

for sacrificial perfumes; braziers; pastry moulds (like the modern); hinges; keys; various and beautiful models of Roman lamps; rich door handles with ornamentation, now called *renaissance*; mirrors; strigils, with which the perspiration was scraped off after the hot bath; gargoyles; rich platters and fruit dishes; bells; ointment boxes; compasses; an ax; weights; bass-reliefs of jewel cases, etc., etc. Mark the interesting bronze lamp of a human foot, with a taper between the toes; a design probably brought from the East, where the device was for prevention of bites of adders in the dark, and thus suggesting the origin of the Scriptural comparison, "Thy word is a lamp to my feet and a light to my path."

Notice the tear bottles, which, containing the tears of mourners, were placed in or near the cinerary urns, holding ashes of the dead. Three models of such urns are in the *Lararium*.

There is a slave's collar with this inscription in Latin: "I am a slave; arrest me; I am running away." This collar was no doubt welded to the neck of some wretch who had endeavored to escape from the barbarity of his master.

The colors of the exterior were revised by Professor Fischetti. His rendering of a drawing of the Facade, as also a beautiful tablet of Pompeian colors, prepared by him with his choice of pigments, may be seen framed in the gallery. It is doubtful whether moderns can possibly supply colors of the durability of the original Pompeian tints, or equal to some of them in richness and intensity. This is specially true of the blue and purple of the ancients. The Tyrian purple is probably unknown to modern art; and it has been recently announced that a French chemist has discovered the Pompeian blue.

Illustrations of Roman masonry are to be placed in the garden of the Pompeia.

In concluding this sketch of the most elaborate reproduction of a Roman house of the first century of the Christian era, as yet attempted, it may not be presuming to suggest that therein is a field for instruction far beyond novelty and entertainment. Students of history may here find dry descriptions illuminated by color and object. With an entirety of the surroundings in Roman domestic life, painted by the eye upon the retina of the brain, the lives of Plutarch and other classics will take more vivid interest.

A profoundly philosophical and interesting work\* has this title:

"POMPEII—THE CATACOMBS—THE ALHAMBRA."

"A Study by the Aid of These Monuments upon Pagan Life at Its Decline; Christian Life at Its Aurora, and Mahometan Life at Its Apogee."

It opens upon this broad generalization by this inquiry:

"To-day, above all, when history has so well comprehended the assistance it can draw from an intimate alliance with archæology, is there a scientific pilgrimage more agreeable and more useful than that to Pompeii?"

The bare walls and broken columns of Pompeii reveal only the boundaries and divisions of its homes. Their exhumation has gathered in Naples their paraphernalia in immense multiplication; but in no practical juxtaposition; only in the show-case monotony of a museum.

May it not be an opportune and expedient substitute therefor, that professors of history in colleges and academies shall have readings of Roman archæology, with their classes in the Pompeia?

Lovers of romance may also therein re-awaken sympathetic visions with Bulwer of the "Last Days of Pompeii."

The floating or ideal figures in the *Alæ* and *Peristyle* are copied from the finest in Pompeii and Herculaneum—consisting of Bacchantes, Genii and Dancing Girls. "In the villa of Cicero, at Pompeii, discovered in 1749, there are twelve dancing girls, floating in a dark ground; fleet," says Winkelman, "as thought, and as lovely as if they had been drawn by the hand of the Graces. Many others are conspicuous for the graceful flow of the dress and harmonious coloring. The light and grouping is in many instances worthy of commendation."

Becker says: "In the time of Vitruvius it was considered good taste to possess a Pinacotheca (picture gallery). Several paintings on the walls of Pompeii are provided with frames, like borders."

Floors were never boarded. They were laid with bricks, slab-work, marble, tile, coarse and fine mosaic. Another kind of pavement was of plaster, with beaten or broken tile. In a house in Pompeii 2,000 colored slips of marble were found on one square foot.

