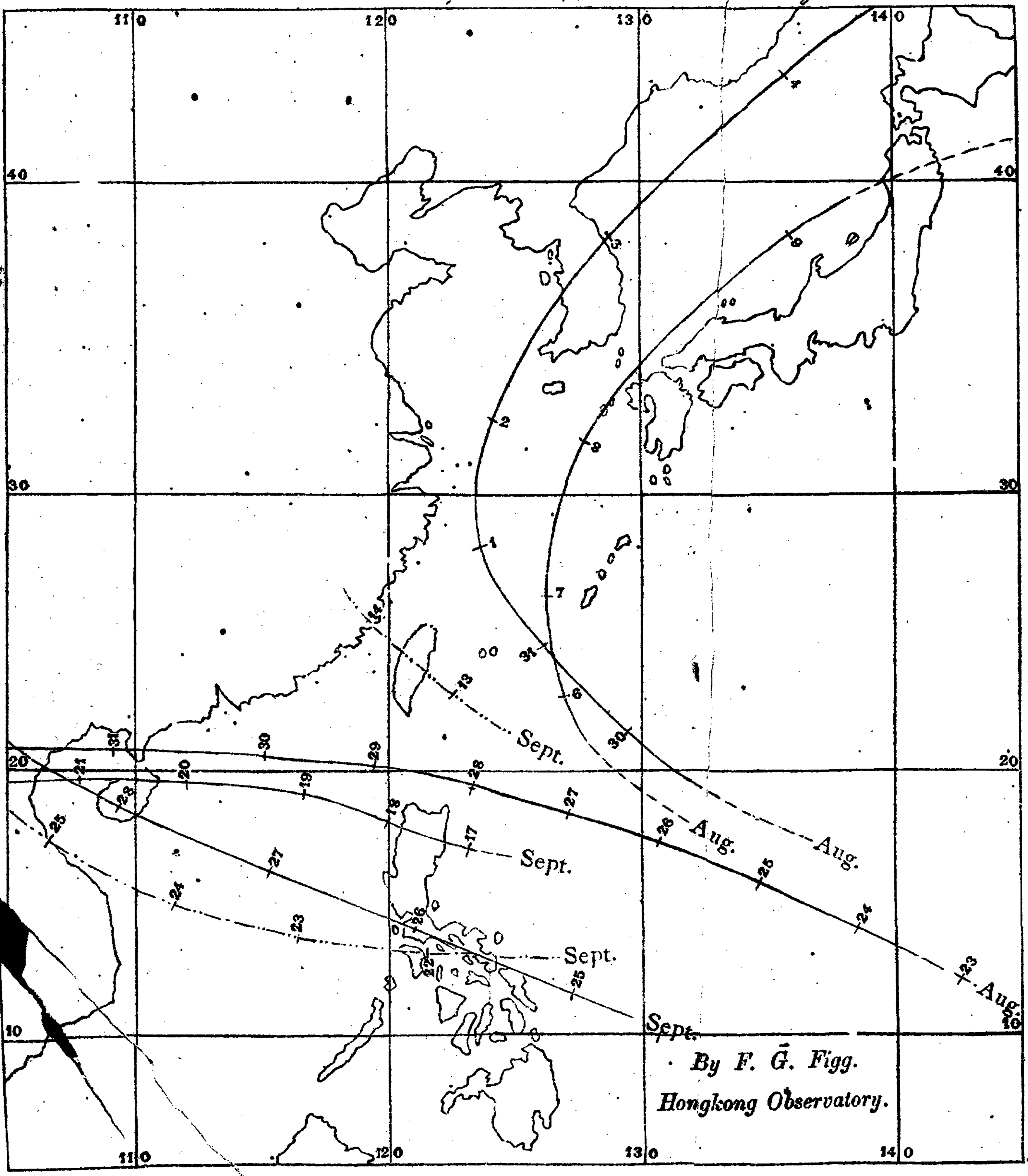
*Less intense depressions thus* —·—·—

*Where dotted the tracks are approximate or doubtful.*

# Typhoon Tracks of 1905

## in three plates.

