Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Curious and Incongruous Attachment.

Messrs. Editors:—I am reminded by your article of last week, entitled "Curious Associations among Animals," of an incident in my boyhood's experience more remarkable and more inexplicable than anything I have ever heard or read, which, if you think it worth the while, you may give to your readers.

My boy brothers and myself were one day roaming over the fields with a little dog—our inseparable companion in such rambles—and amusing ourselves by turning over logs, flat stones, etc., to give the dog a chance at the field-mice or meadow moles, as we called them, so frequently to be found in moist meadows and pastures.

Boys and dog were having rare sport "bagging" lots of game, when on turning over a log, we found one of those round, soft, skillfully constructed nests, with which every country boy is familiar, and, upon tearing it open, discovered five little bare, helpless mice, not yet able to crawl. We concluded to take nest and mice to the house, the nest as a curiosity, and the mice as a feast for our favorite cat. Upon placing the little creatures on the floor before her, expecting to see them consecutively gobbled with all that gusto which cats from time immemorial have manifested for that species of delicacy—imagine our astonishment at the result. Instead of devouring them, pussy, with that peculiar caressing purring usually heard only from the feline mother when calling their young, commenced licking and petting the little things, lay down on her side, and pushed them up to her body with her paws exactly after the manner of cats with their very young kittens. The whole family were called to witness the strange performance.

We had read in our juvenile treatises on natural history of the curious freaks of cats which had lost their kittens, and should not have been so much surprised if our cat had been subjected to any such bereavement, but our cat *had never had any kittens,* and became a mother for the first time ten days or a fortnight after the occurrence in question. After watching them for a time, we were told to take them away, and carried them to the barn a short distance from the house, the cat following, and calling as to kittens. The infantile mice being deposited in the barn, the cat continued to caress, and as far as she could to care for them. After a little time we left them, and returned to the house to dinner. Pussy availed herself of the opportunities thus offered to bring *every one* of her newly adopted proteges into the house again and to place them on a bed to which she had access, where they were found about an hour afterward.

The performance was becoming something of a nuisance, to get rid of which, as well as to save the little creatures from a lingering death, we destroyed them. I do not recollect that the cat manifested any particular regret, or that her subsequent conduct was at all peculiar, and as I have said, a few days after she had a family of her own.

Let those who attribute all the acts of animals to "unerring instinct," account for these facts. I give them as they occurred, and give you my word that they are exactly as stated.

Albany, N. Y. C. A.

The Currant Worm.

Messrs. Editors:—On page 297, of the Scientific American, copied from an exchange, is a description of the currant worm and its habits, which contains three errors: "The miller that deposits the eggs" is not a miller at all, but a small yellow fly with brown wings, about as large as the common house fly, but slimmer and more active. The flies deposit their eggs the last of April or first part of May, the worms appearing usually by the middle of May. This year they were first seen May 7th. When the worms attain to their full size they go under ground and turn to flies again and lay their eggs sometime in June. Last year a *third* brood of worms appeared about the 1st of September, which continued upon the bushes till every leaf was destroyed. The last brood of worms after reaching maturity, go under ground where they remain till the following April.

The "miller" of which your correspondent speaks is the parent of the loop or measuring worm, its body being about an inch in length, yellow, and covered with black dots. This worm also preys upon the currant leaf, but is *comparatively* harmless.

My method of fighting these plagues is as follows: I hold a tin pan underneath the bushes, and gently rap the branches with a paddle, the worms fall into the pan and are then easily destroyed. This I do once a week, or oftener if they be numerous. In this way I save my bushes, keep the worms in check, and have all the currants I want. J. H. P.

Wear of Driving Wheels on Locomotives.

Messrs. Editors:—A correspondent asks "Why the forward wheels of locomotives wear more than the hind ones?" In answer I would say that it is lateral slip, produced mostly in passing curves. The forward wheels only, partake of lateral slip, and having this extra motion must, as a natural consequence have more wear.

St. Louis, Mo. Geo. Shone.

The Australian preserved meat imported into England has it is asserted, hitherto proved an unsuccessful experiment, as people will not touch the strange food, preferring to go without meat altogether rather than to taste an untried dish. The importation of live cattle from Brazil has, therefore, been attempted, and the River Platte Company has recently sent 500 oxen, which arrived in good order at Falmouth.

[For the Scientific American.]

On Ruthenium.

By Professor Charles A. Joy.

