rated into different kinds by passing through sieves having meshes of different size. The specimens he chemically examined are all those prepared in the celebrated tea producing district Uji, and are supposed to be unadulterated. The accompanying table gives the result of the analysis.

ANALYSIS OF JAPANESE TEAS.

NAME.	Moisture.	ASH.			ORGANIC MATTER.			Total Extract.	Nitrogen.	Yens per Kin.
		Soluble.	Insoluble.	Total.	Soluble.	Insoluble.	Total.			
Shimonohaua.....	9.27	3.86	1.18	5.04	35.96	50.74	86.70	39.82	4.24	0.24
Toyokumo.....	9.97	3.74	1.20	4.94	37.06	46.03	83.09	42.70	4.14	0.25
Hochayen.....	9.38	2.66	2.72	5.38	34.14	51.10	85.24	36.80	3.90	0.50
Kiuiumosato.....	7.66	4.35	1.26	5.61	38.40	48.33	86.73	42.75	—	1.25
Nagautomo.....	8.71	4.28	1.69	5.97	37.32	48.00	85.32	41.60	5.37	1.50
Toyokage.....	8.81	3.88	1.68	5.56	40.40	45.23	85.63	44.28	—	2.50
Toyomaye.....	8.31	3.41	1.32	4.73	41.87	45.09	86.96	45.21	3.87	3.50
Giokuro.....	6.90	3.45	2.55	6.00	33.55	53.55	87.10	37.00	—	5.00

ses. On examining the table there seems to be no connection between commercial quality and chemical composition, but it is very interesting to observe how nearly the same is the amount of the constituents in all specimens; so that, in any instance, if we find some of the constituents, as ash, for instance, in quantity differing from those found in the table, we may consider such specimen being previously adulterated.

Nitrogen in the table was determined by Dumas' method.

Theine.—He estimates this most important constituent of tea by the following method: 15 grms. of powdered tea are mixed with an equal amount of magnesia, and the mixture is boiled with water, filtered, and residue washed with hot water. The filtrate being evaporated to dryness is exhausted with hot benzole, and the extract is then evaporated and the residue is weighed. By this method he found 0.189 per cent. in *Nagautomo*, and 0.207 per cent. in *Horiu*, all brought from Uji.

Tannin.—This is determined by a standard solution of plumbic acetate. In six specimens from Uji he found the following amounts: *Toyokumo*, 16 per cent.; *Toyokage*, 16.25 per cent.; *Shimonohaua*, 15.62 per cent.; *Nagautomo*, 14.70 per cent.; *Toyomaye*, 16.70 per cent.; *Hochayen*, 16.12 per cent.

Gum.—Estimated by evaporating the aqueous extract of tea almost to dryness, treating the residue with methyl spirit, the extract evaporated to dryness, and the residue weighed, which after ignition is again weighed; the loss represents the gum. By this method he found the following amounts in the same specimens as above. *Toyokumo*, 13.72 per cent.; *Toyokage*, 9.75 per cent.; *Shimonohaua*, 12.32 per cent.; *Nagautomo*, 10.10 per cent.; *Toyomaye*, 9.90 per cent.; *Hochayen*, 10.61 per cent.

ANALYSIS OF TEA ASH.

	Green Tea from Uji.		Black Tea from Settsu.	
	I.	II.	III.	IV.
Silica.....	8.91	6.19	5.01	4.61
Sulphuric acid.....	3.87	4.70	3.03	4.22
Phosphoric acid.....	16.62	17.02	21.87	19.77
Chlorine.....	1.62	1.95	1.26	1.04
Carbonic acid.....	7.82	9.45	6.23	7.03
Oxide of iron and alumina.....	8.21	9.06	6.35	7.96
Manganese sesquioxide.....	0.59	trace.	0.98	1.30
Lime.....	14.57	13.17	8.33	10.42
Magnesia.....	6.95	6.17	6.92	7.00
Soda.....	2.70	4.03	5.01	2.99
Potash.....	27.92	28.11	35.04	33.60
	99.78	99.86	100.03	99.93

JAPANESE TOBACCO.

There are various varieties of tobacco plant differing more or less in the form and size of the leaf, but those growing in this country are known as *Nicotiana glauca* and *Nicotiana glauca*, bearing a rose colored flower, and growing to the height of 3 to 5 feet. The tobacco plant is cultivated almost in every province, but the best leaves are produced in the provinces of Hizen, Hitachi, Satsuma, and Nagato.

