In the basement of the house twelve batteries of 34 cells each are installed, and these are charged and discharged in parallel. With each having a capacity of 100 ampere-hours, it is possible to light 100 16-candle-power incandescent lamps. The successful working of this plant for lighting the house and laboratory has demonstrated the value of a windmill generating set for light loads.

The question of the general construction of the windmill itself has been the subject of considerable experiment. In this respect the Danish experts reached the conclusion that a curved wing would develop nearly twice as much power as the plane wing. This is better stated thus in figures: While the maximum power obtained from a curved wing was 108 gramme-meters per second per square meter of surface, the power obtained from a plane wing was only 42 gramme-meters. Grooved wings gave power equal to curved wings, and this form of windmill wing has been used ever since in all of the Danish tests. Four wings make the most convenient form of windmill in use, and a constant proportion between the length and width of the wings gives the highest results. Thus, to secure the most satisfactory surface area, the width of each wing should be from one-fourth to one-fifth the length, and the greatest width should be about three times as great as the narrowest part. The greatest width of the wing is placed in front, so that the wind is caught and carried toward the center, where it finds ready space for its escape. In such a windmill the tip of the wing should develop a speed 2.43 times that of the wind when working. The windmill plant at Wittkeil, in Schleswig, has demonstrated certain facts that carry out the foregoing statements. In this case the windmill has an enormous wind surface. The diameter of the windmill is about 40 feet, and an effective wing space of nearly 1,000 square feet is presented to the wind. The windmill develops 30 horse-power with a normal speed of eleven revolutions per minute. It operates a shunt dynamo that makes 700 revolutions per minute, and develops 160 volts and 120 amperes. This full load is developed when the wind is blowing at the rate of about 8 miles per hour. The windmill furnishes electricity to light the town of Wittkeil, and small motors and lamps are connected to the storage battery, which maintains a voltage of 110. The battery has a capacity of 66,000 watt-hours. This plant has proved so satisfactory that it is being enlarged, and as a permanent lighting station it is likely to prove of unusual importance in the development of modern electricity by windmills.

In the adaptation of the windmill generating plant to commercial purposes in this country, experiments have taken some peculiar forms. In order to eliminate the storage battery, the windmill must be able to store up its energy in some other way. A number of methods to do this have been suggested. At present the extra cost of constructing the storage battery makes the initial cost of the plant more expensive than the first cost of an oil or steam-driven plant. After the first installation the cost of operation is very little, and if it were not for the constant oversight required of the storage battery, the plant would work entirely without any watchman. The storage battery requires the attention more or less of an electrical expert, and the labor question enters into the problem of operation. By eliminating the storage battery, the cost of installation, the repair items, renewals, and the labor item would all be reduced. One patent tested in this country was to utilize a compressed-air plant in connection with the windmill. The dynamo is direct-connected to the air compressor, and the power thus stored up could then be utilized as needed. But in this case the extra amount of mechanism increases the cost of installation even more than the storage battery. The compressor, moreover, requires pretty constant watching, and the windmill generator thus approaches no nearer the self-regulating and operating machine than before.

Another method has been employed, which appears to contain some possibilities for the Western farmers, where windmills are already in use for pumping water for irrigating purposes. By means of storage tanks, the windmill pumps the water to a great height, and then the pressure developed by the falling water is utilized for driving a water turbine or wheel. In this case the dynamo is driven very much like any hydraulic generating plant, and ordinary motors and generating sets could be adapted to the work. The turbo-generating method of utilizing the windmill for electrical development would require nearly as much expense for initial installation as any of the other methods, but once in working order it would prove purely automatic and self-regulating. The great size of the tank required to develop sufficient horse-power to operate the generators is one of the drawbacks to this system. The loss of efficiency would be quite considerable, and the ordinary windmill now in use for electrical generation would have to be increased in size or supplemented by several others. Such a storage tank would, moreover, have to be large enough to hold sufficient water to run the turbo-generators for at least eight or ten hours consecutively. Even then the plant might be put out of work for ten hours or more through the failure of the wind. All would depend upon the average velocity of the wind in the region where the plant was installed. The storage of water by means of windmills in reservoirs on the hillsides has been suggested, thus furnishing an artificial supply of water for hydraulic purposes. In this case a sufficient number of windmills might be installed to pump the water in a huge reservoir that would never be exhausted. The results of such an experiment would certainly prove of interest to engineers, but it is somewhat doubtful if the returns would pay for the heavy outlay of funds for the windmills and the storage reservoir. Yet despite these many serious drawbacks to windmill electrical engineering, it is quite apparent that in the course of time the power of the wind will be used more and more for developing electricity, and with new mechanical methods better results are bound to follow.