*Dated at the noon position of the centre each day.* Plate. II




*Typhoons thus* ————————

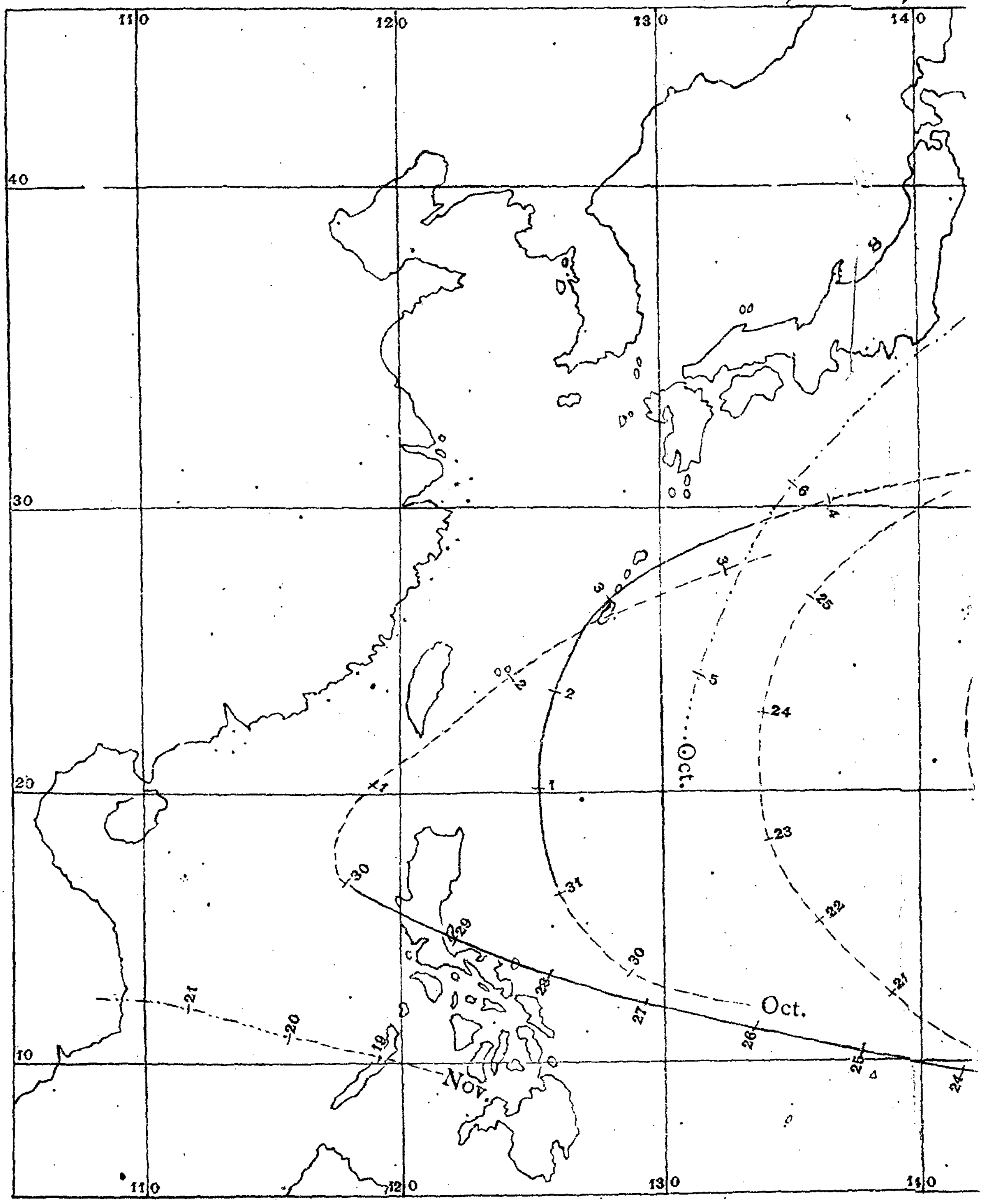
*Less intense depressions thus* —··—·—··—

