SCIENTIFIC EXPLORATION OF FUTURE SETTLEMENTS.

(The following article is contributed to the Canadian News by Herr Von Klenze, of Munich, Editor of the Ackerbau-Zeiting.)

In unknown countries a geographical exploration mostly precedes the culture pushed forward from its boundaries. This kind of exploration occupies itself with climate, geology, and topography, but leaves the important question of ability for culture untouched. If such a district ought to be settled and cultivated with the greatest possible speed a geographical exploration is not enough; one must be able to give the would-be settlers a certain amount of advice based upon actual experience to ensure them against loss. This experience cannot be collected by practice fast enough, science must be called to help, even if some may smile at this who have not much respect for science, because they do not understand anything about it. It cannot be repeated often enough that there can never be a difference of opinion between practice and science; it only so seems sometimes, but then invariably wrong deductions or inconsideration of circumstances have been used on one side.

An example of the facility and rapidity with which the productiveness of a soil can be determined by science occurred to me last year, and I must write it here. In Upper Bavaria lies a lake fifteen miles long, and, on the average, one broad, whose surface was sunk seven feet deeper in 1869 by digging a canal. The object was to lay dry about 1,000 acres of swampy meadows, and to reclaim over 400 acres heretofore covered by the lake. The whole work had cost £7,400, which is rather a large sum for the peasants who undertook this grand improvement, as these people in Upper Bavaria have very little ready money, and have lived for generations from hand to mouth. Well, the lake was drained, and everybody was expecting astounding results. The new land was tilled and sown, and—nothing grew, not one ear ripened; the drained meadows which had, when wet, given a liberal yield of coarse grass, used for litter, brought nothing at all! The greatest dismay prevailed. Everybody accused the other, the whole—in itself laudable—undertaking got into discredit, and it was a sore subject in the whole district. This state of affairs lasted until spring, 1875, when a friend told me about it, whereupon I resolved to have a look at it. I found that the cultivation of the reclaimed land had entirely ceased, and only some of the meadows received stable manure and well repaid it. The affair began to interest me, and I went on a tour round the lake to settle its geological formation. I found the lake to lie in a bed of minerals (molasse) consisting almost entirely of carbonate of lime. I took samples of the soil in two places where larger tracts of land had been left uncovered by the receding lake, and analyzed them. No. 1, being much the same with No. 2, consisted of

No. 1

Sand	5.59	per cent.
Silicates	4.72	"
Oxide of iron	1.27	"
Carbonate of lime	84.25	"
Carbonate of Magnesia	4.01	"
Alkalies	0.14	"

Here was the solution of the whole mystery: phosphoric acid and kali missing almost entirely, besides only 7.97 per cent. of organic matter, therefore very little nitrogen. Under such circumstances no plant can grow fully or bear seed. This fact, which practice took months to prove, was proved by science in a few days, and then practice had not said why, while science showed clearly that it could not be otherwise; and, last, practice had not told me what I could do to make the soil available for culture, while the analysis showed me the contents of the soil and science knows exactly what the plants want, so it was possible to say: If I can, in a profitable way, bring these missing elements into the soil, then I can expect it to bear crops, otherwise it is worthless; now, with artificial manures this is easy enough: I know the average amount of phosphoric acid, &c., taken by a crop off one acre; I know also what percentage of it is contained in the different artificial manures, so I can tell exactly how much I ought to use to prove these theories. I marked out an experimental field on a piece of this reclaimed land and planted thirty separate squares with six kinds of crops and different kinds of manures, leaving one square of each crop unmanured. The unmanured crops did not yield one grain, the manured were as heavy as ever grown in that district. The results were astounding, and the crops shown at the agricultural exhibition of Munich in October, 1875, earned the general admiration and a prize medal. The Bavarian Government was also so much struck with them that it ordered a continuation of the experiments, which says a good deal—in Bavaria. The meadows, which had been soaked with water before, did not yield, as I have said, any grass after they were laid dry. Science could also have said, beforehand, this must come so, because the grasses which grow with their roots continually in water cannot exist without it, and for better grasses the humic acids in the soil, formed by the decomposition of the roots of the first, is destructive. Therefore the humid acids must be neutralized before cultivation, and this is easily done by carting on these meadows the lime of the reclaimed land. The losses in the years from 1869 to 1874, occasioned by not consulting science, and thereby losing the produce of the reclaimed land and the meadows, may be calculated by any one! I will not further dwell upon this experiment, but I hope it satisfactorily proves that science did in one season what would have been in such cheapness and perfection impossible to obtain by practice alone.

