has forwarded the first and second patterns of his rain and snow gauge (the latter of which is now used in the Prussian Meteorological Service), and also his gauge for measuring the density of snow. Wild's rain-gauge, as used in Russia, and Nipher's protected snow-gauge, as used in the United States, are also exhibited.

Among the miscellaneous gauges may be mentioned the marine rain-gauge, mounted on gimbals for use on board ship; Livingstone's rain-gauge, with funnel 3 inches in diameter, as made for the late Dr. Livingstone; tropical rain-gauge, with funnel 4½ inches in diameter, and receiver large enough to hold 40 inches of rain; Colladon's gauge for determining the temperature of hail; Sidebottom's snow-melting rain-gauge; and Mawley's snow-gauge.

Perhaps the largest rain-gauge that has ever been made is that employed by Sir J. B. Lawes and Dr. J. H. Gilbert on their experimental farm at Rothamsted; this has an area of one-thousandth of an acre. The funnel portion of this large gauge is constructed of wood lined with lead, the upper edge consisting of a vertical rim of plate glass, bevelled outwards. The rain is conducted by a a tube into a galvanized iron cylinder underneath, and when this is full it overflows into a second cylinder, and so on into a third and fourth, and finally into an iron tank. Each of the four cylinders holds rain corresponding to half an inch of depth, and the tank an amount equal to 2 inches. Each cylinder has a gauge-tube attached, graduated to 0·002 inch. Of course, this gauge itself could not be exhibited, but two of the collecting gauge cylinders are shown, as well as a coloured view of the gauge *in situ*, drawn by Lady Lawes. A coloured view of the Rothamsted drain or percolation gauges, drawn by Lady Lawes, is also shown. There are three drain-gauges, each one-thousandth of an acre area, which are used for the determination of the quantity and the composition of the water, percolating respectively through 20, 40, and 60 inches depth of soil (with the subsoil in its natural state of consolidation). Sir J. B. Lawes and Dr. Gilbert exhibit a table giving the results of rainfall and drainage at Rothamsted for the twenty harvest years ending August 31, 1890. The annual means are as follow:—

Rainfall.		Drainage through soil (uncropped).				Difference approximately = evaporation.		
		20 in.	40 in.	60 in.		20 in.	40 in.	60 in.
in.		in.	in.	in.		in.	in.	in.
30·29	...	14·38	15·16	13·61	...	15·91	15·13	16·68

The Exhibition also includes a number of evaporation gauges for determining the amount of evaporation from a free surface of water or from plants. The Meteorological Council exhibit von Lamont's atmometer, and Wild's, De la Rue's, and Piche's evaporimeters; Mr. Casella shows Babington's atmidometer, and an 8-inch pedestal evaporator. Dr. W. G. Black shows his floating rain-gauge and evaporating cup for use on ponds; and Mr. W. H. Dines exhibits the apparatus used by the late Mr. G. Dines for measuring evaporation. Mr. Symons shows the following from the series of evaporators constructed under the supervision of Mr. Rogers Field, and used in experiments at Strathfield Turgiss about twenty years ago, viz. Fletcher's, Watson's, Miller's wet-sand, tin, tin with overflow, Casella's can and bottle; also Field's hook gauge, used for determining the depth of water evaporated from the large tank, 6 feet square and 2 feet deep, which was used as the standard wherewith the foregoing and some other forms of instrument were compared. The Cambridge Scientific Instrument Company exhibit a self-recording evaporimeter, designed for use with growing plants in a botanical laboratory; and MM. Richard Frères show their self-recording evaporation gauge for use with either water or plants.

Several new instruments are also shown in the Exhibition, among which may be mentioned the following:—Latham's self-recording apparatus for wells, rivers, and reservoirs; Dines's and Munro's helicoid and Robinson's anemometers, and helicoid air-meter; and Richard Frère's statoscope (which is a very sensitive atmospheric barometer) and anemo-cinemograph. Mr. Clayden exhibits a small and large camera for meteorological photography, showing a simple method of attaching a mirror of black glass for photographing meteorological phenomena. The Kew Committee exhibit the frames designed by General Strachey and Mr. Whipple for measuring cloud pictures for determining the height and drift of clouds.

The Exhibition also includes a large number of photographs illustrating meteorological phenomena, &c., as well as a number of maps and diagrams showing the distribution of rainfall over various parts of the world.

The Exhibition will remain open till Thursday, the 19th instant.

WILLIAM MARRIOTT.

THE PTOLEMAIC GEOGRAPHY OF AFRICA.