The mode of collecting the leaves varies in different places, but generally two or three small leaves, which are situated at the upper part of the stem, are first taken off by hand, and the remaining leaves, after being exposed to the sun for 3 to 5 days, are successively taken, three or four at a time. In Awa it is just reversed; the lower leaves, which are of inferior quality, are taken off at first in June, when the leaves are slightly yellowish, and the middle leaves, which form the best sorts, are collected after 13 or 14 days. In some places a second crop is obtained from new shoots, which, if properly cultivated, yield leaves which are not inferior to those of the first gathering.

The leaves thus collected are placed on a floor covered with a straw mat, allowed to remain for one or two days, when the mat is taken off; those which have assumed the melon-yellow color are sorted out and dried by exposure to air, while those still retaining the original color are kept in the same condition till the required color is developed.

The dried leaves are now packed and sent to market. According to Japanese fashion, tobacco for smoking purposes is cut into fine threads.

The methods he used for the determination of nicotine and organic acids are as follows:

1. *Nicotine*.—Ten grms. of powdered tobacco are made alkaline by ammonia, which is intended to displace nicotine. It is then extracted by ether, the extract evaporated to dryness, when a pasty residue of nicotine and a greenish yellow resinous body are obtained, from which nicotine is determined by standard sulphuric acid.

2. *Acetic Acid*.—Tobacco powder is moistened with water, and then ground with tartaric acid. The mass is exhausted with steam, which volatilizes acetic acid, and which is condensed by means of Liebig's condenser. The acid is determined by means of standard alkaline solution.

3. *Oxalic, Malic, and Citric Acids*.—Ten grms. of tobacco are moistened with hydric sulphate, the quantity to be used being previously calculated from the ash of the leaves. It is then exhausted with ether in a continuous distillation apparatus. The organic acids are dissolved in ether, and the operation is completed

when a small quantity of ether, evaporated, does not leave any residue.

In order to extract the required acids, leaving the foreign bodies in ether solution, a few drops of water are added and the whole is shaken. The aqueous solution is separated from ether solution, and the water solution is neutralized by ammonia, and a few drops of acetic acid is added. Then the oxalic acid is precipitated by a dilute solution of calcic acetate, and determined.

To the filtrate a dilute solution of lead acetate is added until a permanent precipitate appears, and about 1 c. c. of the supernatant liquid is taken into a test-

ANALYSIS OF TOBACCO LEAVES.

	PROVINCE OF PRODUCTION.			
	Nagato. Per cent.	Shimozuki. Per cent.	Settsu. Per cent.	Osumi. Per cent.
Water.....	6.41	10.01	7.63	13.18
Ash.....	15.76	8.45	20.71	9.80
Nicotine.....	2.45	3.02	3.92	1.89
Acetic acid.....	0.05	0.04	0.01	0.08
Oxalic ".....	trace.	0.27	0.25	trace.
Malic ".....	0.79	1.02	1.83	2.98
Citric ".....	0.52	0.59	0.92	0.89
Pectic ".....	1.24	5.84	7.42	2.35

	PROVINCE OF PRODUCTION.			
	Nagato.	Shimozuki.	Settsu.	Osumi.
Carbonic acid.....	10.20	15.40	10.20	14.86
Sulphuric ".....	4.75	3.40	2.02	5.52
Phosph. ".....	4.30	5.15	3.32	4.85
Chlorine.....	11.70	8.23	5.56	4.45
Silica.....	3.86	5.46	9.55	5.51
Fe ₂ O ₃ +Al ₂ O ₃	3.80	2.60	8.17	9.15
Lime.....	33.12	22.92	23.45	21.95
Magnesia.....	7.98	6.57	8.02	6.78
Potash.....	13.78	25.52	27.51	24.49
Soda.....	6.11	4.18	3.82	1.90
	99.60	99.43	99.62	99.46

glass, and a drop of very dilute lead acetate solution is added; if the precipitate produced is not dissolved by addition of a few drops of acetic acid, then, after 1 c. c. taken is returned to the main portion, the addition of lead acetate is continued. This is repeated until a precipitate, produced by a new addition of lead acetate, is completely soluble in hydric acetate. Then it is filtered, washed with water containing a small quantity of lead acetate and acetic acid, and finally with alcohol at 36°. The washings are kept separate from the main filtrate. Citric acid is then determined from the lead oxide left after combustion of the precipitate. In the washings a small quantity of citric and malic acids is present; they are precipitated, after alcohol is expelled, by adding an excess of lead acetate, and their amounts are determined from the quantity of lead oxide, assuming the two acids to be present in equal proportions.

