Correspondence.

The Government Surplus.

To the Editor of the Scientific American:

It seems that Congress does not know what to do with the large amount of money now belonging to our government. I suggest the passing of an act to give one million of dollars annually, by lot, to one thousand *inventors*, allowing $1,000 to each inventor, among all those who have received letters patent. There are several thousand inventors, and nothing would be more beneficial to progress and to the advancement of science than such a gift, and it would go to a deserving and needy class of people. The effect of such a gift would soon be apparent, and place the United States far in the lead of all other governments.

F. M. SHIELDS.

Coopwood, Miss., February 12, 1887.

The Aurora Borealis.

To the Editor of the Scientific American:

In your issue of February 26 you describe (Fig. 1) a magnificent example of an aurora borealis which was observed near the coast of Norway on the 18th day of October, 1868. I simply desire to say that this aurora was visible also from the United States, although I have never seen an account of it before. I witnessed it in company with a number of fellow students from the campus of Dickinson College, at Carlisle, Pa. The phenomenon occurred about midnight, and lasted only a few minutes, as indicated in your published description. It was a most sublime spectacle, and to the susceptible imagination of young college students it served the purpose of a moral lesson, for although out on a lark, I believe we all went straightway to bed, not forgetting on this occasion to say our prayers. EDWARD W. BYRN.

Washington, D. C., February 28, 1887.

Prince Rupert's Tears—Observations of a Glass Maker.

To the Editor of the Scientific American:

In a recent issue of your paper mention was made of drops of glass called "Prince Rupert drops," and how, upon being hit upon the small end, the entire piece would fly into small fragments. I have worked in a glass house for several years, and have seen them so large that when broken one would make a large sized handful. I have also seen them in the shape of long threads (this happens more frequently) which would snap upon being bent. By grasping one of these elongated ones near the end and placing the long end against my clothes, and then bending the short end, it would only break as far as the middle of my hand, and in this way I have taken a water cracker, as they are called in the factory, several feet long, and broken it four or five times. You also explained how a flask may be broken by shaking a crystal in it. This explained to me what caused an untempered bottle to burst. Any bottle which has not been tempered, and has a heavy bottom, will burst upon dropping another piece of glass into it, and then shaking it. JAMES WILLIAMS.

Sharpsburg, February 5, 1887.

A Suggestion for Precipitating Rainfall.

To the Editor of the Scientific American:

In the coffee plantations in this district it is very important for us to get our blossoming showers about the end of the month of March. About that time, thunder clouds are abundant, but very frequently they blow away from us, and fall on the dense groups of jungles by which we are surrounded, and are of no value to anybody, when, if they fell on the plantations, they would be of immense importance.

It has occurred to me that if I was to get some large size fire balloons, and send them up into the clouds when they were about, with, say, a pound of dynamite done up in a light package, and attached to the balloon by a string, the explosion might do something toward bringing on the rain. Can you give me any opinion on this subject, and any recommendations as to procedure?

I believe that it is a well established fact that if there are any rain clouds about at all, it always rains after an artillery engagement.

W. MAXWELL MAYNARD.

Hitlow, Koppa, Mysore, India.

[We think the above suggestion worthy of trial. The efficacy of artillery discharges in producing rainfalls has never been satisfactorily determined.]

Sawdust Explosions.

To the Editor of the Scientific American:

Some experiments I made about eight years ago to test this point may be of interest. I placed shingles in a sash and door factory where a sandpaper machine was working. In a very short time they were coated with dust to the depth of an inch. This dust was so wet that, when squeezed in the hand, water would run out. I then carried the shingle to my office, where a bright fire was burning, and used a small hand bellows to blow the dust off the shingle so as to come in direct contact with the flame, and the result was an undoubted explosion, of such a force as sufficed to blow the mica lights out of their places in the stove. The result of the few tests I made demonstrated this fact: that if a *flame* is brought into contact with finely disseminated dust, such as is found in flour mills, sash and door factories, and other works of like nature, an explosion will take place of such violence that no building could withstand it. The factory wherein my experiments were conducted immediately adopted blowers and exhaust fans for the entire removal of all the dust from the building, and this is the only safe way of dealing with this problem. M. J. BUTLER.