There were not doors to all the rooms. Hence at Pompeii there are often no trace of hinges. The place of a door was supplied by hangings; the iron poles and rings of which are to be seen in Pompeii.

In Pompeii chimneys are only to be found in baths and bake houses.

"The production of the loom appears to have fallen in ancient times very little, if at all, below the beauty and variety of the damasks, shawls and tapestry of the present age; and to have vied with the works of the most celebrated painters representing mythological subjects. Fine specimens of tapestry, some with gold thread, were spread upon couches and chairs. Weaving and embroidery of *pallia* with pictures and flowers of gold was the elegant employment of females of highest distinction."—(*Smith's Dictionary of Roman Antiquities*.)

The walls and pillars of Pompeii that remain are mostly of brick, covered with cement. Those of marble perished; or were removed for other construction. Rich fragments of it remain.

Not only did the Romans gracefully salute the incoming guests with *SALVE* (welcome); but over the door some

suspended a bird that had been taught to give this salutation.

In the pavement upon the street will be seen in mosaic *HAVE*; a precise replica from the House of the Tragic Poet. It is from *Aveo* or *Habeo*, another salutation of good wishes.

In the Bibliotheca are *fac-similes* of ancient rolls in papyrus, remarkably simulated in Paris, from the collection in the Louvre. As the languages Latin, Greek, and Hieroglyphic were those of the people in Pompeii, a cosmopolitan city, the scrolls must closely resemble the books of the Pompeian age.

There may be seen the latest plans of Pompeii, showing the existing lines of excavations, and indicating the houses of Pansa, the Tragic Poet, etc.

A curious and painstaking work is that by Raphael Garrucci of the inspirations, caricatures, political bon-mots, etc., graven on the walls of Pompeii in *fac-simile*: "Very many inscriptions will be noticed on the walls of houses, painted usually in red letters. Most of these are election placards, asking the inhabitants to vote for so-and-so as *Ædile*."

"For instance:

MARCELLIUM, ÆDILE, M. LIGNARI, ET PLOSTARI, ROGANT.

"The carpenters and carvers wish Marcellius to be *Ædile*. These advertisements generally ended with the letters O. V. F. (*Ovo vos facitus*.) 'Please vote for him.'"

In the Bibliotheca are also thirty-three busts of Roman and Greek rulers, philosophers, etc.

Especially to be remarked for richness of design and ornament are bronzes of finest workmanship in the *Atrium* and *Tablinum*. The superb tripod found in *Herculaneum* has for many years been sold in Paris in miniature as a model of highest art. The same is true of the candelabrum and lamps "upon a rectangular pillar crowned with a capricious capital" placed upon the marble table in the *Atrium*. The figure of Victory and the small bronzes of drunken Silenus are interesting contrasts of subjects.

Colossal busts of Jupiter and Melpomene are upon buttresses of the Roman arch of the art gallery. That of Diomed in the *Æcus* is of powerful Roman cast in heroic size.

The following extracts are from the late work of E. Neville Rolfe, B.A., of Norfolk, England, now a resident of Naples. The title is well vindicated by its contents, "Pompeii, Popular and Practical. An easy book on a difficult subject."

It excels previous publications in satisfaction of curiosity, as in the fragments appended.\*

"With regard to glass in Pompeii, we observe that it was in common use. Many windows were glazed. It is in the nature of things that fine glass should have been broken, and that the coarser specimens should have survived to us."

"We have ocular demonstration that the Pompeians frequently colored their statues. Plato tells us (B. C. 347) that in his day the ancients colored their statues."

"Let us glance for a moment at the religion of the period, of which Gibbon says justly that it was considered 'by the people as equally true, by the philosophers as equally false and by the magistrates as equally useful.' The worship was utterly degraded, but their temples were kept up with great splendor, and their ritual was carried out with extreme minuteness."