*Where dotted the tracks are approximate or doubtful.*

# *Typhoon Trac*

## *in three*

*Dated at the noon position of th*




*Typhoons thus*

*Less intense depressions thus*

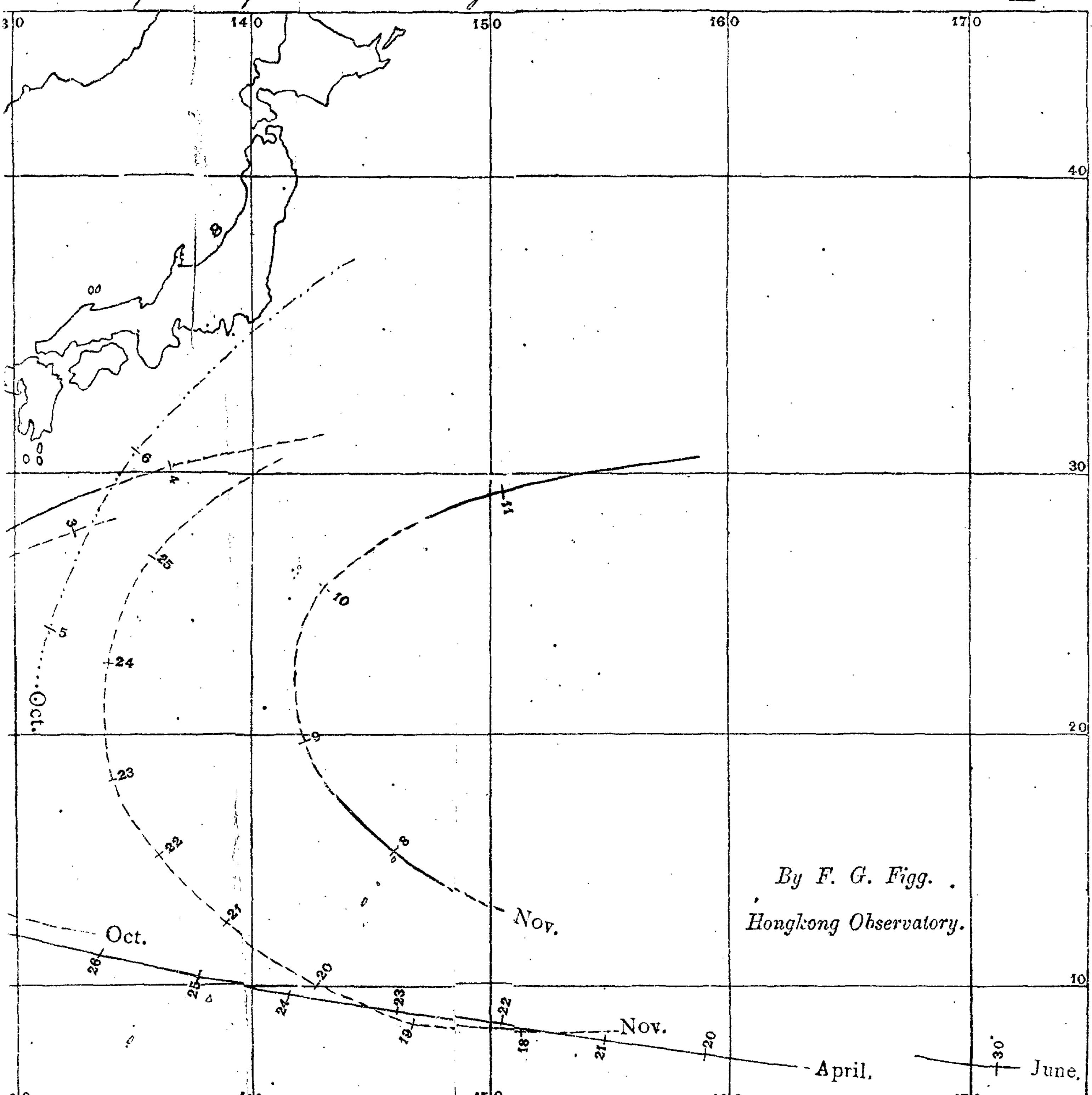
*Where dotted the tracks are a*

# Typhoon Tracks of 1905

## in three plates

...t the noon position of the centre each day.

