Correspondence.

The Pure Food Question Again.

To the Editor of the SCIENTIFIC AMERICAN:

I note in your esteemed issue of September 1 that you published an article from the prolific pen of the Chief of the Bureau of Chemistry, Department of Agriculture, criticising my communication published in your valuable issue of August 18.

Irrespective of the chief chemist's remarks, the law will compel the true labeling of all food products. Any manufacturer or packer of food stuff certainly labels his products. The label must be correct or the article will be deemed adulterated.

The law says in the case of food that it will be deemed adulterated:

First: "If it be an imitation of or offered for sale under the distinctive name of another article."

Second: "If it be labeled or branded so as to deceive or mislead the purchasers or purport to be a foreign product when not so or if the contents of the package as originally put up shall have been removed in whole or in part and other contents shall have been placed in such packages, or if it fail to bear a statement on the label of the quantity or proportion of any morphine, opium, cocaine, heroin, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate, or acetanilide, or any derivative or preparation of any such substances contained therein."

Third: "If in package form, and the contents are stated in terms of weight or measure, they are not plainly and correctly stated on the outside of the package."

Fourth: "If the package containing it or its label shall bear any statement, design, or device regarding the ingredients or the substances contained therein, which statement, design, or device shall be false or misleading in any particular."

I will not weary your readers with any more quotations from the law, as I am confident they will at once recognize the fact that the law does compel the true labeling of all articles of food. I will also say for the further authentic information of your numerous readers, that while the federal law does not mention borax or boric acid, it will allow the outward application of a non-penetrating preservative.

Boron compounds are of a non-penetrating nature and they are the preservatives recognized as the only ones that are allowed. The chief chemist is well aware of the fact. He says my communication was written "to induce the people to think that borax and boric acid are permitted preservatives, but this is not the case, as is shown by the recent regulation for the enforcement of the meat inspection act, in which all preservatives, with the exception of sugar, salt, spices, vinegar, wood smoke and, pending further investigations, saltpeter, are prohibited." The forgetful chief neglected to add to the above "unless specifically provided for by a federal statute."

The chief chemist then says, referring to boron preservatives: "If used at all, can only be used at the time of packing, only externally, and only when necessarily removed, and only when directions for such removal accompany each package." Another instance where the law will compel a label.

The chief chemist quotes some comparatively unknown Baltimore doctors who have freely quoted the chief, who without doubt supplied them with the matter which the chief quotes as follows:

"Borax and boric acid as preservatives are the subject of numerous conflicting opinions. It is possible that some of the favorable opinions have been issued by those who draw their salaries and their opinions from the same source. While it is stated by many that the use of these chemicals is not injurious, there are instances on record when they have caused severe symptoms and even death."

The completion of the article the chief overlooked, which is as follows: "Boracic acid and borax may, however, find their proper use in preserving meats such as hams for exporting purposes. Meat sprinkled with boric acid does not become slimy as it does without it."

The Baltimore doctors do not cite the cases where death occurred from borax. I am inclined to think they are unable to prove their statements, as I have made an exhaustive study of boron food preservatives and I do not know of an authentic case where a person has been injured, much less killed, by partaking of foods preserved with borax or boric acid.

Why did not the chief quote such world-renowned professors as F. W. Tunnicliffe and Dr. Otto Rosenheim, of London, who experimented with boron compounds on children? Their observations were made on three children, two boys aged two and one-half years and five years, and a girl aged four years, who was delicate, being convalescent from pneumonia. The result of their experiments on the children was that neither boric acid nor borax in any way affected the general health and well-being of the children.

The experiments made by the chief chemist also resulted in favor of boron preservatives. It is a well-known fact that the government employes who tendered their stomachs for Uncle Sam to determine the effects of borax and boric acid on the human system were, when the test was completed, in better physical condition than when they entered the contest seven months before; consequently, the fact is, that boron preservatives were not injurious to the boys or the invalid girl or to the members of the so-called "poison squad" or to the English nation who have consumed boraxed foods for decades. Consequently, these mild, innocent preservatives should not be condemned.

The above are facts that cannot be disputed, and as I well know the SCIENTIFIC AMERICAN desires scientific facts, I take pleasure in forwarding this communication to you. H. H. LANGDON.

New York, September 11, 1906.

The Causes of Gun Erosion.

To the Editor of the SCIENTIFIC AMERICAN:

I have read with interest your editorial on "Gun Erosion" in the September 15 issue of your valuable paper. While I admit the correctness of a large part of your article, I do not believe that you have stated the entire case in regard to erosion. My reasons are as follows:

If the erosion of the bore of a rifle were due solely, or even principally, to the rush of gases past an imperfectly-fitting projectile, the destruction would be practically uniform along the entire length of the bore. If, however, the erosion is due to the action of the highly-heated and chemically-active gas confined behind the projectile, the erosion will become progressively less as the muzzle of the gun is approached, the reason being, of course, that the breech end of the bore is subject to the action of these gases for a comparatively longer period. As a matter of fact, the latter is the case, so we may conclude with certainty that a larger part of the erosion is due to this cause.

That these gases should produce serious erosion is entirely reasonable. Being under extremely high pressure, they are probably more active chemically than they would be otherwise, and have a solvent action upon any oxidizable metal, just as steam at high temperatures dissolves certain qualities of glass which are unattacked at ordinary pressures. On account of the very great temperature of explosion, several thousand degrees, the inner surface of the gun must be raised almost to a melting heat. The gases within the gun during an explosion are not by any means quiescent, but are probably circulating in currents of enormous velocity, due to the contraction of the bore immediately forward of the powder chamber. These powerful currents of intensely-heated and corrosive gases, playing upon the heated and softened steel of the gun, can have no other effect but to produce serious erosion.