Gottfried William Osann, born at Weimar, in 1797, Professor of Chemistry at the University of Dorpat from 1823 to 1828, and afterwards, until the time of his death a few years since, Professor at Wurtzburg, while examining some platinum ores from Siberia, found in them what he considered traces of three new metals. One of them because it was discovered in platinum from Urai, he named from the first letters of those words—pluranium; the second, from its gray color, was called after the Greek, polinium; and the third, as it was the first metal discovered in ores from Russia, was called after the ancient name of that empire, *Ruthenia,* ruthenium.

Professor Osann never succeeded in fairly isolating and describing these metals, and all these names would have been dropped and forgotten if it had not been for the labors, in 1845, of a native Russian chemist, Professor Claus, who was more successful in his efforts, and really found a new metal in the platinum ores, differing from anything described by Osann, but which, out of compliment to that *savant,* and in honor of his country, he called ruthenium.

According to Claus, the original ruthenium was composed of zirconia, with oxide of iron, silicic and titanic acids, and was consequently nothing new. As for polinium and pluranium, it is not probable that we shall ever hear of them again.

Professor Claus found ruthenium in the residues after treating ores of platinum with acids. It occurs in the fine black scales called "iridosmine," now so extensively used for pointing gold pens, and is so rare that if it were ever to be required in considerable quantity in the arts it would be difficult to supply the demand.

The platium ores of Russia, America, and Borneo, contain it, and recently an interesting mineral has been found at the latter locality, which Woehler shows to be a sulphur compound of osmium and ruthenium, and to which, out of compliment to an old friend, he has given the name of *laurite.* Previous to the discovery of this mineral it was not supposed that sulphur would ever be found associated with the metals of the platinum group.

It is not necessary to recapitulate all of the steps taken by Claus to isolate ruthenium, as that would lead us into a scientific labyrinth of no practical value, but it is quite worth while to give an account of the method pursued by Deville for obtaining it, as it has qualities that adapt it to interesting uses, and many persons may desire to make it. The material to be employed is iridosmine, which is a refuse article from the gold-pen manufactory, and also from the assay office. At one time it was to be had in considerable quantity, but of late years, partly owing to a different way of working gold ores and partly to the absence of the scales in gold and platinum from new localities, we have less of it than formerly. Since the discovery of a method for the employment of iridium in alloys with platinum, the iridosmine has become more valuable, and more efforts are made to discover and save it.

The iridosmine is fused with four or five times its weight of zinc in a carbon crucible, and the heat is then raised sufficiently to volatilize all of the zinc.

This leaves a porous, easily pulverized mass, which is again fused with 3 parts of peroxide of barium, and 1 part of saltpeter, and the resulting powder must be treated with hydrochloric acid, and afterwards with nitric and sulphuric acids, we then convert the ruthenium into oxide and fuse it by means of the oxyhydrogen blow pipe in a lime crucible.

We have omitted certain details of the operation, but have given enough to show that it is no easy matter to obtain the metal. Ruthenium is, after osmium, the most difficult to fuse of all the metals; it is only possible to melt small quantities in the hottest point of the oxyhydrogen flame at a temperature that would convert gold and platinum into vapor.

The specific gravity of the metal thus prepared is 11·4. It can be alloyed with other metals, such as zinc and tin, but does not, as an alloy, present any peculiar features or uses. There is a property of spongy ruthenium that is worthy of note, and is not generally known. It was discovered by Professor Schoenbein, and used to be exhibited by him as a capital class experiment. He found that when cholorine gas was conducted into water and spongy ruthenium added, the metal acted in a manner analogous to sunlight, and decomposed the water into free oxygen and hydrochloric acid.

The metal was not itself in the least changed, so that the same piece would decompose an indefinite amount of chlorine water. Schoenbein was of the opinion that by passing chlorine gas continuously through water in which ruthenium was placed, a stream of oxygen gas would continue to come off as long as any water was left to be decomposed.

This curious reaction suggests other possible uses of the metal as a substitute for platinum in the manufacture of vinegars, and also to bring about many chemical changes where simple contact is sufficient. It is a subject that needs investigation and may lead to the discovery of important uses for ruthenium.

Since 1845, Claus has continued his investigations into the properties of ruthenium, and has published several papers on the subject; also Fremy, Deville, Bunsen, and Gibbs have increased our knowledge of the element, but their papers are of a purely scientific character, unsuited to a popular journal, and we refrain from attempting an abstract of them.

Ruthenium belongs to the platinum group of metals, and is closely allied to osmium in many of its chemical relations. The metals of the platinum family never occur separately, with the exception of palladium. They all possess the curious properties of determining a large number of chemical reactions by simple contact.

The order of fusibility of the group is as follows: Palladium, platinum, rhodium, iridium, ruthenium, osmium.