"And if the religion of the country was in decadence, could it be said that the sacred Fount of Justice was any purer? We are afraid we must reply that justice no longer presided over the law. Apart from the atrocities perpetrated by the emperors, the cruelty and venality of the judges was notorious, and bribery of the worst kind was universally practiced."

"The theater, and especially the comic stage, was as degraded as it could be. The upper classes were extremely wealthy. We can hardly credit the sums expended by them on a single banquet."

"Yet with all their luxurious extravagance they were a deeply wretched race. Their magnificence could not give them happiness, and Horace wrote of them, 'dark Care brooded over their brazen pleasure boats and sat behind their caparisoned horsemen.'"

#### INSTANCES OF THE EFFECTS OF MUSICAL SOUNDS ON ANIMALS.

By ROBERT E. C. STEARNS.

##### CATS AND MUSIC.

MR. GEORGE GUION, of Ventnor, Isle of Wight, referring to a cat owned by his friend, a Captain Noble, says:

"If any one in her presence commences whistling a plaintive air, Brownie will presently go to him, climb into his lap, and raising herself on her hinder legs will put her mouth close to that of the whistler. Captain Noble's view of the motive is that the cat imagines the performer to be in pain, and thus endeavors to express her sympathy. One day when sitting round the table after dinner, we each for experiment attracted the animal in turn, who on the above supposition must have thought we were suffering from an epidemic, as each of us in succession exhibited the same symptoms. It is necessary that the air whistled should be of a plaintive character, as I found by commencing a lively measure, which I had to change. In my boyhood we had a cat which had a habit very similar. If I laid myself down on the sofa and made a moaning noise, the cat would jump up and hover about me, as if anxious to find out what was the matter."

Another party writes: "Some time since I had an ordinary tortoise shell cat, which had a peculiar fondness for the tune known as 'Rode's Air.' One day I chanced to whistle it, when, without any previous training, she jumped on my shoulder, and showed unmistakable signs of pleasure by rubbing her head against mine, and trying to get as near my mouth as possible. I have tried many other tunes, but with no avail."

\* Mr. Smith states that a concise abridgment of some of the most interesting material from this and other works will be issued from the Pompeia as soon as practicable.

Captain Noble, of Forest Lodge, Maresfield, England, whose cat "Brownie" is referred to by Mr. Guion, in response to the incident above given, says: "By the bye, I don't know whether 'Rode's Air' is a lively or plaintive tune, but only one of the latter kind affected my poor old 'Brownie.' I used as a rule to whistle the 'Last Rose of Summer' when I wished her to perform. I never could satisfy myself as to her motive in putting her mouth to mine. The most feasible conjecture that I was able to make seemed to be that she imagined me to be in pain, and in some way tried either to soothe me or to stop my whistling."

F. C. R., of Gwasted, in commenting on one of the instances above related, says: "We too have a cat which is very sensible of the whistling of tunes, and which will, even when with her young kittens, show great uneasiness immediately after the whistling commences, and rise and leave them to follow the person about, ending by trying to seek for the unaccountable sounds in the very mouth of the performer. Still, unlike the cat of 'Musicus,' she seems to experience more uneasiness than pleasure."

Then follows E. J. T., who says: "I can give another instance above personal knowledge. A few years ago my brother had a favorite cat, which, when he whistled a tune, would follow him round the room, and climbing up on him would touch his mouth with her paw, and rub her head against his face, all the time purring with pleasure. I may add that this musical taste is not hereditary, for a grandchild of this cat, now in our possession, shows the greatest antipathy to music; a few notes on the piano or concertina are enough to rouse her from her slumbers on the hearth rug, and drive her to the door, mewing loudly to be let out."

Another illustration is furnished by Mr. Oborn, relating to the power of music on English cats. He writes:

"I have a cat that has apparently great fondness for music. Whenever any of the family or a stranger commences playing on the piano, and if the tune is at all lively, she fondles and purrs and evinces the greatest pleasure imaginable, and sometimes becomes so excited that she will jump on to the keys and rub herself against the hands of the person playing."