On the other hand, the effect of the rush of gas by the projectile cannot produce as serious results. Since the gases can only pass the projectile in very thin streams, they must be comparatively cool. Not only so, but they encounter only the cool surface of the gun tube, since the heat has not had a chance to act on that part of the bore occupied by, or ahead of, the projectile. The gases escaping past the projectile can only act at any given point in the bore while the projectile is passing that point. The gases confined behind the projectile act at any point in the bore for the whole time occupied by the projectile in passing up the remainder of the bore, an interval on the average at least ten times as long. For these several reasons, we may conclude that the major part of the erosion is due to the action of the gas confined behind the projectile.

While it is true that the remedy proposed in the editorial will eliminate that part of the erosion due to the rush of gas by the projectile, it is also true that the experiment has been tried in practically every country with unsatisfactory results. It is easily possible to construct a device which will practically prevent any gases from escaping past the shot as it rushes up the bore. But although the erosion is reduced, the most of it still remains. We must seek elsewhere for the cure of the difficulty.

One way out of the difficulty would be to dispense with the rifling, making the gun smooth-bored, and adopt some other method of giving the requisite rotary motion to the projectile, as was done in the case of the pneumatic dynamite gun developed by Zalinsky. The smooth bore would be less subject to erosion, and the effects would be less serious on the accuracy of fire. Another method that might be successful would be the reduction in temperature of the gases by the use of some inert volatile solid in connection with the powder, such as ammonium carbonate. A larger weight of charge would thus be required to produce the same volume and pressure of gas, but the lower temperature would make the gas less erosive.

The writer is of the opinion, however, that the best solution of the difficulty lies in the use of high-speed steel for the material of inner tubes. Since the gas developed by modern powders is oxidizing in its tendency, high-speed steel would be especially valuable in this case, in that it is almost impossible to burn it. Since high-speed steel maintains its strength and hardness at a dull red heat, it is especially adapted to the service demanded of the inner tubes of guns. Since it is able to withstand the tremendous wear involved in cutting operations, at such speeds that both tool and chip approach the temperatures of the inner wall of a gun, it would seem to follow that it is the proper material to withstand the wear of the rushing gases and projectile. So far as the writer is aware, nothing has been done along this line, and it would seem to be the part of wisdom for the government to try the experiment upon a gun of small caliber.

There are objections to the use of this steel for this purpose, such as high cost of material and of working. However, if its use would double the life of the gun, it would be a profitable investment. Add to this the fact that the use of this steel offers an opportunity to very largely increase the power of the gun, and we must conclude that even with the same life of gun, the proposed weapon would be far the cheaper, considering its power.

FORREST E. CARDULLO.

Syracuse, N. Y., September 14, 1906.

Restoration of Color of Hair After Treatment With Roentgen Rays.

Dr. Imbert, professor in the medical faculty at Montpellier, and Dr. Marquès, his head laboratory assistant, have been busying themselves daily with medical applications of X-rays. They were tolerably surprised to find that the beard and hair (which were almost white) of one of them were progressively becoming colored, to the point even of shortly assuming a hue deeper than the original one. On the other hand, in the case of a man of fifty-five whom the two professors treated with X-rays for a lupus affecting the left cheek, the hair turned strongly gray. During the first months of treatment they had refrained from limiting by a screen the surface to be irradiated. The hair for several centimeters around the left ear, fell; of the hairs of the mustache, further withdrawn from the blister, no appreciable irradiation was noticed. The hair grew almost black again near the ear, its color plainly weakening in proportion to the distance from it. Likewise the left half of the mustache had assumed a hue less white than the right half. The hair has not been subjected to the X-rays for several months, and it is frequently cut; but it remains black. Other observations authorize Messrs. Imbert and Marquès to declare that under the influence of X-rays, light hair assumes a deeper shade. This last attribute will no doubt be little utilized by young women; but the new process which permits of no longer growing gray in growing old will be highly appreciated by both sexes, if new investigations establish definitely its usefulness and harmlessness. However, physicians alone will have the right to dye hair in this manner; for a recent decision of the Académie de Médecine has reincluded the use of X-rays in the category of medical practices forbidden to the vulgar. Still, everyone will reserve the right of "coloring" himself; but extreme prudence is requisite in the matter.—L'Illustration.

The Current Supplement.

The current SUPPLEMENT, No. 1604, contains an unusual amount of valuable matter. It opens with a well-illustrated and excellently written description of the gigantic irrigation project which has been undertaken by the Canadian Pacific Railway, and which will involve the expenditure of $4,000,000. Elihu Thomson presents his views on the nature and origin of volcanic heat. Prof. J. A. Ewing writes on the structure of metals. The splendid treatise on the modern manufacture of alcohol which was begun in the last number is continued. In this installment the subjects taken up are the preparation of the must from various agricultural products, and the fermentation of the wort. The article on large electrical and steam locomotives is concluded. Robert Grimshaw writes on the industrial applications of gypsum. The English correspondent of the SCIENTIFIC AMERICAN describes a depth indicator for torpedo boats. Edwin J. Prindle's excellent analysis of the art of invention is concluded. Joseph Eysséric gives the results of his experiments with wind shields, and tells how he successfully used one type of wind shield on an automobile.

During the twelve months ending June 30, 1906, the value of American automobiles exported was $3,497,016, which is a million dollars more than during the previous year. Of a little more than half a million dollars' worth of cars that were exported during June, England took the greatest proportion, $194,709, with British North America second, Mexico third, and France fourth.