The specific gravities as given by Deville are: Ruthenium, 11·4; palladium, 11·8; rhodium, 12·1; platinum, 21·15; iridium, 21·15; osmium, 21·4.

It will thus appear that osmium is at once the heaviest and the most infusible of all the metals; ruthenium stands next to it in point of fusibility, but is much lighter.

The sesqui-chloride of ruthenium has been recommended by Gibbs as a delicate reagent in testing for salts of the nitrates—with nitrates of the alkalies it forms double salts which are difficultly soluble.

Many salts of ruthenium have been made by chemists, but they possess a purely scientific interest, and we refrain from giving them here.

Manufacture of Benzine, or More Properly, Benzol.

In the year 1825 Faraday was occupied with the investigation of certain liquids which were deposited in the cases used for containing compressed oil-gas, a material which was at that time a cheap source of illumination. He was able to detect, in the complex mixture on which he had to work, a body to which, in accordance with the current nomenclature and notation of his time, he gave the name "bicarburet of hydrogen." Several years afterwards, Mitscherlich found that on distilling benzoic acid with lime, a volatile oil came over, and that this was in every respect identical with Faraday's compound. Hence the name "benzol." It was not, however, until 1845 that Hofmann proved the presence of benzol in coal tar; nor until three years later that Mansfield (unhappily a martyr to these researches) showed how it might be obtained from that source on an industrial scale. A small specimen of Faraday's original preparation is still in existence, sealed up as a recondite curiosity by its discoverer; now, benzol is manufactured by the tun. The direct proportion of power to knowledge could scarcely be illustrated by a more instructive contrast.

Benzol constitutes sometimes as much as one tenth of the weight of crude tar. In order to prepare it, the light oil is used as a starting point. This material is placed in large stills, and submitted to what is termed "fractional distillation," that is, to a distillation in which the contents of the retort are separated into certain portions, which are distilled over and received separately. The apparatus employed is very simple in principle, and, however varied in form, is generally merely the embodiment of a method first delineated by Mansfield. The retort invariably contains a mixture of hydrocarbons, having a gradually increasing boiling point, and a gradually increasing chemical complexity. On applying heat so as to cause ebullition, the first "distillate," or substance that arrives at the receiver, will be that which possesses the lowest boiling point; the next will have the next higher boiling point, and so on. This law, however, is not more than approximately true, it being always found in practice that a complete separation of the constituents in the retort cannot be effected, each body of lower boiling point dragging with it, so to speak, some of each body of higher boiling point. The impurities which would thus be introduced into the distillate necessarily exist in the vapor; but it is found that, by passing the vapor through an upright tube surrounded by baths of various suitable temperatures, they can be cooled out, and compelled to run back into the retort, without rising high enough to pass over into the receiver.

The benzol of commerce, however, is never pure, its boiling point being frequently 100° in fact, a steam bath is employed in its preparation. Absolutely pure benzol can be obtained by re-distilling commercial benzole at about 80°, and submitting the distillate to the prolonged action of a freezing mixture. It then crystallizes in beautiful white plates, having a high luster, which melt at about 3°, and from which the impurities can be removed by draining and pressure in a cold apartment. When these crystals are re-melted, they constitute a colorless, highly refractive liquid, of somewhat agreeable odor, boiling at 82°, and considerably lighter than water. The crude or pure product may be used as a solvent of grease stains, of caoutchouc, gutta-percha, and resins, as an ingredient in varnishes, as a chemical discriminant in analysis, as a means of rendering tracing paper temporarily transparent, etc.; but its most important application is to the manufacture of nitro-benzol.

What the Telescope is Doing.

One of the largest telescopes in the world, it is well known is owned by the Chicago University. The destined work of this wonderful instrument is to make, in connection with nine chief observatories of Europe and America, an entirely new catalogue of 250,000 stars, determining the right ascension and declination of each particular star; so that by observing its position, astronomers may, in far-off ages, be able to announce authoritatively on its motion, and to declare in what direction it has proceeded through the illimitable voids. At this moment it is slowly and surely performing its sublime work, and furnishing those far-off astronomers the data upon which to base their calculations respecting that mighty problem, the direct motion of the sun through space.

When this is solved, data will also be abundant for locating the position of the great central sun, around which millions upon millions of other suns popularly denominated stars, do, in all probability, revolve. The labor being divided among the ten principal observatories in the world, will make the share of it falling to the Chicago Observatory, 25,000 stars—upon each one of which the most careful observations will be made and recorded. It will require about ten years to accomplish this stupendous work, and when it is done we may expect some most important astronomical discoveries.