It is the same thing with a district which is to be settled and whose soil and capabilities are not known. Is the poor immigrant to spend his few shillings for this experience necessary for his thriving, or ought the Government to provide for it, as it is of importance to ensure prosperity to a settlement? The answer is, according to our views, not difficult. By an expedition to a newly opened district a scientific man well versed in agricultural chemistry can find whether a settlement there promises the necessary conditions for a thriving future and advise the best way of cultivation, and so found a basis from which the work may be pushed with security.

POWERFUL EXPLOSIVES.

The recent disaster at Bremerhaven, Germany, in which so many persons lost their lives, calls public attention to the great danger attending all explosive preparations in which nitro-glycerine is the active ingredient.

Dynamite, called giant powder (infusorial earth and nitro-glycerine), dualin (sawdust saturated with nitro-glycerine and saltpetre), litho-fracteur (dynamite with coal, soda, saltpetre, and sulphur), vulcan powder (a product similar to litho-fracteur), rend-rock, and many other compounds before the public under various names, which derive their explosive force from nitro-glycerine, are especially dangerous, and should not be allowed to be stored or transported, except under special conditions; for although, when freshly made, they are not so liable to explode by friction or slight concussion as the terrible liquid to which they owe their potency, they are all of them exceedingly sensitive to decomposition, excited by change in temperature which is followed by generation of heat, and is the forerunner of spontaneous combustion.

Professor Draper, in one of his works on popular science, states that Nobel was led to the experiments from which resulted dynamite by the fearful explosions of nitro-glycerine at Aspinwall, San Francisco, Sydney, North Wales, and elsewhere; and he adds that M. Guyot, a French chemist, has shown that the nitro-glycerine may exude from its absorbent, and saturating the paper of the cartridges and boxes, reassume the state in which it is readily exploded by a slight blow.

Nitro-glycerine has a sweet, pungent, aromatic taste, but produces a violent headache if placed upon the tongue or even allowed to touch the skin at any point; thus those working with it or its compounds suffer excruciating pain. It also freezes at a very high temperature (39° to 40° Fah.): and before being used in winter, it has to be thawed out in order to explode it. This operation, on all the compounds alluded to, causes the nitro-glycerine to exude, and if they are not quickly used, decomposition is liable to set in. And if once the absorbent yields up its nitro-glycerine, and the compound becomes moist, it will explode by a slight jar or shock. (See W. N. Hill, "On Certain Explosives.")

At this time, when engineering operations of vast extent are in progress and in contemplation, it is useless to expect that the employment of such materials, dangerous as they are, will ever be discontinued; and it becomes the duty of scientific men to look for some more controllable explosive. Such a preparation is found in pulp-compressed gun cotton, whose density is 62 lbs. per cubic foot, and it is considered six times as strong as gunpowder.

Vast strides have been made in improving this material by Professor Abel, of England, in the last few years; and his patent process enables him, it is stated, to manufacture it with perfect safety, and to transport and explode it in a wet state, and even store it under water without deterioration.

