Correspondence.

A Natural Mathematician.

To the Editor of the Scientific American:

I notice in SUPPLEMENT 879 a table for finding the day of the week for any given date. The table is the simplest one I have yet seen, but it seems to me that there may be a still simpler one. The reason I think so is that there is a simple-minded negro man here named William Butler who can tell, almost instantly, the day of the week for any date within the last 300 or 400 years. He has been given numerous severe tests and has never made over one or two misses out of fully 100 trial questions put to him.

He evidently makes some sort of mental calculation, because he repeats a few words to himself rapidly and then gives the correct answer within five seconds. I have questioned him very closely to see if I could find out how he does it, but he is not possessed of sufficient intelligence to give any of his process. He says "he just knows it," but he is surely possessed of some short cut by which he readily computes the day of the week. He knows all about leap years and old and new style dates, but he cannot add up any figures mentally the sum of which will exceed 50 or 60. Experts have in vain attempted to find out his method, but while he is perfectly willing to talk about it, he can not give any satisfactory explanation of the matter. Is he a prodigy, or has he got hold of some short cut process? A. A. LEWIS.

Somerset, Ky., November 14, 1892.

The Brooks Comet.

To the Editor of the Scientific American:

The comet discovered by me on August 28 of the present year may now be easily observed with moderate size telescopes, and is gradually growing brighter. Found on the border of the constellation Auriga, the comet has moved through Gemini, Cancer, and Leo, at the date of this writing being about twelve degrees south of the bright star Regulus. Its direction of motion is southeasterly, which will carry it through Hydra, and early in December the comet will be found in the constellation Corvus—the Crow. From there it will move on toward the head of the Centaur.

As some readers may wish to pick up the comet, I give a few positions as follows:

	R. A.	Decl. south.
Nov. 20	10h. 40m.	5° 43′
" 24	10h. 59m.	9° 50′
" 28	11h. 20m.	13° 57′
Dec. 2	11h. 40m.	18° 00′
" 6	12h. 2m.	21° 50′

From these places the path of the comet may be readily traced.

Early in December the comet will be thirty times brighter than at the date of discovery, and will continue to increase in brilliancy until about the time of its nearest approach to the sun, on December 28. The object is an interesting one in the telescope, having a bright, starlike nucleus and a well developed tail.

WILLIAM R. BROOKS.

Smith Observatory, Geneva, N. Y.,
November 12, 1892.

Birds that Eat Acorns.

To the Editor of the Scientific American:

In the October 22 issue of this paper, page 257, was an article from *Science*, by Dr. Morris Gibbs, stating that the number of birds in Michigan that feed upon acorns is but six. These are the passenger pigeon, the morning dove, the white-bellied nut hatch, the crow blackbird, the blue jay and the red-headed woodpecker. I can add another to the list, though the incident that brought it to my notice occurred in an adjoining State. This is none other than the common wood duck, found in almost all, if not all, of the States.

About five years ago, while hunting ducks in Ohio, I came one afternoon to a little pond, frequented much by ducks. It was at the edge of a wood and a rail fence partly surrounded it. Several ducks flew up, apparently out of the wood, as I approached, and I sat down in a fence corner and waited for them to return. Presently they came back, and after a little circling lit upon the water. As they did not light close together, and I was only armed with an old musket, I concluded to wait until they would swim together, and thus get a chance to kill two of them or perhaps all. But they seemed to want to keep apart. I waited and waited, but not once could I get more than one in range. They just floated around a little, and occasionally tipped themselves up while reaching for something on the bottom. Other ducks circled around but did not light. The ones on the water still kept apart, and I began to think it would be one duck or none. I had waited almost an hour. Suddenly all three started toward my side of the pond, and when near the edge raised and lit on the fence just a panel from where I lay crouched. My heart sank, for I thought my last chance for a duck was gone. I was almost afraid to breathe as I looked up at them sitting almost over me and apparently looking right into my eyes. After sitting a moment and taking a hasty survey, they lit under a white oak tree, not thirty feet away, and commenced eating acorns, which lay thickly on the ground. They gobbled them up with the characteristic gobble of ducks while feeding. I was so surprised at first that I sat and stared at them, but recovering myself I fired at the one nearest me and killed it, a beautiful drake with feathers all variegated and golden. I hastily put him into my game sack and started for home, as it was getting late. On arriving there I examined him and found two acorns in his gullet about half way down, and, opening the crop, I found several more, all with the hulls entire. Little else was found in the crop, and I concluded that the acorns must have been one of their favorite foods, as there was plenty of duck weed in the pond and also a kind of grass seed of which they are very fond. Since then I have watched the wood duck, and often come upon them feeding on acorns under trees near some pond. But it is difficult for the hunter to get them then, as they immediately rise among the trees and prevent a good shot at them, and no doubt this is why others have not discovered their peculiar food and written of the subject sooner. GEORGE E. MCCULLOCH.