Napanee, January 27, 1887.

When Wood Dust Does not Explode.

To the Editor of the Scientific American:

Since a gas explosion in the smoke of smoldering fuel in a boiler furnace occurred recently, demolishing a building and sending flame into a shavings room, and because somebody said that "minute wood dust drew into the ash pit and caused a violent explosion," some folks seem inclined to believe the notion that wood dust is explosive.

The old buildings in Mechanics' Row, in this place, recently torn down, contained a planing mill and several large rooms, which were used in manufacturing doors, sashes, and blinds. Water power drove the machinery. We had no steam boiler and no room for exhausting fans and their pipes, and a more prolific place for the accumulation of wood dust could not be found.

Five very large stoves with openings in their tops did the heating. The rooms being "low posted," when we dumped shavings and sawdust into the stoves, a flame would often flash up, sending a shower of sparks to the floor above, but the wood dust clinging everywhere never took fire. The stoves and their funnels were frequently red hot. We became so accustomed to "this sort of thing" for thirty years, that the thought of exploding the wood dust never occurred to us.

WM. W. HUBBARD.

Manchester, N. H., February 22, 1887.

Taking Cold—a War Experience.

To the Editor of the Scientific American:

Let me relate my experience. I served three years in the 13th Mass. Regt. I was a delicate young man with a consumptive tendency. When our regiment was on its way to the front, our captain singled out, as I subsequently learned, two men (robust, hearty fellows) whom he thought would survive the hardships of war, and two more (I was one of them) who would not do so. As it happened, both the hearty fellows succumbed to the hardships of the service and died—and I live. The fourth man was taken down with chronic diarrhœa, and died on the way home. Naturally enough, sleeping on the damp ground soon brought on a cough. I was sent to the hospital; subsequently returned to the regiment, still sick, and spent the winter with it in close board huts, at Williamsport, Md. I was excused from all duty, except to turn out at the evening dress parade. My officers wanted me to accept a discharge and go home; had I done so, I verily believe I should have died. When the army, in obedience to Lincoln's orders, moved across the Potomac in the early spring of 1862, I was left behind as too weak to "keep up with the procession." A little squad of us feeble ones followed, as best we could, in the wake of the forces, sleeping at night in sheds, under hay stacks, or wherever and however night found us. Singularly enough, with each day of "roughing it" I gathered new strength, and within a week I was able to take my place in the ranks, and from that time forth I *couldn't* take cold, no matter how much I was chilled, or soaked, or frozen. I have often thought of it since, and believe that if one spends *all* his time in the open air, he cannot catch cold; it is alternating in doors and out that makes all the trouble. The second winter we spent half burrowed in the sands of Stafford County, Va., with shelter-tent roofs to our "dugouts." The third winter, at Mitchell's Station, we lived in diminutive log huts with the same kind of roofs. In both cases the ventilation was perfect. I remember entering one day an ordinary house, and the sense of suffocation was so great that I could not stay there. Arctic explorers, I believe, relate the same experience. My advice, therefore, to those consumptively inclined is to go out to the woods and plains, and live "near to nature's heart," if they wish a radical cure. B. SPOONER.

Dorchester, Mass., February 19, 1887.

A New Explosive Mixture.

A. Cavazzi (*Gazzetta Chimica Italiana*), in studying the reduction of potassium nitrate by various substances, has found that a mixture of equal parts of the nitrate and sodium hypophosphite detonates violently when heated to about the fusing point of the mixture. The experiment should be made on small quantities only, and while other proportions yield an explosive mixture, those mentioned are the best.

How Pure Butter and Cheese are Sophisticated.

The report of Prof. H. A. Weber to the Ohio Dairy and Food Commission, which has just been made, strikes hard at the boasted purity of so-called natural butter, and shows to what an alarming extent adulteration, simulation, and extension are caused by the butter, cheese, and milk producers.