The English War Department recently appointed a special commission, composed of nine well known officers and gentlemen, to enquire into the whole system of manufacturing, storing, and using the different known explosives. In arranging the substances in the order of relative danger, they gave them thus: Nitro-glycerine, gunpowder, dynamite, litho-fracteur, and, lastly, compressed gun cotton. "The investigation," writes a member of this special commission to the London *Times*, in April of this year, "was entered upon with a certain amount of prejudice against gun cotton, arising from the catastrophe which occurred at Stowmarket in the year 1871. A careful enquiry into the circumstances, however, conclusively showed that it was not the result of accident, but that it was caused by the wilful and malicious act of some person, possibly not aware of the grave consequences of this criminal proceeding." "I feel," the writer continues, "that any one will read the able and exhaustive report of Major Majendie, R.A., on this subject, must arrive at this conclusion;" and he further adds that "the improved gun cotton is manufactured by an entirely wet process throughout, the last stage being the formation of disks or short cylinders of various diameters by hydraulic pressure, in which state they contain 18 per cent. of moisture, which is increased by the addition of water to 25 per cent. for the purpose of securing uniformity and a larger margin of safety, and because the gun cotton in this state can still be exploded, but only under special conditions applied by an expert. This fact was not known till some time after the date of the explosion referred to, it then being the practice to dry the disks and to store and transport them in that condition. In that state gun cotton cannot be exploded by any collision, however violent, even by a rifle bullet fired into it; nor even inflamed, unless it is enclosed in strong hermetically sealed cases, so that it might be transported by railway if some simple precautions were taken. In the damp state, as exclusively offered for transport, and without the appliances alluded to above, it cannot even be ignited, much less exploded, either by a spark, by heat, by friction, or by a collision, even if it resulted in the extreme case of the contents of a locomotive fire box being emptied upon a truck full of gun cotton; while, if exploded surreptitiously, it must be the act of a skilled malefactor, provided with the necessary appliances of dry gun cotton, waterproof materials, special detonators, patent fuse, or electrical apparatus, and thoroughly acquainted with the *modus operandi*."

The result of the English investigation caused England, Germany, and France to adopt the use of gun cotton for torpedoes, submarine mining, and in the water shell, the two former governments manufacturing their own, while France has made a large contract with a company (manufacturing under Abel's process in England) to supply it. Walter N. Hill, chemist to the U. S. Torpedo Station, Newport, R. I., in his "Notes on Certain Explosive Agents," in speaking of gun cotton, says: "By the method of Abel, a perfect washing is obtained; and in addition, the material is prepared in a form convenient to use and yet perfectly safe. For blasting, demolitions, torpedoes, etc., the pulp-compressed gun cotton is an admirable agent. Wet compressed gun cotton is the safest of all explosive agents; it is not liable to be fired by a spark or a flame, nor affected by blows, friction, or other rough handling. The transportation of gun cotton presents no special difficulties, since there is no danger of leakage, neither is it sensitive to blows. In England, many of the railroads transport it as readily as other freight."

In selecting an explosive, and considering its advantages and disadvantages, too often the health of the employees is taken least into consideration. The smoke from gunpowder is deleterious in the air of mines, and the headache caused by the fumes of nitro-glycerine, or even by touching it or any of its compounds, must be most injurious to the health. Dr. Angus Smith, F. R. S., in his report to the English Parliament, says, in reference to gun cotton, that, owing to its freedom from smoke: "In every trial in which the effect on the senses, or the breathing, and, as far as we can judge, on health, was considered, gun cotton has come off with the highest character. I feel much confidence in speaking thus highly in its favor."

The value of life and health should be considered by all those who have it more or less intrusted to their power, as in the case of mining operations, where the owners or managers decide upon what explosive shall be used on their works; and in this age of progression and enlightenment, we feel justified in calling attention to Professor Abel's much-needed invention, which has been tested and vouched for by so many high authorities.