Fort Wayne, Ind.

The Oldest Herbarium in the World.

There is in the Egyptologist Museum at Cairo an inconspicuous collection of dried or artistically prepared parts of plants, which on more grounds than one is of universal interest. In the first place this collection constitutes the oldest herbarium in the world; it was collected from old Egyptian graves, and, at the suggestion of the former director of the museum, Maspero, they were submitted to the well known botanist and explorer, Dr. George Schweinfurth, for a thorough investigation.

As regards the significance of the use of plants in the death cult of the Egyptians, we must make a distinction between the edibles, which were ordinarily placed in earthen vessels on the floor of the sepulcher, and which were regarded as necessary adjuncts in furnishing the "eternal house," as the Egyptians characterized the last resting place of their beloved ones, and those symbolic death offerings which were designed to express reverence for the dead, especially in the higher sphere to which they were translated, and to which secret magical power was sometimes ascribed. Prof. Schweinfurth says concerning these death offerings, which consisted principally of wreaths and garlands of flowers:

"Here (that is in the coffins) we find lotus flowers fixed under the outer ties of the mummy wrapping, with whole wreaths and bunches on the side of the mummy, between it and the inner folds of the grave cloth, and also wreaths covering the breast of the mummy in concentric rows, or garlands twined about the head. These wreaths and garlands are characteristic in their arrangement and appearance, being such as are never found among any other people than the Egyptians. The limited space between the mummy folds and the shroud did not admit of making the wreaths as we make them. They had to be thin and flat. To this end leaves of leathery texture were taken, twice folded, and strung together with fibers of date palms to form little agraffes for holding small flowers or petals, which were here secured as in a vise. Finally fine strips of date palm ran through the whole lengthways, securing the perfectly flat wreath."

In this connection it may be remarked that the rarity of floral decoration was due to its costliness, which confined it mainly to the higher classes. People of small means had to content themselves with colored pictorial representations on the coffin lid.

While the long wreaths, together with the unarranged flowers and bunches of flowers, which were probably offered to the dear departed at the last moment before the coffin was closed, are traceable to the earliest times, the olive wreaths are not seen before the Græco-Roman epoch, and appear to have been introduced from Greece. Wreaths and garlands were not, however, wanting in a deeper symbolical meaning. To the latter especially certain magic powers were ascribed. After due preparation with prescribed formulas, they enabled the dead to remember the prayers and petitions necessary to his salvation, and further to present them acceptably, on which account they were frequently styled "the crown of the right utterance."

The most of the floral remains recovered from Egyptian graves are in an astonishingly well preserved condition, so much so that after treatment with warm water they can be handled like modern herbarium specimens. In some flowers the parts which were protected by an outer covering, pistils, anthers, etc., were, in spite of their extreme delicacy, perfectly intact. The preservation of the colors, too, is something remarkable. Apart from the fact that the colors are slightly faded they show no very remarkable variation from modern specimens. Some water melon leaves, even, by immersion in water showed that they still retained a portion of their green coloring matter (chlorophyl).