Prof. Weber says almost every article of food that is offered for sale is adulterated, and very often in a manner that is injurious to health. Butter is adulterated with too much water and salt. The coloring matter that is generally used consists of annatto, a harmless coloring substance, also turmeric, saffron, marigold, and carrots. Of the mineral coloring matter said to have been found in butter may be mentioned chrosin yellow, a compound of lead and yellow coal tar colors, Victoria yellow, and Mastin's yellow. The detection of these coloring substances requires the best chemical skill.

Of cheese, the Professor states that it may be adulterated by the use of normal coloring matter, as red lead and Venetian red; the addition of sandy matters, as potatoes and bean meal; the substitution of foreign fats, as oleo and lard, in place of butter fat, removed by skimming the milk. The following analyses are given by him as illustrating this point. The first analysis of pure cream cheese manufactured by B. B. Herrick, Wellington, Ohio, in 100 parts:

Water	35·42
Ash	2·47
Fat	34·66
Caseine, sugar, etc	30·45
	103 00

Analysis of skim milk cheese, known as Chicago Firsts, in 100 parts:

Water	52·73
Ash	2·69
Fat	2·63
Caseine, sugar, etc	41·95
	100·00

The most common adulteration of milk is water. In order to hide the effect of the water, other substances, such as molasses, sugar, and salt, to correct the taste; and chalk, starch, cerebral matter, annatto, turmeric, gum dextrine, etc., to correct the appearance.

Metric Table.

The *Popular Science News* gives a table of the equivalents of both the common and metric systems together, as follows:

Length.

Unit of measurement.	Approximate equivalent.	Accurate equivalent.
1 inch	2½ cubic centimeters	2·539
1 centimeter ($\frac{1}{100}$ meter)	0·4 inch	0·393
1 yard	1 meter	0·914
1 meter (39·37 inches)	1 yard	1·093
1 foot	30 centimeters	30·479
1 kilometer (1,000 meters)	⅝ mile	0·621
1 mile	1½ kilometers	1·609

Weight.

1 gramme	15½ grains	15·432
1 grain	0·064 gramme	0·064
1 kilogramme (1.000 grms.)	2¼ pounds avoirdupois	2·204
1 pound avoirdupois	½ kilogramme	0·453
1 ounce avoirdupois (437½ grains)	28⅛ grammes	28·349
1 ounce troy or apothecary (480 grains)	31 grammes	31·103

Bulk.

1 cubic centimeter	0·06 cubic inch	0·061
1 cubic inch	16⅓ cubic centimeters	16·386
1 liter (1,000 cubic centimeters)	1 U. S. standard quart	0·946
1 United States quart	1 liter	1·057
1 fluid ounce	29½ cubic centimeters	29·570

Surface.

1 hectare (10,000 sq. meters)	2½ acres	2·471
1 acre	⅖ hectare	0·404

Soda Stoves for Heating Cars.

A good idea reaches us from a correspondent. The fireless soda locomotive of Honigman, described in our SUPPLEMENT, No. 483, has suggested to him the application of the same device to heating cars. The soda engine is based on the affinity of caustic soda for water. By arranging a reservoir of very strong soda solution so as to receive the exhaust of an engine, a source of heat is at once supplied, dependent on the chemical reaction, if it can be called such, between soda and water. As the steam meets the solution, it increases its temperature to an exceedingly high degree. In the Honigman engine, this reservoir of soda solution represents the furnace of an ordinary boiler, and is surrounded with a boiler in which steam is generated. Were soda stoves constructed for use on railroads, some of the exhaust steam would be required to keep up the heat. A small quantity injected into the stove would be ample. The stove might be provided with hot water circulating apparatus with steam radiating pipes, or might even be used as a heater directly. The soda solution would have to be boiled down to a proper strength at intervals. It seems as if there were a good chance for invention in this direction. It would meet the objection made to using steam, of the insufficiency of the available supply for long trains.