ORIGIN OF THE SPICES.—Nutmeg is the kernel of a small, smooth pear-shaped fruit that grows on a tree in Molucca Islands, and other parts of the East. The trees commence bearing in their seventh year, and continue fruitful until they are seventy or eighty years old. Around the nutmeg, or kernel, is a bright brown shell. This shell has a soft scarlet covering, which, when flattened out and dried, is known as mace. The best nutmegs are solid, and emit oil when pricked with a pin. Ginger is the root of a shrub first known in Asia, and now cultivated in the West Indies and Sierra Leone. The stem grows three or four feet high, and dies every year. There are two varieties of ginger, the white and black—caused by taking more or less care in selecting and preparing the roots, which are always dug in winter, when the stems are withered. The white is the best. Cinnamon is the inner bark of a beautiful tree, a native of Ceylon, that grows from twenty to thirty feet in height, and lives to be centuries old. Cloves—native to the Molucca Islands, and so called from resemblance to a nail. The East Indians call them "changkek," from the Chinese "Techengkia," (fragrant nails). They grow on a straight smooth-barked tree about forty feet high. Cloves are not fruits, but blossoms gathered before they are quite unfolded. Allspice—a berry so called because it combines the odor of several spices—grows abundantly on the beautiful allspice or bayberrytree, native of South America and the West Indies. A single tree has been known to produce one hundred and fifty pounds of berries. They are purple when ripe. Black pepper is made by grinding the dried berries of a climbing vine native to the East Indies. White pepper is obtained from the same berries, freed from their husk or rind. Red or cayenne pepper is obtained by grinding the scarlet pod or seed-vessel of a tropical plant that is now cultivated in all parts of the world.

RESUSCITATION.—Midwinter and midsummer are alike favorable to drowning accidents, and in view of the present skating season we print the following very plain directions from the Massachusetts Humane Society: 1. Lose no time. Carry out these directions on the spot. 2. Remove the froth and mucus from the mouth and nostrils. 3. Hold the body, for a few seconds only, with the head hanging down, so that the water may run out of the lungs and windpipe. 4. Loosen all tight articles of clothing about the neck and chest. 5. See that the tongue is pulled forward if it falls back into the throat. By taking hold of it with a handkerchief, it will not slip. 6. If the breathing has ceased, or nearly so, it must be stimulated by pressure of the chest with the hands, in imitation of the natural breathing, forcibly expelling the air from the lungs, and allowing it to re-enter and expand them to the full capacity of the chest. Remember that this is the most important step of all. To do it readily, lay the person on his back, with a cushion, pillow, or some firm substance, under his shoulders; then press with the flat of the hands over the lower part of the breastbone and the upper part of the abdomen, keeping up a regular repetition and relaxation of pressure twenty or thirty times a minute. A pressure of thirty pounds may be applied with safety to a grown person. 7. Rub the limbs with the hands or with dry cloths constantly, to aid the circulation and keep the body warm. 8. As soon as the person can swallow, give some warm coffee or tea. 9. Work deliberately. Do not give up too quickly. Success has rewarded the efforts of hours. —*Christian Union*.

PAPER QUILTS.—Just one word on the use of paper quilts. They obviate the use of too large a weight of blankets and bed-clothes, which in itself often banishes sleep. I do not know whether they are sold anywhere, but they ought to be. They would indeed be a boon to the poor. They ought to be made of any sort of thickish tough paper, and sewn on to a common bed-quilt, or, better still, use them as we did in Greenland. We always sewed them between two blankets, and found them invaluable. "Deed, indeed, your 'anar," said an Irish shipmate of mine, who had been round Spitzbergen way, in the "Perseverance" (of Peterhead), "cowld wasn't any name for it. If it hadn't been for a paper blanket, I believe, sur, I'd have died iviry blissed night av my life."—*Cassells Family Magazine for January*.

INSANITY IN MASSACHUSETTS.—Dr. Walker of the Insane Asylum in South Boston, is not very cheering in his statements about the increase of insanity. He says that, notwithstanding the large additional accommodations which will be afforded by the completion of the new State asylum at Danvers, two years hence, there will be by that time enough patients to fill that, and crowd to their utmost capacity all the other asylums of the State. If this statement is, as we suppose it is, based upon facts, it indicates such a rapid increase of insanity as should alarm the community, especially those who are the leaders, teachers and directors of the people. Our modern pace is terrible, and we need a great revival of religion to moderate it.—*Congregationalist*.

—A case is reported from Chicago of a little girl who was seriously poisoned by wearing colored stockings. It appears by the report of the analytical chemist by whom the stockings were afterward examined that their seal brown color was produced by the use of picric acid, which is poisonous, and soluble in water. It is probable that the poisonous effect was increased by warmth, causing perspiration.