The most important matter in connection with such finds is unquestionably their age. We possess remains of funeral food from the fifth dynasty (3000 B.C.) The brick pyramids of Dalschur furnished a perfectly well preserved legume of clover (Medicago hispida), and a grave at Sakkara a handful of barley ears. The remains of the twelfth dynasty (2500 B.C.) are still richer in contents, for the recovery of which we are indebted to Mariette Bey's industry. Among the funeral food of that period we find grains of mustard seed, capsules of flaxseed, gourds, lentils, beans, figs, pine needles, juniper berries, etc. The most interesting and important acquisition to our herbarium, in so far as concerns leaves and flowers, was obtained from the mummy find of Deir el Bahari in 1881. The richest booty was yielded by the tombs of Ahmes I., Amenopeth I., and Rameses II., and generally from the eighteenth to the eleventh century B.C.

There is, however, a difficulty in determining the age of some of the most important flower discoveries with precision. Some of these very mummies were opened up and reswathed, from motives of piety, some five hundred years after they were first laid to rest: it is hence impossible to say whether the flowers date from the first or second period. But at the lowest estimate they are nearly three thousand years old, while the oldest herbarium in Europe is scarcely four hundred years old.

Among the flowers chiefly employed in floral decoration for the dead, we find the blue and white lotus, the red poppy, oriental larkspur, hollyhock, the yellow flowered Sesbania Egyptiaca, crown chrysanthemums, safflower, pomegranate flowers, willow leaves, grasses, etc. In the Græco-Roman period celery leaves came into requisition. In the coffin of the so-called Kent mummy (twentieth dynasty) celery was found mixed with lotus leaves and flowers. Onions, leeks, garlic, etc., played an important part also in the offerings to the dead.

The Egyptians further deemed it a duty to provide wine for the comfort of their dead. This was not, however, offered in liquid form. The wine berry was the usual medium in which wine was provided, while barley was provided to secure the deceased his modicum of beer.

As to the fertility of seeds taken from Egyptian coffins, a great many fables have obtained currency. The closest investigation has determined that the seeds were all kiln-dried and partially roasted before being applied to their destined purposes. All attempts to germinate grain taken from Egyptian tombs have been attended with negative results, and if occasionally some of the grain procured with a mummy find has been found fertile, it should be remembered that the Arabs, who do a large trade in mummies, are in the habit of mixing a little new wheat with the old on purely business principles.

One of the general conclusions to be drawn from this herbarium is that Egypt has sustained no appreciable climatic changes during the last 4,000 years.—*Paul Pasig, in Westermann's Monats-Hefte; The National Druggist.*

Fluorography.

Fluorography is a process that permits, through fluorated inks, of transferring lithographic or phototypic images to glass. In contact with sulphuric acid, these inks disengage hydrofluoric acid, which engraves upon the glass delicate images that one might say were traced by snow and hoar frost.

In order to obtain this artistic result, a phototype is inked with the following mixture:

	Grammes.
Glycerine	400
Water	200
Fluorspar	100
Tallow	100
Soap	100
Borax	50
Lampblack	50

From this proofs are taken that are transferred to glass in the same manner as would be done for transferring them to a lithographic stone. Then the glass is bordered with wax and covered with sulphuric acid concentrated to 64° or 65° Baume. At the end of about twenty minutes the acid is poured off and the plate is washed thoroughly with water and cleansed with a solution of potash in order to remove every trace of acid. Finally, another washing is given with water and the glass is wiped with a warm cloth.—*Le Genie Civil.*

ANOTHER great railway engineering achievement was recently accomplished in England. This was the piercing of the Totley tunnel on the Dore and Chinley Railway, the new line on the Midland system connecting Sheffield with Manchester. The tunnel, with the exception of that which runs under the Severn, is the largest in England, being a little more than three and one-half miles in length. Over 1,000 men have been engaged on the undertaking for the past four years, and considerable difficulties, caused by the presence of immense quantities of water, have been surmounted.

The California Vine Disease.

