Correspondence.

St. Joseph, Missouri.

To the Editor of the Scientific American:

In your list of cities (see SCIENTIFIC AMERICAN of June 13) that are the centers of large populations within a square of fifty miles around them one city was omitted, which must rank next to, if it does not exceed, Pittsburg, and that is St. Joseph, Missouri. Within fifty miles of her is Kansas City, Mo., and Kansas City, Kansas, and this brings the number considerably over six hundred thousand. South of Kansas City the country is not so populous as that around St. Joseph. Large as is this population around St. Joseph, no part of the country is increasing more rapidly.

Oregon, Mo., June 23, 1891. CLARKE IRVINE.

Bursting of an Emery Wheel.

To the Editor of the Scientific American:

There occurred a singular and fatal accident near here recently, in which a prominent and worthy farmer lost his life instantly. Mr. George B. Albertson, of Cook's Valley, was engaged in grinding sickle guards by steam power on an emery stone 12 inches in diameter and 1 inch thick, when the stone burst and a piece in shape like a quadrant, 6 inch radius, buried itself in his head, going down into his neck as far as the collar bone, killing him instantly. It took the combined strength of two men to remove the piece, as it was firmly bedded in his head and neck, nearly out of sight. After the accident the speed at which the stone was running was measured, and it was found to be over 8,000 revolutions per minute. H. B. J.

Wabasha, Minn., June 16, 1891.

An Effective Wash for Orange Scale.

To the Editor of the Scientific American:

I see in your paper of June 20 last an article headed "Condensed Information Concerning the Most Valuable Insecticides," from a circular issued by the United States Agricultural Department. The wash there given for San Jose scale (*Aspidiotus perniciosus*) has long since been abandoned here as not only comparatively worthless, but harmful to the tree, and for fear it might mislead some one I write you.

The horticultural board of this county (Tulare, Cal.) has brought out a wash which is now being used all over the State, and the formula is the following:

Sulphur	20 pounds.
Lime	10 "

Boil for two or three hours in 20 gallons of water until the lime and sulphur have thoroughly united, then add lime enough to make a thin white wash, adding water enough to make 60 gallons. Apply with spray pump warm, and all the scale will be killed and the tree will be invigorated. N. W. MOTHERAL,

Horticultural Commissioner.

Hanford, Cal., June 25, 1891.

A Pest of Snails.

To the Editor of the Scientific American:

I desire information that will aid me in exterminating a species of mammoth snail from my premises. We have been afflicted with them about four years, in a little yard back of our dwelling, 40 × 60 feet, used for cultivating quite a variety of roses and other flowering plants, and have two thrifty grapevines trellised against the back walls.

These snails are found measuring from three to nearly six inches in length and half an inch in diameter. Their slimy iridescent tracks are numerous. Their peregrinations are nocturnal. When I commenced to hunt them in the evening with a lamp, I used to secure sometimes one hundred at a time. I diligently hunted them almost every night during the summers, with hopes of tiring them out. But as time is beginning to tire me out, and the snails hold their own with disgusting pertinacity, I no more waste steps.

Early in the spring they manifest their presence. Our grounds are kept clean and there are no damp or mouldy accumulations on our premises, but adjoining us, over the fence, are rank weeds and, I presume, some careless deposits of rubbish.

What I would particularly desire to know is a method of exterminating the pests—some alkali or astringent that could poison or destroy them on or in the ground. Suggestions and experiments have been utilized to the limit of knowledge, with no relief. If the SCIENTIFIC AMERICAN can offer any device to rid us of this affliction, we will bless it. GEORGE C. ALLIS.

Birmingham, Conn., June 27, 1891.