A lady friend of mine residing in California has observed similar actions on the part of a cat, when the piano is playing in its presence. Whether a Thomas or Tabby cat I did not ask.

Another friend, a lady residing in Washington, D. C., at one time owned a cat that acted in a very peculiar manner upon hearing the music of a piano. When the strain was rather soft and low, the cat appeared to be pleased with it, would climb up into the lady's lap, reach up her head and rub it against the lady's shoulder or chin, but when in the course of the time a passage was reached that was in a high key, with considerable emphasis, pussy became intensely excited, and would put her head against the lady's cheek with a good deal of force, or jump down and run to the piano, and climb up on the person playing, and get up on the instrument in such a fiercely aggressive way that the performer, through fear of being scratched or bitten, would stop playing.

Referring to the effect of whistling upon a cat, as observed by E. J. T., Mr. George O. Howell says: "A relative of mine has a cat, a noble animal, rejoicing under the refined name of Thomas. This creature dislikes to hear any one whistle. But one morning when he was fast asleep I whistled loudly. It acted like magic. Thomas started up in an instant, looked very bewildered, and decamped from the room at full speed."

From dogs and cats, the canine and feline, let us turn to the porcine.

##### PIGS AND MUSIC.

"In old churches and cathedrals we sometimes find a carving on the miserere of a pig playing upon a bagpipe and the little pigs dancing around. This seems to indicate a popular notion (at least in times gone by) that pigs have no ear or taste for music; such a notion, however, seems to be not quite correct, for I once saw four or five great bony pigs standing at a garden gate, listening with the most evident pleasure to the sweet sounds of a wandering German band. They stood in a row, in perfect stillness, with heads bent a little on one side to catch the melody; and from time to time gave utterance to their delight in a gentle grunt of satisfaction. The melody that charmed their breasts was one which rose and fell in gentle and continual waves of sound; not very attractive perhaps to educated ears, but certainly riveting the attention of these untaught creatures, whose desires are commonly supposed to be confined to the quantity and quality of their food, rather than to the enjoyment of the purer delights of sweet sounds."

In proceeding with the domestic animals it will be seen that the bovine group are entitled to a share of attention.

##### MUSICAL COWS.

"That pigs are not the only animals who take a delight in musical sounds, may be proved by the following incident of which I was a witness on more than one occasion. Opposite to our house was a large field in which some twelve or thirteen cows were put during the summer months. One day a German band commenced to play on the road which divided the house from the field. The cows were quietly grazing at the other end of the field, but no sooner did they hear the music, than they at once advanced toward it, and stood with their heads over the wall attentively listening. This might have passed unnoticed; but upon the musicians going away, the animals followed them as well as they could on the other side of the wall, and when they could get no further stood looking piteously, etc. . . . So excited did the cows become, that some of them ran round and round the field to try and get out, but finding no outlet returned to the same corner where they had lost sight of the band, and it was some time before they seemed satisfied that the sweet sounds were really gone. It seems a strange coincidence that both the pigs and cows were charmed by music produced by a German band."

##### OXEN AND MUSIC.

"I have often noticed the power music has over oxen. The other day we had a brass band playing in our garden. In a field adjoining were four Scotch oxen; when the band struck up, they were at the far end of

\* Lagreze, Paris, 1872.

this, a nine-acre field, quite out of sight, the field being very uneven. They set off full trot to the garden wall, put their necks over, and remained so till the tune was finished, when they went back to graze; but as soon as it struck up again they put their heads over again. This went on till the band left, after which they ate little all day, and were continually lowing."

Before leaving the bovines, it may be worth noticing that the most definite statement, the most direct and practical testimony we have as to the effect of music upon members of this group, may be found in that famous book known as "Mother Goose's Melodies." Therein it is stated:

"There was a piper had a cow  
And had no hay to give her;  
He took a pipe and played a tune,  
'Consider, cow! Consider!'