The California vine disease is the name that has been given to a virulent disease attacking the vineyards of Southern California, and causing widespread destruction. The trouble seems to have been first noticed in the year 1885, in the vicinity of Anaheim; and it assumed serious proportions in 1886. In the fall of that year many vineyards were dead or dying, and the grape growers had become alarmed. In 1887 the United States Department of Agriculture sent Prof. F. L. Scribner to the region to look into the matter. Prof. Scribner was accompanied by Prof. Viala, an authority on vine diseases of France, but the time spent in the field was too short to permit of anything more than a general view. It was not until 1889 that the Division of Vegetable Pathology of the Department of Agriculture took charge of the investigation and sent a special agent into the field. This agent was Mr. Newton B. Pierce. There have appeared from time to time brief notices of the work of Mr. Pierce, but no detailed account has been published until within a few days. This detailed account is contained in Bulletin No. 2 of the Division of Vegetable Pathology, entitled "The California Vine Disease: a Preliminary Report of Investigations by Newton B. Pierce, Special Agent." It contains 222 pages, 25 plates, and 2 charts. The letter submitting the report being dated June 15, 1891, and that transmitting it April 15, 1892, shows a rather long delay in its issuance, due to causes incident to most government publications.

The report is a very full one. It treats first of the origin and growth of the early vine industry of Mexico and California, in the course of which it is shown that, although vines have been cultivated in Mexico for 350 years and in California for more than 100 years, no such disease or wholesale death of vines was known previous to 1885 or 1886, when the disease became prevalent at Anaheim. Even in the very spot where it first appeared, vines had been cultivated for twenty-five years without any serious diseases appearing.

Mr. Pierce then proceeds to give the characters of the disease as it affects the different parts of the vine. The leaves, for example, fail to develop chlorophyl in certain places, and they turn yellow or red, or else become spotted. The characters vary in the several varieties, and are well shown in several colored plates. The canes are found to ripen unequally, presenting patches of green and brown after the leaves have fallen. The roots, too, become rotten, the whole finally passing into a loose amorphous mass, and the epidermis can be easily drawn away from the xylem cylinder. The fruit dries upon the vine without maturing, and, even when reaching maturity, does not possess the sweetness it ordinarily should. The sap becomes deficient in quantity and the new shoots are brittle and can be readily broken.

Such are the characters of the disease as given by Mr. Pierce. He then proceeds to trace the gradual spread of the disease from Anaheim as a center, showing it to extend rapidly in all directions, and to soon cause all the vines within the affected region to die. One of the peculiar signs of a diseased condition of the vines is an increased yield of fruit. The amount is sometimes doubled or even trebled one year and then falls to less than half the amount which the vines would normally produce the following year.

In order to determine, if possible, the predisposing causes of the disease, various conditions were examined. In brief, it was found that variations in soil had no effect, the disease appearing on loose, gravelly soil, on sandy loom, or on heavy adobe soil. Elevation and slope, drainage (artificial and natural), irrigation or non-irrigation on uplands or lowlands, manuring, were each and all counted out as factors in the production of the disease. The influence of shade was found to be considerable, those vines exposed to the full effects of the sun succumbing sooner to the disease than those partly shaded from it. The origin of the shade was immaterial, there being no difference whether caused by deciduous or evergreen trees or by houses. This is an interesting fact as showing the cause, whatever it may be, to act more powerfully in the heat than the cold.

Studies of rainfall, temperature, and various other meteorological phenomena are considered to have no effect. So, too, various methods of cultivation, of pruning, of grafting, of planting healthy or diseased cuttings, seem to be unable to cause or modify the disease, although it shows itself sooner when diseased cuttings are planted than when healthy ones are used.

In the chapter dealing with the relationship of the disease there seems scarcely a point left untouched. The fungi affecting the roots, those attacking the foliage, the fruit and the canes, animal parasites (such as mites, nematodes, and insects of various sorts), are all examined. Non-parasitic diseases, such as chlorosis, pourriture, or decay of vine roots, mal nero, rougeot, and folletage, are also discussed. Mr. Pierce does not consider that mal nero, a serious disease of the vine in Europe, resembles the California disease, but rougeot and folletage present some analogies. Still there are not enough, beyond the coloration of the leaves (examples of which are shown in colored plates) to ally the diseases.