AT the meeting on Monday of the Royal Geographical Society, Dr. H. Schlichter read a paper on "Ptolemy's Geography of Eastern Equatorial Africa." Ptolemy, as a geographer, has received very different treatment at different times at the hands of his critics. At one time it was the fashion to sneer at the industrious Alexandrian geographer as entirely untrustworthy, as a mere imaginative arm-chair geographer, without critical discrimination. That Ptolemy was an arm-chair geographer no one denies, but in geography, at least, it should be remembered that the looker-on often sees most of the game. Basing his system on that of his predecessor, Marinas of Tyre, Ptolemy seems diligently to have collected the itineraries of all travellers that came within his reach, and his position at the great port of Alexandria was highly favourable for work of that kind. Of course his methods were faulty, his fundamental data erroneous, and the observations with which he had to deal often of the vaguest kind. Still, when all due allowance is made for these drawbacks, there is no denying that Ptolemy's map of North-Eastern Africa bears a wonderful resemblance to reality—just the resemblance that might be expected in the infancy of cartography, before the invention of instruments of precision, and ere travellers had learned to make good use of their eyes. Recent discoveries in Central Africa have attracted increased attention to the geography of Ptolemy, and make one wonder how he came so near the truth. It has been recently attempted by Dr. Meyer (who in this case is merely the mouthpiece of Mr. E. G. Ravenstein) to show that Ptolemy's knowledge of East Africa did not extend beyond Abyssinia; that his Nile is simply the Abyssinian River, and his lakes the lakes of that country, projected downwards, to suit later knowledge, into the heart of Africa. However that may be, Dr. Schlichter, in his paper, gives the result of an ingenious method adopted by him to test Ptolemy's accuracy, and to prove that he must have somehow obtained information about the lakes which we now know give origin to the Nile, and about the snow-clad mountains that cluster round them, and which are all that remain to us of the once famous Mountains of the Moon that extended like a barrier across the continent. After discussing Ptolemy's cartographical methods, and making allowances for his error as to the length of the degree (600 instead of 500 *stadia*), Dr. Schlichter's *modus operandi* is as follows:—

1. To look for the basis on the coast which Ptolemy used in order to fix the position of this part of Africa; and to eliminate his error of geographical latitude.

2. To reduce the positions of his points to modern graduation.

3. But in all other respects to leave the distances from the basis of the map intact with the exceptions of the itineraries round the Victoria Nyanza.

Dr. Schlichter rightly takes the Rhapta of Ptolemy and his Periplus as the central point of his calculations. Besides Rhapta, Ptolemy mentions a promontory called Rhaptum, and a river called Rhaptus. The "metropolis of Rhapta" must have been somewhat inland, but Dr. Schlichter has no difficulty in identifying the Pangani River with the Rhaptus, and Ras Mamba Mku, a cape to the south of Zanzibar as Ptolemy's Rhaptum. Taking this as his starting-point, and making due allowance for Ptolemy's mistakes as to the length of the degree, Dr. Schlichter measures off with his compasses the distances given by Ptolemy, and in this way identifies most of the places in East Central Africa mentioned by Ptolemy with well-known places of the present day. He measures off, for the sake of minute accuracy, his distances in millimetres. He has constructed two maps—one based merely on Ptolemaic data and another showing the latest knowledge: the coincidences are striking. In this way Dr. Schlichter identified the coast places marked by Ptolemy with such well-known places as Melinda, the mouth of the Tana, the towns of Brava, Marka, Magdishu, Warsheikh, and other places. Applying the same method to the positions in the interior given by Ptolemy, Dr. Schlichter identifies Ptolemy's Eastern Nile Lake with the Victoria Nyanza; the circle, with Rhaptum as the centre and the position given by Ptolemy in the interior as the other end of the radius, cuts the south-east shore of Victoria Nyanza. Following the same method, Dr. Schlichter finds that the position given by Ptolemy for the eastern end of the Mountains of the Moon coincides with a point a little to the south of Mount Kenia. Again, in a similar manner he identifies the Western Nile Lake with Lake Albert or Lake Albert Edward, the western end of the Mountains of the Moon with Ruwenzori, and the confluence of the two rivers which form the Nile with the place where the Somerset Nile flows into Lake Albert.

These instances are sufficient to indicate the method followed by Dr. Schlichter, and its success in identifying the positions given by Ptolemy with features which we know now really do exist. In the subsequent discussion, Mr. Ravenstein endeavoured to prove that Dr. Schlichter's method was entirely misleading, even although he admitted that the position adopted for Rhaptum was approximately correct. Mr. Ravenstein's arguments cannot, however, be regarded as convincing; and although we are not interested in upholding Dr. Schlichter's position, still we think that, in justice to Ptolemy, and in the interests of historical truth, his methods and results deserve serious consideration.