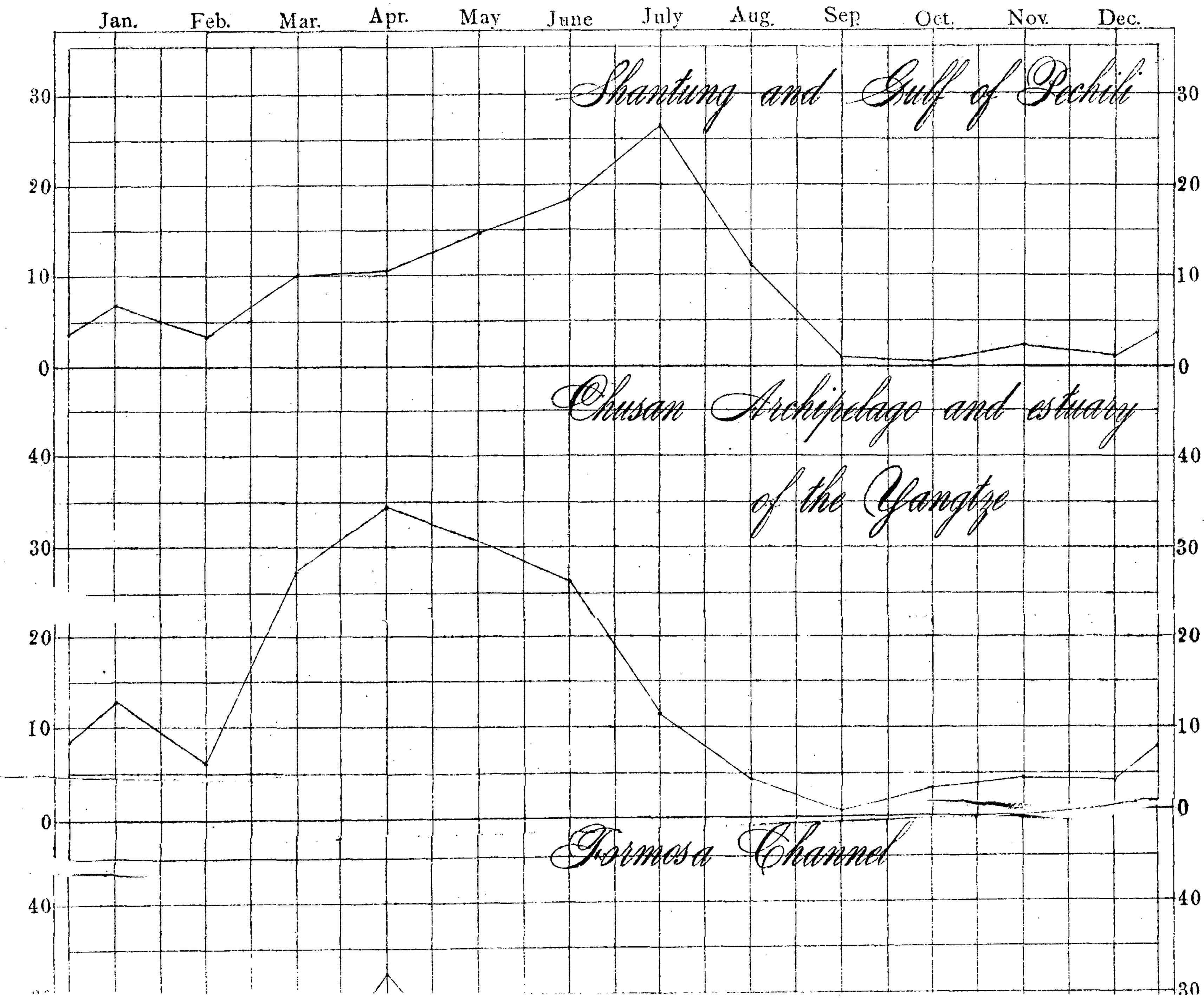
Plate. III



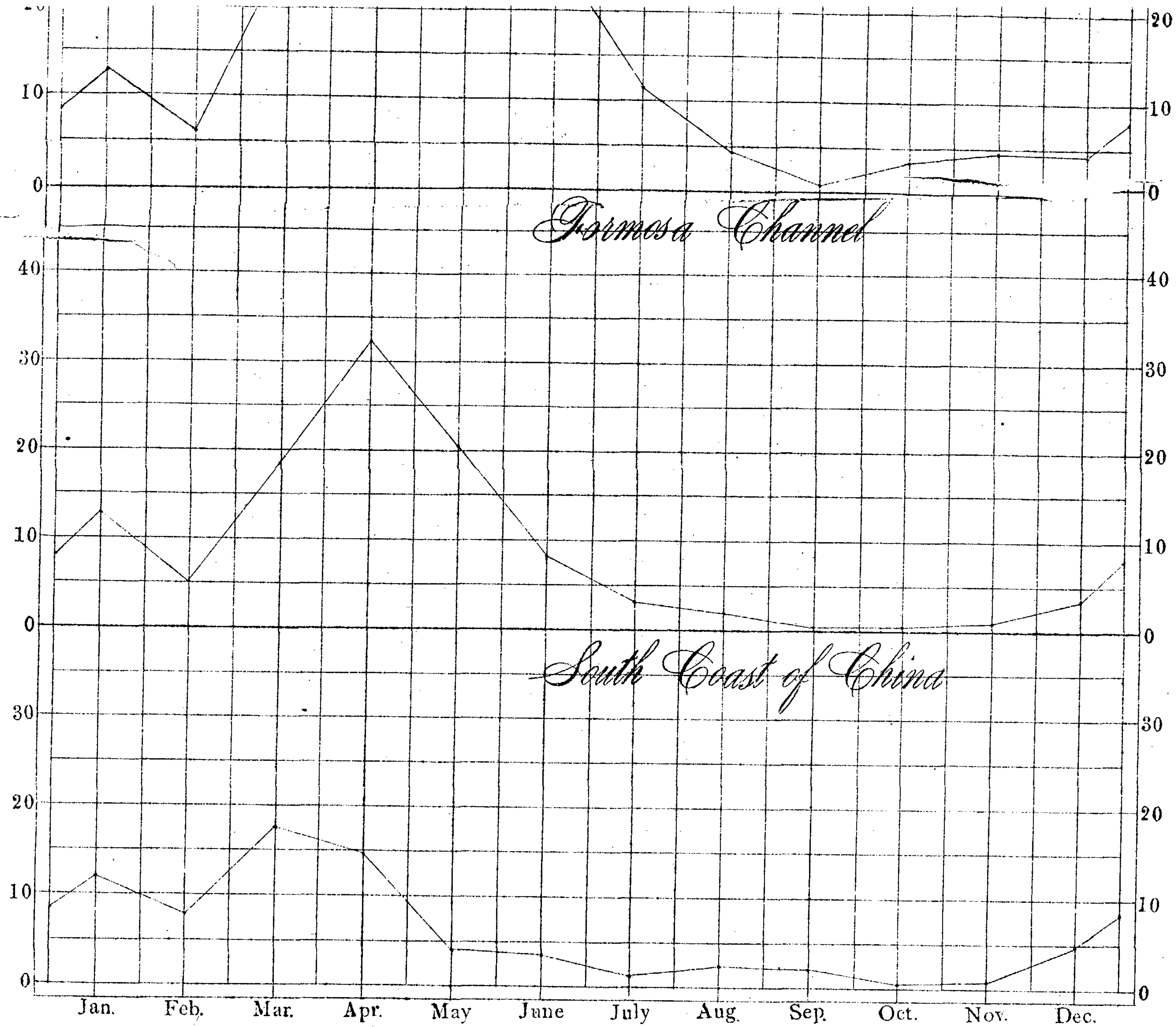

...ns thus ————

...dense depressions thus —··—··—

...dotted the tracks are approximate or doubtful.



Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Sep
Oct.
Nov.
Dec.
Shantung and Gulf of Pechili
Chusan Archipelago and estuary of the Yangtze
Formosa Channel
30
20
10
0
40
30
20
10
0
40


Formosa Channel
South Coast of China
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Sep.
Oct.
Nov.
Dec.
0
10
20
30
40

The extent of coast over which fog prevailed at the same time is given in the following table:—

Table III.

*Mean Percentage of Days in each Month when Fog prevailed on the same Day over various Sections of the China Coast during the five Years 1901-1905, inclusive.*

| Month. | South Coast and Formosa Channel. | South Coast, Formosa Channel and Yangtze Estuary. | South Coast, Formosa Channel, Yangtze Estuary and Shantung. | Formosa Channel and Yangtze Estuary. | Formosa Channel, Yangtze Estuary and Shantung. | Yangtze Estuary and Shantung |
|---|---|---|---|---|---|---|
| January, ......... | 7 | 3 | 0 | 11 | 3 | 4 |
| February, ....... | 3 | 1 | 0 | 2 | 0 | 3 |