The last two chapters, containing remedies and suggestions for treatment and the general conclusions, are those to which many readers will turn with great expectations. Beyond reading of negative results, they will find but little. An account is given of many experiments made to prevent or cure the disease, but failure was the result in each case. The removal of all diseased vines seems necessary; spraying with Bordeaux mixture or eau celeste may have some effect in stimulating the vine, but cannot be regarded as a preventive; sulphuring is recommended, as well as using perfectly healthy cuttings in starting new vineyards. The effects of *Uncinula spiralis*, causing powdery mildew, should be further studied. Bacteriological investigations have not gone far enough to establish the fact of any causal relation to the disease, although forms of these micro-organisms have been found in the diseased vines. Finally Mr. Pierce sums up what may be said in relation to a disease-inciting agency as follows:

"(1) The observed phenomena would be mostly explained if we consider the disease to be due to an epidemic caused by an external parasite arising after the wet season of 1883-84, and spreading with greatest virulence from the vicinity of Anaheim. This parasite must be capable of working during the most heated portions of the year, and must exist at the present time, although working with less intensity than at first. *Uncinula spiralis* is the only parasite yet known in the region which even approximately satisfies these conditions, but more than normal virulence would have to be assigned this fungus to explain the observed results.

"(2) The observed phenomena would be in the main explained if there were a form of micro-organism within the vine capable of altering the normal physiological relations of the plant at the heat of the season, and which organism began to spread in the Santa Ana Valley about the year 1884.

"(3) A weakened condition of the cell contents, acquired under exceptional local conditions at some single period in the past, and which is persistent and cumulative from one hot season to another, would in part explain the observed phenomena. The objections to this explanation are: (*a*) The cause and nature of such a weakness are not fully apparent; (*b*) it does not account for the death of vines grown from unaffected cuttings since the disease appeared; (*c*) it poorly harmonizes with the health and normal productiveness of old vines for several years subsequent to the death of the first vineyards."

While Mr. Pierce in California has been studying this disease, others, in France, have been working upon an equally mysterious malady of the vine. According to published accounts, Mons. Viala and Sauvageau have been more successful than Mr. Pierce in ascertaining the cause of the disease. These authors state that, in studying a disease discovered in France, in 1882, and which caused the leaves to drop and the fruit to become wrinkled and dry, they discovered the reason to lie in a fungus allied to that producing club-root in cabbages. This fungus they named *Plasmodiophora vitis*. It occurs in the palisade tissue, and spreads from thence into surrounding cells. The plasmodium often looks like the cell contents proper, but eventually it breaks up into masses which look like oil drops, containing one or more vacuoles. No remedy is yet known. The interest of this in the present connection lies in the fact that in a later paper the same authors, in studying dried material affected with the California disease, conclude it to be caused by a fungus also, and they refer it to the same genus, under the name of *Plasmodiophora californica*. They do not know of any remedy, and it still remains to be seen whether study of further material will establish or refute their position. Meanwhile those whose vines are being destroyed by the unseen enemy await with anxiety some method of combating the mysterious foe.

JOSEPH F. JAMES.

Washington, D. C., November 11, 1892.

To Give the Appearance of Tortoise Shell and Mother-of-pearl to Horn.

Mr. Bloch, of Paris, has patented a process for giving objects made of horn the aspect of tortoise shell or mother-of-pearl by plunging them successively into an alkaline solution and a bath of a salt of lead. The objects, after a careful polishing, are immersed in a solution of carbonate of soda for a length of time sufficient to saponify the fatty matters, and are then washed with an abundance of water until there no longer remains either any fatty matter or soda upon the horn. They are then placed in water containing sufficient ammonia to render it feebly alkaline, until every bit of sulphureted product has disappeared. In this state the horn has absolutely the appearance of tortoise shell. If it is desired to give the objects the aspect of mother-of-pearl, they are immersed in a 15 per cent bath of nitrate or acetate of lead long enough to allow of the deposit of a thin layer of lead salt upon their surface. After being taken out of the bath, the objects are immediately washed with an abundance of water and then reated with a 5 per cent solution of hydrochloric acid, in which they are allowed to remain a sufficient length of time to take on the desired aspect of mother-of-pearl. Finally, they are polished and brightened with a buff-stick.—*Moniteur Scientifique.*

An Approaching Comet—Is it Biela's?