Reply by Professor C. V. Riley.—The slugs referred to by your correspondent are, from the description, without much question, *Limax flavus*, a well-known pest in European gardens. At least this is the determination given me by Professor William H. Dall, our highest authority on these creatures, for a species which has, during the past three years, been repeatedly sent to me with accounts of its abundance and injuries. They abound most in sheltered, shady, moist situations, and their numbers are easily reduced in our hot summers by avoiding all plank walks and by keeping from the garden all decaying wood or other moist and shade-giving material. Dry, powdery substances, especially those which are pungent, like wood ashes, salt, lime, etc., are antipathetic to and tend to destroy them. Of these different substances lime is the best, because the others are frequently exuviated with the skin. I am not aware just when this species was introduced from Europe, but it has been more than ordinarily common on the Atlantic coast of late years, largely, I think, because of our unusually wet seasons.

Detecting Forgeries on Paper.

Recently before the Belgian Academy of Medicine, Prof. G. Bruylants gave an account of the researches which, in co-operation with Prof. Leon Gody, he had instituted with the view of illustrating how frauds and alterations practiced on business papers can be detected. He said:

Although my experiments were not carried on under the most favorable circumstances, their results were satisfactory. A piece of paper was handed to me for the purpose of determining if part of it had been unequally and greatly wet, and if another part of it had been manipulated for the purpose of erasing marks upon it; in other words, whether this part had been rubbed. The sample I had to work upon had already gone through several experiments. I had remarked that the tint of paper exposed to the vapor of iodine differs from that which this same paper assumes when it has been wet first and dried afterward. In addition to this I realized that when sized and calendered paper, first partially wet and then dried, is subjected to the action of iodine vapor, the parts which had been wet take on a violet tint, while those which had not been moistened became either discolored or brown. The intensity of the coloration naturally varied according to the length of time for which the paper was exposed to the iodine.

There is a very striking difference also when water is sprinkled over the paper, and the drops are left to dry off by themselves in order not to alter the surface of the paper, complete desiccation being produced at a temperature of 212°.

Thorough wetting of the paper will cause the sprinkled parts to turn a heavy violet blue color when exposed to the vapor, while the parts which were untouched by the water will become blue.

If, after sprinkling upon a piece of paper and evaporating the drops thereon, this piece of paper is first thoroughly wet, then dried and subjected to the action of iodine, the traces of the first drops will remain distinguishable whether the paper is dry or wet. In the latter case the traces of the first sprinkling will hardly be distinguishable so long as the moisture is not entirely got rid of, but as soon as complete dryness is effected their outlines, although very faint, will show plainly on the darker ground surrounding the space covered by the first drops.

In this reaction water plays virtually the part of a sympathetic fluid, and tracing the characters with water on sized and calendered paper, the writing will show perfectly plain when the paper is dried and exposed to the action of iodine vapor. The brownish violet shade on a yellowish ground will evolve to a dark blue on a light blue ground after wetting. These characters disappear immediately under the action of sulphurous acid, but will reappear after the first decoloration, provided the paper has not been wet and the decoloration has been effected by the action of sulphurous acid gas.

This process, therefore, affords means for tracing characters which become legible and can be caused to disappear, but at will to reappear again, or which can be used for one time only and be canceled forever afterward.

The usual method of verifying whether paper has been rubbed is to examine it as to its transparency. If the erasure has been so great as to remove a considerable portion of the paper, the erased surface is of greater translucency; but if the erasure has been effected with care, examination close to a light will disclose it, the erased part being duller than the surrounding surface, because of the partial upheaval of the fibers.

If an erasure is effected by means of bread crumbs instead of India rubber, and care is taken to erase in one direction, the change escapes notice, and it is generally impossible to detect it, should the paper thus handled be written upon again.

Iodine vapors, however, show all traces of these manipulations very plainly, giving their location with perfect certainty. The erased surfaces assume a yellow brown or brownish tint. If, after being subjected to the action of the iodine, the paper on which an erasure has been made is wet, it becomes of a blue color, the intensity of which is commensurate with the length of time to which it has been under the action of the iodine, and when the paper is again dried the erased portions are more or less darker than the remainder of the sheet. On the other hand, when the erasure has been so rough as to take off an important part of the material, exposure to iodine, wetting and drying result in less intensity of coloration on the parts erased, because the erasing, in its mechanical action of carrying off parts of the paper removes also parts of the substances—fecula sizing—which in combination with iodine give birth to the blue tint. Consequently the action of the iodine differs according to the extent of the erasure.