"The cow considered very well,  
And gave the piper a penny,  
And bade him play that other tune,  
'Corn ricks are bonny!'

It will be observed that she was a *hard money* cow, while the piper offered only notes!

"There are many anecdotes which show that the ox, or cow, has a musical ear. The carts in Corunna, in Spain, make so loud and disagreeable a creaking sound with their wheels, for the want of oil, that the governor once issued an order to have them greased; but the carters petitioned that this might not be done, as the oxen liked the sound, and would not draw so well without their accustomed music."

"Prof. Bell assures us that he has often, when a boy, tried the effect of the flute on cows, and has always observed that it produced great apparent enjoyment. Instances have been known of the fiercest bulls being calmed into gentleness by music."

It will be seen that a very liberal definition must be conceded to the terms music and musical sounds, when the creaking of a cart wheel is referred to as "accustomed music."\* The instance here quoted may be more properly regarded as illustrating the relation of certain sounds to the ordinary routine, and said sounds having been continued for a long time, until they became a permanent factor in the experience of these animals, the discontinuance caused, perhaps, a feeling of strangeness and discontent.

SHEEP AND MUSIC.

The following pleasing anecdote of the power of music is given by the celebrated Haydn. "In my early youth," says he, "I went with some other young people equally devoid of care, one morning during the extreme heat of summer, to seek for coolness and fresh air on one of the lofty mountains which surround the Lago Maggiore, in Lombardy. Having reached the middle of the ascent by daybreak, we stopped to contemplate the Barrorean Isles, which were displayed under our feet, in the middle of the lake, when we were surrounded by a large flock of sheep which were leaving their fold to go to the pasture."

"One of our party, who was no bad performer on the flute, and who always carried the instrument with him, took it out of his pocket. 'I am going,' said he, 'to turn Corydon; let us see whether Virgil's sheep will recognize their pastor.' He began to play. The sheep and goats, which were following one another toward the mountain, with their heads hanging down, raised them at the first sound of the flute, and all with a general and hasty movement turned to the side from whence the agreeable noise proceeded. They gradually flocked round the musician, and listened with motionless attention. He ceased playing, and the sheep did not stir."

"The shepherd with his staff now obliged them to move on; but no sooner did the fluter begin again to play than his innocent auditors again returned to him. The shepherd, out of patience, pelted them with clods of earth, but not one of them would move. The fluter played with additional skill; the shepherd fell into a passion, whistled, scolded, and pelted the poor creatures with stones. Such as were hit by them began to march, but the others refused to stir. At last the shepherd was forced to entreat our Orpheus to stop his magic sounds; the sheep then moved off, but continued to stop at a distance as often as our friend resumed the agreeable instrument."

"The tune he played was nothing more than a favorite air, at the time performing at the opera in Milan. As music was our continual employment, we were delighted with our adventure; we reasoned upon it the whole day, and concluded that physical pleasure is the basis of all interest in music."

Having given much time to the domesticated quadrupeds, the domesticated bipeds, our friends who wear feathers, must be permitted to give their testimony.

I am again indebted to Prof. Davidson for many interesting anecdotes, all the more so as the instances recited have the authority of his personal knowledge, or that of others known to him as truthful and intelligent.

BIRDS AND MUSIC.