CARL JOHANN MAXIMOWICZ.

CARL JOHANN MAXIMOWICZ, who died at St. Petersburg on February 16, after a few days' illness, was born at Tula in 1827. He went early to St. Petersburg, where he was brought up at the St. Annenschule, a renowned German Lutheran College. In 1844 he left the Russian capital for the University of Dorpat. After completing his studies, he was appointed director's assistant at the botanical garden of Dorpat, a post he held until 1852, when he was made Conservator of the Imperial Botanical Garden at St. Petersburg. The following year he set out on a voyage around the world on board the frigate *Diana*, his chief task being to make acquisitions of living plants for the botanical garden at St. Petersburg. The *Diana* visited Rio de Janeiro, Valparaiso, and Honolulu. But when war was declared by the Western Powers against Russia, she was compelled to call at the nearest Russian harbour, De Castries, on the coast of Mantchuria, at that time the youngest, and scarcely an organized, Russian colony. Maximowicz had to leave the frigate, and decided at once to go up the River Amur, and to explore its banks and the adjoining country, which was then little known. Though furnished with only limited means, he carried out his task under great difficulties and severe privations in a very successful manner. He returned to St. Petersburg by way of Siberia in 1857. The next two years he devoted entirely to the working out of his "Primitiæ Floræ Amurensis: Versuch einer Flora des Amurlandes," a thick quarto volume, which appeared in 1859, and contained a full enumeration of his botanical collections, and a most clear exposition of the general physical features of the country visited by him, and particularly of its phytogeographical character. Immediately after, the full Demidoff Prize was awarded to him in acknowledgment of the excellence of his work. At the same time he was directed to proceed again to the far East. In 1859 and 1860 he travelled in Mantchuria; in 1861 he visited the island of Yesso; 1862, Nipon; 1863, Kiu-siu. He returned to Europe by the sea-route in 1864. It was then that he first visited England. He was at that time in a bad state of health, in consequence of an obstinate fever he caught in Japan, and from the effects of which he suffered from time to time throughout his life. In 1869 he was appointed Botanicus Primarius at the Imperial Botanical Garden at St. Petersburg, and he was a Fellow of the Imperial Academy of Science from 1864. Consequently he was also entrusted with the direction of the Herbarium of the Academy. After 1866 he published many contributions to the flora of Eastern Asia in the *Mémoires* and the *Bulletins* of the Academy, the most important being a monograph of the rhododendrons of Eastern Asia, the "Diagnoses breves Plantarum Novarum Japoniæ et Mandshuriæ, Dec. i.–xx."; the "Diagnoses Plantarum Novarum Asiaticarum, i.–vii.," &c. It was in the latter that he began to work out the large and exceedingly important collections made by Prjevalsky, Potanin, &c., in Central Asia. In consequence, however, of the extreme thoroughness of his work, and his highly critical method, combined with overwhelming official duties, the first parts of these important works did not appear before the end of 1889. These are the "Flora Tangutica" and the "Enumeratio Plantarum hucusque in Mongolia, &c., Lectarum," each comprising only the Thalamifloræ and the Disciflorae of the collections. A general review of the phytogeography of Central Asia, founded on the collections of Prjevalsky and other Russian explorers, however, was submitted by him to the Botanical and Horticultural Congress at St. Petersburg, 1884; it is a model of lucidity of style and arrangement. Now, we fear, these two works, so comprehensively planned, will proceed no further, although Maximowicz's preparations for the remaining parts were considerably advanced and a large number of most beautiful plates are ready for press. But we look in vain for the man in Russia who could take up the work. Russia was so unfortunate as to lose her great explorer by sudden death at the very moment when he was setting out to gather new laurels, and now his most famous interpreter has breathed his last not less unexpectedly. Deeply as we must regret that he was not permitted to finish his work himself, one thing is certain—that whatever he completed will last. He was of a noble, high-minded nature, a highly cultivated scholar in almost every branch of learning, and a gentleman in the truest sense of the word.

OTTO STAPF.

NOTES.

THE next ordinary general meeting of the Institution of Mechanical Engineers will be held on Thursday evening, the 19th, and Friday evening, the 20th, at 25 Great George Street, Westminster. The chair will be taken by the President, Mr. Joseph Tomlinson, at half-past seven p.m. on each evening. The following papers will be read and discussed, as far as time