In the filtrate, malic acid is precipitated by adding an excess of lead acetate solution, and the precipitate is treated as in case of citric acid.

4. *Pectic Acid*.—Ten grms. of powdered tobacco are exhausted with alcohol at 36° containing one-fourth its volume of concentrated hydric chloride until the filtered liquid no longer contains lime. The residue is washed with alcohol so as to remove hydric chloride completely, and it is then treated with a solution containing a known quantity of ammonium oxalate, by which pectic acid is dissolved out. After two hours' digestion at 35°, it is filtered, the residue washed, the filtrate made to 1 liter, from which a known volume is measured out, and an excess of calcic acetate is added, when a white precipitate of oxalo-pectate of lime is formed, which is filtered on a weighed filter and weighed after drying at 100° C. This precipitate is then burnt, and the amount of lime formed is ascertained. The amount of pectic acid is then calculated from the following:

$$P = (B - C)A,$$

where A is the weight of ammonium oxalate, and B that of oxalo-pectate, and C the amount of lime formed on burning oxalo-pectate.—*Chem. News*.

RESEARCHES ON LIQUEFIED GASES.*

By Professor JAMES DEWAR, M.A., F.R.S.

THE two Russian chemists, MM. Wroblewski and Olszewski, who have recently made such a splendid success in the production and maintenance of low temperature, have used in their researches an enlarged form of the well-known Cailletet apparatus; but for the purposes of lecture demonstration, which necessarily involves the projection on a screen of the actions taking place, the apparatus represented in the annexed

* A paper read at the Royal Institution of Great Britain.—*Chem. News*.

woodcut is more readily and quickly handled, and enables comparatively large quantities of liquid oxygen to be produced. The arrangements will be at once understood on looking at the figure, which is taken from a photograph. The oxygen or air reservoir, C, is made of iron; it contains gas compressed for convenience to 150 atmospheres. A is the stopcock for regulating the pressure of the gas in the glass tube, F, and D is the pressure-manometer, the fine copper tube which connects the gas reservoir and the glass tube, F, being shown at 1. The air-pump gauge is marked J, the tube leading to the double oscillating Bianchi being attached at H. The glass test-tube, G, which contains the liquid ethylene, solid carbonic acid, or liquid nitrous oxide, which is to be boiled *in vacuo*, is placed in the middle of a larger tube. It has holes, shown at E, in the upper part, so that the cool vapors in their course to the air-pump are forced to pass round the outside of the vessel and help to guard it from external radiation. The lower part of the outer cylinder is covered with pieces of chloride of calcium, shown at K. If a thermometer is used and a continuous supply of ethylene maintained, the India-rubber cork through which the tube, F, passes has two additional apertures for the purpose of inserting the respective tubes. When the pump has reduced the pressure to 25 mm., the ethylene has a temperature of about -140° C.; a pressure of between twenty and thirty atmospheres is then sufficient to produce liquid oxygen in the tube, F. The tube, F, is 5 mm. in diameter, and about 3 mm. thick in the walls, and when filled with fluid oxygen (for projection) holds at least 1.5 c. c. With such a quantity of fluid oxygen it is easy to show its ebullition at ordinary pressures, and by means of a thermo-junction to demonstrate the great reduction of temperature which is attendant on its change of state at atmospheric pressure.

Provided a supply of liquid ethylene can be had, there is no difficulty in repeating all the experiments of the Russian observers; but as this gas is troublesome to make in quantity, and cannot be bought like carbonic acid or nitrous oxide, such experiments necessitate a considerable sacrifice of time. It was, therefore, with considerable satisfaction that I observed the production of liquid oxygen by the use of solid carbonic acid, or preferably liquid nitrous oxide. When

these substances are employed, and the pressure is reduced to about 25 mm., the temperature of -115° C. may be taken as that of the carbonic acid, and -125° C. as that of the nitrous oxide. As the critical point of oxygen, according to the Russian observers, is about -113° C., both these cooling agents may be said to lower the temperature sufficiently to produce liquid oxygen, provided a pressure of the gas above the critical pressure, which is 50 atmospheres, is at command. In any case, however, the temperature is near that of the critical point; and as it is difficult to maintain the pressure below about an inch of mercury, the temperature is apt to be rather above the respective temperatures of -115° C. and -125° C. In order to get liquefaction conveniently with either of these agents, it is necessary to work at a pressure of oxygen gas from 80 to 100 atmospheres, and to have the means of producing a sudden expansion when the compressed gas is cooled to the above-mentioned temperatures. This is brought about by the use of an additional stop-cock, represented in the figure at B. During the expansion the stop-cock at A is closed, and the pressure manometer carefully observed.