| March, ............ | 14 | 10 | 3 | 15 | 8 | 11 |
| April, ............ | 17 | 13 | 4 | 41 | 13 | 15 |
| May, ............. | 1 | 1 | 1 | 28 | 12 | 21 |
| June, ............. | 1 | 1 | 1 | 9 | 6 | 19 |
| July, .............. | 0 | 0 | 0 | 0 | 0 | 5 |
| August, .......... | 0 | 0 | 0 | 0 | 0 | 2 |
| September, ...... | 0 | 0 | 0 | 0 | 0 | 0 |
| October, ......... | 0 | 0 | 0 | 0 | 0 | 0 |
| November, ...... | 0 | 0 | 0 | 1 | 1 | 1 |
| December, ....... | 2 | 0 | 0 | 1 | 0 | 0 |

The figures do not always quite agree with those given in Table II because the stations are in some instances too far asunder to show the lines of demarcation on the different sections of the coast, and also because it frequently happens that a station here and there records no fog while others in the same district all record fog. Thus in dealing with the areas over which fog existed on the same day it has been assumed that if the greater part of the stations in a given area recorded fog, or that the record was fairly well distributed over the area the condition of that area was foggy.

It will be noticed that the percentage of days when fog prevailed along the whole of the China coast on the same day is a small one, the maximum, occurring in April, being only four per cent. Between June and the following February no cases occurred. The figures naturally increase as the extent of coast diminishes.

Fogs covering the most extensive areas of the coast on the same day were most frequent in April, except over the area from the Yangtze to Shantung and the Gulf of Pechili when May shows the greatest percentage. April is seen to be a very bad month along the stretch of coast comprised by the Formosa Channel and mouth of the Yangtze, the prevalence of fog on the same day being very frequent over the whole area. After April it seldom happens that fog embraces the S. coast and Formosa Channel areas at the same time, but they continue till about the middle of June in the area comprised by the Formosa Channel and the Yangtze districts, and they disappear still later in the section of the coast comprised by the estuary of the Yangtze and the Shantung districts. After the end of July there are practically no fogs covering extensive sections of the coast on the same day. It is in January that they begin to increase again.