First relating to pigeons. "It must have been about 1841 when I had gotten rid of about fifteen pairs of pigeons of different varieties; but I retained a fine white 'hen pigeon' because we all felt a kind of attachment toward her—the younger brothers and sisters and my mother. I was going through the task of learning the flute from my father's teaching. I had only a one-keyed flute, but of very sweet tone. Our white pigeon had always made herself at home about the back part of the house, frequently leaving the large pigeon house and coming into the kitchen; but after the sale of all the other pigeons she was continually among our feet, and making close friends with one and all. In the course of my fluting we noticed that this white pigeon became very much excited over one particular tune, but as to the others she seemed wholly unconcerned. So to please the younger portion of the family, as well as my mother, I frequently cleared a space for the pigeon to perform in and commenced to play. She would begin to circle round and round in the most excited manner, in a space say six feet or more in diameter, crouching low, spreading out her wings and

cooing in the most intense tones. It was very interesting to us all, and the louder I played, the more excited became the bird. She never exhibited any feeling for any other tune. Very frequently my mother would ask a neighbor or two in to see the performance, and to still further test the pigeon's idiosyncrasy I would begin to play while she was outside, when she would instantly leave her corn and come in for the music. Two of my sisters write me that the tune was 'Rule Britannia,' and that the pigeon was then ten years old. Subsequently I purchased other pigeons and mated her, after which she evidently considered music too frivolous for such aged maternity."—*American Naturalist*.

DECURRENT-LEAVED MUTISIA.

*Mutisia decurrens*.

THE figure that accompanies this note represents one of the most interesting of the many exotic plants that adorn the gardens of Britain. We do not aver that it is the most beautiful, for, in respect of beauty, it is distinct, attractive, and much to be admired; but no claim can be made for it that in beauty it is either unique or exceptional. It is particularly interesting for one reason, that there are few plants so difficult to keep; and for another reason, that to grow it and keep it is easy enough for those who understand it.

*Mutisia decurrens* is one of forty species of Mutisia, a genus of composites the species of which are more or less remarkable in growth; and many of them not less so for the size and beauty of their flowers. Some of these have pinnated leaves; others have entire leaves that terminate in tendrils, as in the example before us. *M. latifolia*, figured by Sweet in his "British Flower Garden," vol. iii., second series, t. 288, is characterized by a curious leafage, and winged stems, the flowers being smaller than those of the plant before us, and of a soft rosy pink color. *M. grandiflora* is, perhaps, the most to be desired after *M. decurrens*, but appears not to be in cultivation in Europe at the present time.



DECURRENT-LEAVED MUTISIA.

*Mutisia decurrens* (Flowers brilliant orange color).

The Decurrent Mutisia was introduced by Messrs. Veitch & Son, through their collector, Mr. Pearce, from the Chilian Andes, in the year 1860 or 1861, and was figured in B. M., t. 5273. It is a hardy climber, with peculiar decurrent leaves, of a glaucous green color, and flowers of a brilliant orange color. It is described in B. M. as "climbing to the height of a few feet." On the wall of the museum next the pond, in Kew Gardens, a plant may now be seen that is about ten feet high, and has been flowering freely for two or three months past, presenting an attractive appearance, both by reason of the gay color of its flower heads and the distinct form and glaucous tone of its leaves.

If we sum up the merits of this plant by likening it to a climbing gazania, that is perfectly hardy in the climate of London, we shall be giving a fair idea of its claims to admiration. But we have remarked above on the difficulty of keeping it, the consequence solely of the liking of slugs and snails for the young growth as it rises from the ground; for, if these enemies have access to it, they will effectually prevent its ever rising to the dignity of a flowering plant. At Kew the difficulty is met by the simple precaution of spreading broken coke over a space of about two square feet where the plant is situated. Over or beneath this the marauders can make no progress, and thus it is secured.

In comparing our figure with the one above cited, and with another in the "Florist and Pomologist," 1862, page 81, we find that in both the flowers are represented of large size and with much broader ray florets. It is not for us to say that they are exaggerated, and, indeed, as they are from the pencil of Mr. W. H. Fitch, we take them to be faithful in every particular. Our figure represents the flowers as they appeared in the Kew specimen when at its best in the month of July last, and the figure is an admirable example of the conscientious work of Miss Ada Brooke. —*The Gardeners' Magazine*.

A DEVICE FOR RAPID ADDITION AND EXTRACTION OF THE CUBE ROOT.