No doubt liquid nitrous oxide is the most convenient substance to use as a cooling agent; but as it is apt to get superheated during the reduction of pressure, and boil over with explosive bursts of vapor, it is well to collect the fluid in a small flask of about 250 c. c. capacity, and to change it into the solid state by connecting the flask with the air pump, and then to use the substance in this form. The addition of alcohol or ether to the solid nitrous oxide makes the body more transparent, and thereby favors the observations.

It is evident that this apparatus enables the observer to determine the density of the fluid gases condensed in the tube, F, since he has only to measure the volume of fluid in F, and to collect, by means of the stop-cock, B, the whole volume of gas given by the fluid and condensed vapor, which gives an accurate determination of the total weight of substance distributed between fluid and vapor in the whole apparatus.

The amount of substance which is required to produce the vapor is easily found by observing the vapor pressure of the liquid gas before expanding it into gas for the volume measurement; and while keeping shut the stop-cock, B, by opening A suddenly until this pressure is just reached, and then instantly shutting off the receiver. If this volume of gas is now measured by opening B as before, the difference between the two volumes thus collected will correspond to the real

weight of substance in the liquid state. A rough experiment with oxygen near the critical point gave the density 0.65.

As to the most convenient substance for use as a cooling agent, I am still of the opinion that marsh gas would be the best; and I may take the opportunity of pointing out that the employment of this body was suggested by me in a communication made to the Chemical Section of the British Association in 1883.

The following extract from *Nature* of October 4, 1883, will prove that my experiments with liquid marsh gas were made a year in advance of those made recently by M. Cailletet* and M. Wroblewski†:

"Professor Dewar pointed out an important relation between the critical temperatures and pressures of volatile liquids and their molecular volumes. The ratio of the critical temperature to the critical pressure is proportional to the molecular volume, so that the determination of the critical temperature and pressure of a substance gives us a perfectly independent measure of the molecular volumes.

"Prof. Dewar pointed out the great advantage of employing a liquid of low critical temperature and pressure, such as liquid marsh gas, for producing exceedingly low temperature. He hoped to be able to approach the absolute zero by the evaporation of liquefied marsh gas, whose critical temperature was less than -100° C., and whose critical pressure was only 39 atmospheres."

I ought to mention that the marsh gas used in my experiments was made by the action of water on zinc methyl, and was therefore very pure, and that the observed critical pressure was not 39 atmospheres, but 47.6. The following table gives the value of the ratio of the absolute critical temperature to the critical pressure in the case of a number of substances. The values for ammonia, sulphureted hydrogen, cyanogen, marsh gas, and hydride of ethyl are new.

	T. Critical temperature.	P Critical pressure.	T P
Chlorine.....Cl ₂	141.0°	83.9	5.0
Hydrochloric acid...HCl	52.3	86.0	3.7
Oxygen.....O ₂	-113.0	50.0	3.2
Water.....H ₂ O	370.0	195.5	3.3
Nitrogen.....N ₂	-146.0	35.0	3.6
Hydrogen sulphide...H ₂ S	100.2	92.0	4.0
Ammonia.....H ₃ N	130.0	115.0	3.5
Diethylamine...(C ₂ H ₅) ₂ NH	220.0	38.7	15.4
Nitrous oxide.....N ₂ O	35.4	75.0	4.1
Sulphurous acid...SO ₂	155.4	78.9	5.4
Marsh gas.....CH ₄	-99.5	50.0	3.5
Acetylene.....C ₂ H ₂	37.0	68.0	4.5
Ethylene.....C ₂ H ₄	10.1	51.0	5.5
Ethyl hydride....C ₂ H ₆	35.0	45.2	6.8
Amylene.....C ₆ H ₁₀	191.6	33.9	13.7
Benzol.....C ₆ H ₆	291.7	60.4	9.3
Chloroform.....CHCl ₃	268.0	54.9	9.9
Carbon chloride...CCl ₄	282.0	57.6	9.6
Carbonic acid.....CO ₂	31.9	77.0	4.0
Bisulphide of carbon.CS ₂	277.7	78.1	7.0
Cyanogen.....C ₂ N ₂	124.0	61.7	6.4