ANOTHER NORTH POLE BALLOON EXPEDITION.

According to a notice in the Vossische Zeitung, Marcillac contemplates taking a trip to the North Pole by balloon, similar to that of the unfortunate Andrée. As a safeguard against such accidents as befell the latter, Marcillac intends to carry with him a wireless telegraph apparatus by means of which the balloon will be kept in permanent connection with the starting station.

As regards the technical particulars of the Marcillac scheme, it may be said that the balloon is to be provided with an electromotor capable of evolving driving power during 200 hours, which would be intended either to drive the balloon in the case of weak winds, or to impart to it a course different from the direction of the wind. The balloon is to receive from 5,000 to 5,500 cubic meters of gas, supplied by a novel apparatus in the car. Several instruments have been constructed by Marcillac especially for this expedition—for instance, an amenoscope for investigating the air currents; a velometer for measuring the speed of the balloon; a horn intended to give acoustical signals; and finally, what he calls a "thermogen," viz., a special device for counteracting the influence of the polar cold on the gas of the balloon.

Spitzbergen is to be chosen as starting-point, as in the case of the Andrée expedition. The cost of this trip is estimated at 90,000 francs, while that of the Andrée expedition was about double the above amount.

THE PREVENTION OF "COLDS."

Now that the season for "colds," coughs and neuralgic pains is with us, the careful man is on the lookout for such preventive measures as will guard him against the "eager and nipping air" that may prepare the way for a winter's sickness. It is the proper adaptation to his environment that must settle the question of his immunity against the ever threatening weather ailments.

With the changeable climate of our northern latitudes the task is often a difficult one. Thus a sudden drop in temperature is often followed by a veritable epidemic of catarrhal troubles.

The ordinary phenomenon of a "cold" is explained by a rapid cooling of the surface whereby the superficial circulation is temporarily arrested and internal congestions are produced. The primary effect is generally upon the mucous membranes of the nose, throat, and upper air passages. In consequence of this revulsion chilliness, lassitude, headache, sneezing and cough follow in turn, and the patient becomes generally miserable. Then, when it is too late, he doubts his resisting powers against draughts, cold rooms, undue exposure and the like, and is ready to resign himself to the coddling process for the remainder of the winter. Strange as it may appear, it is this misguided carefulness that explains most of the chronic catarrhs of the season.

First on the list of such causative agencies are our overheated and ill-ventilated apartments. Eminent medical authorities maintain that the sudden change from an overwarmed room to the cold air outside has more to do with the production of "colds" than all other supposed agencies combined. The air passages, after having been dried, and, so to speak, baked in our living rooms, are not only peculiarly sensitive to cold, but are in a condition least liable to resist the influences of the change.

The same principle might apply to overheating the body by too much clothing and enfeebling the skin by confined perspiration. The exact contrary condition results from inurement to low temperature and the creation of a habit of natural resistance. The man who is accustomed to bare his throat to the blast never suffers from tonsilitis, and the one who is used to the cold morning plunge never knows a shiver, even in zero weather. The real moral is to face the cold with a bold front, to conquer rather than to shrink from it and be overcome in the end. The hardened man makes his skin an ever-ready adjuster to all variations of temperature. The feebler one can approach such a state of protection and may in the end equal it.