When paper is partially erased and wet, as when letters are copied, the same result, although not so striking, follows upon exposing it to the iodine vapor after letting it dry thoroughly.

Iodine affords in certain cases the means of detecting the nature of the substances used for erasing. Bread crumbs or India rubber leave yellow or brownish yellow tints after iodination, and these are distinguished by striæ or more intense coloration, erasure by means of bread crumbs causing the paper to take a violet shade of great uniformity. These peculiarities are due to the upheaval of the fibers, caused by rubbing. In fact, this upheaval creates a larger absorbing surface, and consequently a larger proportion of iodine can cover the rubbed parts than it would if there had been no friction. When paper upon which writing has been traced with a glass rod, the tip of which is perfectly round and smooth, is exposed to iodine vapor, the characters appear brown on yellow ground, which wetting turns to blue. This change also occurs when the paper written upon has been run through a supercalender. If the paper is not wet, these characters can be made to appear or be blotted out by the successive action of sulphurous acid and iodine vapor.

Writing done by means of glass tips will show very little, especially when traced between the lines written in ink. The reaction, however, is of such sensitiveness that where characters have been traced on a piece of paper under others they appear very plainly, although physical examination would fail to reveal their existence, but a somewhat lengthy exposure to iodine vapors will suffice to show them.

If the wrong side of the paper is exposed to the iodine vapor, the characters are visible, but of course in their inverted position.

If the erasure has been so great as to take off a part of the substance of the paper, the reconstruction of the writing, so as to make it legible, may be regarded as impossible: but even in this case subjecting the reverse side of the paper to the influence of the iodine will bring out the reverse outlines of the blotted-out characters so plainly that they can be read, especially if the paper is placed before a mirror. In some instances, when pencil writing has been strong enough, its traces can be reproduced in a letter press by wetting a sheet of sized and calendered paper in the usual way that press copies are taken, placing it on paper saturated with iodine to be reproduced, and putting the two sheets in a letter book under the press, copies being run off as usual in copying letters. The operation, however, must be very rapidly carried out to be successful. As a matter of fact, the certainty of these reactions depends entirely upon the class of paper used. Paper lightly sized or poorly calendered will not show them, while manipulations of which I think description would be rather superfluous here can interfere very materially with the results mentioned above.

Another point consists in knowing how long paper will retain these reactive properties. In my own experiments the fact has been demonstrated that irregular wetting and rubbing three months old can be plainly shown, as after this lapse of time characters traced with glass rod tips could be made conspicuous. I have noticed that immersing the written paper in a water bath for three to six hours will secure better reactions, but although these reactions are very characteristic, they are considerably weaker.

Antidote for Snake Bites.

An interesting illustration of the antagonistic action of poisons is mentioned in the current number of the *Pharmaceutical Journal*. Dr. Mueller, of Yackandandah, Victoria, has written a letter in which he states, says our contemporary, that in cases of snake bite he is using a solution of nitrate of strychnine in 240 parts of water mixed with a little glycerine. Twenty minims of this solution are injected in the usual manner of a hypodermic injection, and the frequency of repetition depends upon the symptoms being more or less threatening, say from 10 to 20 minutes. When all symptoms have disappeared, the first independent action of the strychnine is shown by slight muscular spasms, and then the injections must be discontinued unless after a time the snake poison reasserts itself. The quantity of strychnine required in some cases has amounted to a grain or more within a few hours. Both poisons are thoroughly antagonistic, and no hesitation need be felt in pushing the use of the drug to quantities that would be fatal in the absence of snake poison. Out of about 100 cases treated by this method, some of them at the point of death, there has been but one failure, and that arose from the injections being discontinued after 1¼ grains of strychnine had been injected. Any part of the body will do for the injections, but Dr. Mueller is in the habit of making them in the neighborhood of the bitten part or directly upon it.