A glance at the last column of the table shows that a large number of substances have at their respective critical temperatures simple volume relations. Thus hydrochloric acid, water, ammonia, and marsh gas, the four chemical substances from which the great majority of chemical compounds may be derived by processes of substitution, have nearly the same volume; while the more complex derivatives show an increased volume which bears a simple ratio to that of the typical body. As the critical pressures are not known with any great accuracy at present, it would be useless to discuss the results with any severity. All that can be inferred is that the subject is worthy of further investigation, and promises important generalization.

Sarrau (*Compt. Rend.*, 1882) deduced the critical temperatures and pressures of hydrogen, oxygen and nitrogen by the application of Clausius' formula to the experiments of Amagat; and it is interesting to compare his results with the experimental values.

Sarrau's Calculated Values.

	T. Critical temperature.	P Critical pressure.	T P
Hydrogen.....	-174°	98.9	1.0
Oxygen.....	-105.4	48.7	3.4
Nitrogen.....	-124	42.1	3.5

It will be observed that the calculated critical temperatures of oxygen and nitrogen are remarkably near the truth, being respectively 8° and 22° too high. On the other hand, the values of the ratios of the calculated critical temperatures and pressures are almost identical with those obtained by direct experiment. The only peculiarity to be noted is in the case of hydrogen, which has such a high critical pressure and therefore leads to a remarkably small molecular volume at the critical point. If the values of the T ÷ P ratio be taken as proportional to the molecular volumes, then it is easy to infer the densities of the fluids at their respective critical temperatures, provided the density of one standard substance is known by experiment. The simple formula thus stated is—

S' / S = (W' / W) * (V / V')

where S and S' are the specific gravities of two bodies, W and W' their molecular weights, and V and V' their molecular volumes. It will be convenient to take the density of carbonic acid at the critical point as the standard density to which the others can be referred. The density of carbonic acid under such conditions may be taken as 0.65.

Calculating with the above formula, the density of acetylene would be 0.32, whereas the experimental number of Ansdell is 0.36. In the same way the density of hydrochloric acid is found to be 0.6, the true value being 0.61. The density of oxygen would be 0.63, and

that of nitrogen 0.45. The calculated density of hydrogen at its critical point would be 0.12 if we assume the correctness of Sarrau's values for the critical temperature and pressure.

We may compare these values with the numbers obtained by Cailletet and Hautefeuille for the densities of oxygen, nitrogen, and hydrogen from their experiments on the density of liquid carbonic acid obtained from mixtures of this body with these gases. At the temperature of 0° C., the experiments found for oxygen, nitrogen, and hydrogen the respective values of 0.65, 0.37, and 0.025. It seems that the calculated values for oxygen and nitrogen are not very far wrong; but hydrogen is clearly incorrect. The explanation of this anomaly is probably to be found in the fact that the calculated molecular volume of hydrogen is wrong, and that instead of being unity on our scale it ought to be 3.5, like oxygen and nitrogen. In fact, the chemist would infer that, as the difference in the complexity of the molecular structure of hydrochloric acid, water, ammonia, and marsh gas does not affect the molecular volume under the conditions we are discussing, in all probability the value for hydrogen would be identical with that of the above mentioned bodies. If we adopt this view, and change the value of the Tc ÷ Pc to 3.5, then the density of the fluid would become 0.034, which is in accordance with the experimental number of Cailletet and Hautefeuille.

An accurate determination of the critical temperature and pressure of hydrogen, for which, judging from the success of the experiments of Olzewski, chemists will not have to wait long, will thus be of great interest.

ON THE DRYING OF WOOD.

THE drying of wood is an important operation that has been practiced for a long time, and which is so much the more necessary at present in that old wood is becoming rare, and that it is necessary to use green

tudinal, very light, superposed arches supported by I-irons, and so arranged as to form two distinct compartments which do not communicate with each other, but which are connected with the drying-room through orifices provided with valves that are maneuvered from the exterior. The drying-room likewise communicates with the exterior through its roof, by means of small and uniformly distributed chimneys, each provided with a sand cover.