A like principle applies to exercise. With ordinary garments the well individual never suffers from cold while in motion, but the one who sits or lies in a cold room or in a draught from open door or window is sure to become a victim of his indiscretion.

These are simple enough rules in themselves, but few think of applying them to individual needs until reminded of their lost opportunities.

The worst of all is that a "cold" taken in early winter is apt to linger and thus prepare the system for even more distressing ailments. The very lack of vital resistance that invites the first attack of catarrh is apt to intensify the predisposition to subsequent colds. This in a great measure explains the prevalence of pneumonia during the inclement season. The microbe never attacks a healthy membrane, but lies in wait for the local debilitation which furnishes the soil for the seed.

No more forcible argument could be used in favor of preventive measures against the slightest respiratory trouble that may show itself at this time. Nothing lowers the vital resistance against all winter diseases more than the initiative and apparently insignificant "cold."—N. Y. Herald.

SCIENCE NOTES.

An important item in the extension of the work of the Bureau of Chemistry has been the establishment of inspection for imported food products. As a result food products imported to this country have been greatly improved. In former years the United States was regarded as the dumping ground for the refuse teas of the commerce of the world. Many years ago, in order to overcome this evil, a system of inspection of imported teas was established and has since been maintained. Under the beneficent working of this system Americans are now certain of being able to purchase pure and wholesome tea, since it is almost impossible for spurious and adulterated teas to find their way into this country. Congress has now extended this system of inspection to all foods, beverages, and condiments imported into the United States. There is every reason to believe that when this system is thoroughly established an improved condition comparable to that which has taken place in teas may be anticipated.

The bactericidal effect of wall-paints has been studied ately by Dr. Beaufils (see Revue Générale des Sciences) according to the following method: A layer of paint having been spread out on wooden boards or glass plates, a culture of microbes was placed on this layer after being dried, and the plate thus prepared was kept in the laboratory protected against dust. At regular intervals some microbe colonies were removed and spread out on an appropriate medium or used in inoculating animals. An unpainted check-plate served to ascertain the action exerted by the paint on the vitality and virulence of the microbes, this action being shown generally to be distinctly bactericidal while varying according to the nature of the painting. The colors of enameled porcelain are for instance found to be much more active than oil colors, especially in regard to the bacillus of tuberculosis. The fact that these paints exert a constraining action on the latter bacillus would seem to be the most important practical result of these researches.

When chloride of silver is exposed to sunlight it assumes a violet tint and gives off chlorine. A chemical change thus occurs, and the change of color must be attributed to the formation of a new compound. But there seems to be a great difference of opinion as to the nature of this effect. D. Tommasi, in taking up the question, considers that the chloride of silver, under the influence of the rays, undergoes a partial decomposition which is proportional to the surface, the exposure, and strength of the light. A very small quantity of silver chloride is transformed into Ag_2Cl or Ag_4Cl_3 (this chloride has been directly obtained by Von Bibra) which is finally decomposed into silver and chlorine by a long exposure to the sun, so that the violet chloride of silver contains variable quantities of $AgCl$ and the two chlorides mentioned above, and also metallic silver. As there are some differences of opinion as to many of the properties of silver chloride, M. Tommasi undertook the study of these properties, and gives the following results. The white chloride of silver when exposed to the sun in a glass-stoppered flask containing water saturated with chlorine, in a short time acquires a slight violet tint which does not become any darker on a long exposure. Here a state of equilibrium is formed between the action of the light upon the white chloride and the action of the chlorine upon the violet chloride, which has the effect of preventing the light from blackening the white chloride, and the chlorine to bleach the violet chloride. Again, dried white chloride in a sealed glass tube becomes violet when exposed to the sun and becomes white again when the tube is placed in the dark. When the dry violet salt is shaken with chlorine water in the dark, it whitens in a short time. He also finds that when the violet chloride is boiled with nitric acid, it is not bleached. Bromide of silver acts in an analogous manner, but the iodide is not affected by exposure to the sun.