A comet, visible to the naked eye, and, on November 17, in the constellation Andromeda, is now approaching the earth. It appeared on that date more than double the size that it was when first discovered by Professor Holmes by photography at Lick Observatory, about midnight on November 6, occupying, on the 17th, thirteen minutes of the arc of which it at first sight occupied only five. Up to November 17, Professor Pickering, of Harvard, stated that its orbit could not yet be estimated. Immediately upon the discovery of the comet, Professor Pickering says: "We got two positions with our large telescope, and on the 9th we found the comet. It was observed about the same time by Professor Barnard at the Lick Observatory. On the 10th a telegram was received from Professor Berberich, of Kiel Observatory, announcing that its orbit was the same as that of Biela's. On the 13th a contradiction was made. Meanwhile we have been getting observations of its location in space. Our observations reveal this interesting feature, that it has apparently remained stationary. Some one has written a paper to show that the methods of computing motion by increase or decrease of brightness are incorrect. The fact that the Holmes comet is apparently about stationary goes to show either that it is approaching us directly or is moving slowly. This observatory is at present the only place where observations of brightness are being made. Hence we are particularly desirous that a bright comet should come. It is too early to determine how far off the comet will be when nearest the earth. Of course I cannot be positive that this is Biela's comet."

Biela's was a small comet sixty-six years ago, a short one, and remarkable for being a double one. It was discovered in 1826 by an Austrian officer, whose name it bears. Its periodic character was first detected by Gambart. Its orbit brought it within a few thousand miles of the earth. The comet returned in 1832. Then it was expected that an encounter with the earth would take place, which created a panic in the south of France. It passed the point where the expected collision was to occur a month before the earth arrived, and the nearest the two objects came to each other was fifteen million miles. In 1839 it was again seen. In 1846 two comets were seen to grow from one, the first recorded instance of the kind. The first discovery of the division was made in New Haven. For four months the pair traveled along side by side, 160,000 miles apart. Sometimes one was brighter than the other. On the night of November 27, 1872, there was a wonderful meteoric shower. In November, 1886, there was another, and it was concluded that the Biela comet was no more. That comet has been missing five times, and more than once under favorable conditions of visibility. It is once more the recurrence of its time, and perhaps it has flared up again for the final time, lighting its fires in honor of the Columbian period. Professor Pickering, besides observing the comet nightly with the 6 inch and the 15 inch telescopes, has been photographing it and its spectrum with the 11 inch and 8 inch glasses.

According to the calculations of Professor Boss, of the Dudley Observatory, the Holmes comet will be very near the earth on November 27 and 28, probably within 1,000,000 miles. From the calculations, the earth is due to arrive at the point where its orbit is nearest the track of Biela's comet on the evening of November 27, at 10 o'clock, eastern standard time. The comet is apparently due to arrive at that point on the morning of November 28; but, owing to the disturbances by the attraction of the planets which the comet has experienced, its exact course through space is not now known with sufficient accuracy to justify a prediction as to how near the comet will approach the earth. This must therefore be left to future observation and calculation. All that can now be said is that in case the Holmes comet is identical with the Biela's, its approach to the earth about November 28 will be much closer than in any other case on record.

Professor Boss estimates the distance of the comet from the earth, on the evening of November 13, to have been 13,500,000 miles. The comet then appeared as a large and bright nebulosity with well marked, though relatively faint, central condensation. The nebulosity was found to be nine minutes in diameter, and was much better defined on the eastern than on the western side. The nucleus, or central condensation, was small and elongated toward the east. The diameter of the nebulosity is estimated at about 36,000 miles, and of the densest part about 300 miles. There was no appearance of a solid kernel, such as is supposed to exist at the center of all great comets. Assuming the comet to be at the distance mentioned, any solid body at its center smaller than fifty miles in diameter would probably have escaped detection.