The sides of the drying-room are formed of three thin walls (as shown in the figure), which are cross-braced by longitudinal courses of bricks. The whole is connected by iron cross-braces provided with keys. Each of the walls therefore contains two flues of wide and distinct circulation. The inner one, Q, communicates with the lower compartment of the drying-room ceiling, and the external one with the upper. Each room is provided with a wide, hinged, folding door containing apertures for the insertion of a thermometer and for removing a trial specimen of wood from time to time, in order to see how the operation is advancing.

The lower chamber, D, which communicates with the stove, E, through the apertures, O, O,***, is capable of communicating likewise with the lateral flues, Q, Q,***, this being effected by the simple maneuver of registers, F, F,***, at the bottom of each of the flues.

The stove under consideration is capable of effecting all the operations of drying, and the arrangements are such that two of them can be placed alongside of one another, or four grouped together around one central chimney, and the drying be done with hot air or with smoke, and through ascending or descending currents, at will.

The entire arrows indicate a drying effected through a descending current. After passing into the chambers, B and D, in succession, the products of combustion flow through the apertures that are opened and closed by the registers, F, into the interior flues, Q. They pass along these to the lower division of the ceiling,

STOVES FOR DRYING WOOD.

The processes of drying that are known up to the present are numerous, and are nearly all of them based upon smoking, the object of this being to exhaust the sap and to substitute therefor empyreumatic vapors having creosote for base, and which, on combining with the pyroligneous acid of the wood, deposit in its cells a preservative principle that protects it against dry rot and the attack of insects.

There are cases, it is true, in which smoking cannot be practiced; for example, with wood designed for the manufacture of furniture, by reason of the persistence of the empyreumatic odor, and with wood that must not show any artificial coloration.

The apparatus shown in the annexed engraving is designed for the drying of wood either by smoking or by the use of hot air, and consequently gives just such products as may be desired. The fire-place, A, which is situated at a slight depth beneath the surface, is so arranged that the fuel may be burned slowly or produce a hot fire, according as smoke or hot gases are to be obtained. The products of combustion, after crossing the fire-bridge, are distributed through the chamber, B, whence, through lateral apertures, C, in front and behind, they pass to the upper chamber, D, situated immediately beneath the drying-room floor, which is formed of longitudinal brick arches, F, that support double T-irons.

Each of these arches has openings, O, O,***, in the key that may be opened or closed by means of registers, G, G,***, maneuvered from outside.

Over and between each of the arches run collecting flues, V, V,***, that contain apertures, U, U,***, in their upper part, and between which pass transversely the beams, H, that support the wood to be dried or the track upon which runs the truck that carries the charge. The orifices, U, U,***, all communicate with the flue that runs to the chimney, T, through a passage provided with a register.

The ceiling of the drying-room, E, is formed of longi-

whence they enter the drying-room, E, and descend to the orifices, U, U,***, of the flues, V, V, which lead them to the chimney.

On the contrary, if the registers, F, are closed, and the valves, G, open, the current ascends, and the gases, after traversing the stove from bottom to top, and entering the lower compartment, reascend through the flues, Q, Q, and go to the chimney. This is the mode preferred.

The drying of green planks is effected in less than four days with one of these drying-rooms.—*Chronique Industrielle*.

MANAGEMENT OF MEASLES, WHOOPING-COUGH, AND DIPHTHERIA.

By GEORGE B. FOWLER, M.D., Visiting Physician, New York Infant Asylum.

NEW YORK, Oct. 11, 1884.

A. N. BELL, M.D., Chairman of Committee, etc :

I cheerfully comply with your request for my view of the value of the hygienic measures instituted by you at the country home of the New York Infant Asylum, for the suppression of a most severe epidemic of whooping-cough, measles, and diphtheria, during the summer and autumn of 1883.

The home is situated in the town of Eastchester, Westchester County, N. Y., upon an elevated and attractive plot. It consists of a large main building and five outlying cottages, besides an old residence. With the exception of this last, each house was constructed under careful supervision to meet the wants and emergencies natural to an institution devoted to the care of women and children.

Early in July, when the number of inmates was about 320 (223 children and 97 women), whooping-cough began to prevail, and soon after a case of measles appeared in a ward of the main building. Without going

* "Sur l'emploi du Formène pour la production des très basses températures," *Comptes Rendus*, June 30, 1884.
† "Sur les propriétés du gaz des marais liquide, et sur son emploi comme réfrigérant," *Comptes Rendus*, July 21, 1884.