By Professor CLARENCE M. BOUTELLE, Principal of the Public Schools of Decorah, Iowa.

1. When the Numbers to be Added consist of One Figure Each, and the Sum is less than 100.

Use two counters, called the adding counter and the "carrying" counter respectively.

Place both counters on the 0 in the left hand column to begin. Move the adding counter down to the number named, then horizontally to 0. Repeat for each number added. Whenever the adding counter passes below the heavy horizontal line, move it horizontally to the left to 10, then vertically to 0, and move the carrying counter down 1. When the addition is completed, move the adding counter horizontally into the left hand vertical column; read the tens of the sum from the "carrying" counter, and the units from the adding counter.

A little practice will enable one to move the counter only up and down, letting the eyes move to the right and left to determine the horizontal line in which to stop.

2. When the Sum is between 100 and 1,000.

Use three counters placed side by side on the 0 of the left hand column in beginning. These counters, used for the hundreds, tens and units respectively, must have distinctive shapes or colors; one may be white, one blue, and one red, for instance.

The adding counter for tens is also the "carrying" counter for units, and the adding counter for hundreds is the "carrying" counter for tens. Move the respective counters in succession, beginning with hundreds and ending with units, for each number as it is read; use the approximate "carrying" counters, as in the first case, whenever a counter passes below the heavy horizontal line.

3. When the Numbers have any Values Whatever.

Use as many addition blanks, arranged side by side, as there will be periods of three figures each in the sum and use three counters in each blank. Add the hundreds, tens and units of each period in succession, beginning with the highest, "carrying" in each period as before, and remembering that the lowest counter in any period is the "carrying" counter for the highest order in the period below.

A little practice will enable one to add, with absolute accuracy and almost no mental effort, any set of numbers assigned, and almost as rapidly as they can be distinctly read aloud.

In adding sums of money, the lowest period may be given to cents and mills.

The author proposes further on to show how other arithmetical processes can be made easier and more rapid by use of the addition blanks. In brief, he will show that "addition blank" is only one of the many names appropriate to this useful device.

ADDITION BLANK.

0									
1	0								
2	1	0							
3	2	1	0						
4	3	2	1	0					
5	4	3	2	1	0				
6	5	4	3	2	1	0			
7	6	5	4	3	2	1	0		
8	7	6	5	4	3	2	1	0	
9	8	7	6	5	4	3	2	1	0
10	9	8	7	6	5	4	3	2	1
	10	9	8	7	6	5	4	3	2
		10	9	8	7	6	5	4	3
			10	9	8	7	6	5	4
				10	9	8	7	6	5
					10	9	8	7	6
						10	9	8	7
							10	9	8
								10	9

EXTRACTION OF THE CUBE ROOT.

The following method of extracting cube root, when the conditions are such that the root is known to be a whole number less than 1,000, is much shorter than the one given in a recent issue of this paper. By its use, the root of any perfect cube of three periods can be determined mentally, and, unless the unit figure is 5, determined almost instantly.

1. Table 1 must be committed to memory. No one ever attempted to extract many cube roots without learning it. Its use enables us to write the first and last figures of the root of a perfect cube at once.

TABLE NO. 1.

1 <sup>3</sup> = 1	4 <sup>3</sup> = 64	7 <sup>3</sup> = 343
2 <sup>3</sup> = 8	5 <sup>3</sup> = 125	8 <sup>3</sup> = 512
3 <sup>3</sup> = 27	6 <sup>3</sup> = 216	9 <sup>3</sup> = 729

2. Table No. 2 need not be learned, for the simple reason that any one well versed in multiplication and division is already in possession of the facts it illustrates. The numbers in the left hand vertical column represent the figures found at the right hand in divisors. The numbers in the upper horizontal line represent the figures found at the right hand in divi-

\* But then Will Carleton's verses are sometimes called poetry.