

THE
YOUTH'S INSTRUCTOR.

No. 4.]

APRIL, 1824.

[Vol. 1.

HISTORY OF ROB ROY,

*From Colonel STEWART'S Sketches of the Manners,
&c. of the Highlanders of Scotland.*

ROBERT MACGREGOR CAMPBELL, or Rob Roy, was born some time between 1657 and 1660, and married Helen Campbell of the family of Glenfalloch. As cattle were at that period the principal marketable produce of the hills, the younger sons of gentlemen had few other means of procuring an independent subsistence than by engaging in this sort of traffic. At an early period, Rob Roy was one of the most respectable and successful *drovers* in his district. Before the year 1707 he had purchased, of the family of Montrose, the lands of Craigrostone, on the banks of Loch-Lomond, and had relieved some heavy debts on his nephew's estate of Glengyle. While in this prosperous state, he continued respected for his honourable dealings, both in the Lowlands and Highlands. Previous to the Union, no cattle had been permitted to pass the English border. As a boon or encouragement, however, to conciliate the people to that measure, a free intercourse was allowed. The Marquis of Montrose,

created duke the same year, and one of the most zealous partisans of the Union, was the first to take advantage of this privilege, and immediately entered into partnership with Rob Roy, who was to purchase the cattle and drive them to England for sale; the duke and he advancing an equal sum, (10,000 merks each, a large sum in those days, when the price of the best ox or cow was seldom twenty-shillings,) all transactions beyond this amount to be on credit. The purchases having been completed, Macgregor drove them to England; but so many people had entered into a similar speculation, that the market was completely overstocked, and the cattle sold for much less than prime cost. Macgregor returned home, and went to the duke to settle the account of their partnership, and to pay the money advanced, with the deduction of the loss. The duke, it is said, would consent to no deduction, but insisted on principal and interest. 'In that case, my Lord,' said Macgregor, 'if these be your principles, I shall not make it my principle to pay the interest, nor my interest to pay the principal; so, if your Grace does not stand your share of the loss, you shall have no money from me.' On this they separated. No settlement of accounts followed, the one insisting on retaining the money, unless the other would consent to bear his share of the loss. Nothing decisive was done till the rebellion of 1715. Rob Roy 'was out,' his nephew Glengyle commanding a numerous body of Magregors, but under the control of his uncle's superior judgment and experience. On this occasion the Duke of Montrose's share of the cattle speculation was expended. The next year his Grace took legal means to recover his money, and got possession of the lands of Craigrostone on account of his debt. This render-

ed Macgregor desperate. Determined that his Grace should not enjoy his lands with impunity, he collected a band of about twenty followers, declared open war against him, and gave up his whole course of regular driving, declaring that the estate of Montrose should in future supply him with cattle, and that he would make the Duke rue the day in which he quarrelled with him. He kept his word; and nearly thirty years, that is, till the day of his death, levied regular contributions on the Duke and his tenants; not by nightly depredations and robberies, but in broad day and in a systematic manner; at an appointed time making a complete sweep of all the cattle of a district; always passing over those not belonging to the Duke's estate, as well as the estates of his friends and adherents: and having previously given notice where he was to be by a certain day with his cattle, he was met there by people from all parts of the country, to whom he sold them publicly. These meetings, or trystes as they were called, were held in different parts of the country; sometimes the cattle were driven south, but oftener to the north and west, where the influence of his friend the Duke of Argyle protected him.

“When the cattle were in this manner driven away, the tenants paid no rent, so that the Duke was the ultimate sufferer. But he was made to suffer in every way. The rents of the lower farms were partly paid in grain and meal, which was generally lodged in a store-house, or granary, called a *girnal*, near the Loch of Monteith. When Macgregor wanted a supply of meal, he sent notices to a certain number of the Duke's tenants, to meet him at the *girnal* on a certain day, with their horses to carry away his meal. They met accordingly, when he ordered the horses to be loaded, and, giving a re-

gular receipt to his Grace's store-keeper for the quantity taken, he marched away, always entertaining the people very handsomely, and careful never to take the meal till it had been lodged in the Duke's store-house, in payment of rent. When the moneys were paid, Macgregor frequently attended. On one occasion, when Mr. Graham, of Killearn, (the factor,) had collected the tenants to pay their rents, all Rob Roy's men happened to be absent, except Alexander Stewart, 'the bailie,' whom I have already mentioned. With this single attendant he descended to Chapellairoch, where the factor and the tenants were assembled. He reached the house after it was dark, and, looking in at a window saw Killearn, surrounded by a number of the tenants, with a bag full of money which he had received, and was in the act of depositing in a press, or cupboard; at the same time saying, that he would cheerfully give all in the bag for Rob Roy's head. This notification was not lost upon the outside visitor, who instantly gave orders in a loud voice, to place two men at each window, two at each corner, and four at each of two doors,—thus appearing to have twenty men. Immediately the door opened, and he walked in, with his attendant close behind him, each armed with a sword in his right and a pistol in his left hand, and with dirks and pistols slung in their belts. The company started up, but he requested them to sit down, as his business was only with Killearn, whom he ordered to hand down the bag, and put it on the table. When this was done, he desired the money to be counted and proper receipts to be drawn out, certifying that he had received the money from the Duke of Montrose's agent, as the Duke's property, the tenants having paid their rents, so that no after demand could be

made against them on account of this transaction; and finding that some of the people had not obtained receipts, he desired the factor to grant them immediately, 'to show his Grace,' said he, 'that it is from him I take the money, and not from these honest men who have paid him.' After the whole was concluded, he ordered supper, saying, that as he had got the purse, it was proper he should pay the bill; and, after they had drunk heartily together for several hours, he called his bailie to produce his dirk, and lay it naked on the table. Killearn was then sworn that he would not move, nor direct any one else to move from that spot for an hour after the departure of Macgregor, who thus cautioned him: 'If you break your oath, you know what you are to expect in the next world, and in this,' pointing to the dirk. He then walked away, and was beyond pursuit before the hour expired.

"At another collection of rents by the same gentleman, Macgregor made his appearance, and carried him away, with his servants, to a small island in the west end of Loch Catharine; and having kept him there for several days, entertaining him in the best manner, as a Duke's representative ought to be, he dismissed him with the usual receipts and compliments to his Grace.' In this manner did this extraordinary man live in open violation and defiance of the laws, and died peaceably in his bed, when nearly eighty years of age. His funeral was attended by all the country round, high and low, the Duke of Montrose and his immediate friends only excepted. How such things could happen at so late a period must appear incredible; and this too within thirty miles of the city of Glasgow, and, indeed, with a small garrison stationed at Inversnaid, in the heart of the country and on the estate which had belong-

ed to Macgregor, for the express purpose of checking his depredations. The truth is, the thing could not have happened had it not been for the peculiarity of the man's character; for, with all his lawless spoliations, and unremitting acts of vengeance and robbery against the Montrose family, he had not an enemy in the country, beyond the sphere of their influence. He never hurt or meddled with the property of a poor man, and, as I have stated, was always careful that his great enemy should be the principal if not the only sufferer. Had it been otherwise, it was quite impossible that, notwithstanding all his enterprise, address, intrepidity, and vigilance, he could have long escaped in a populous country, with a warlike people well qualified to execute any daring exploit, such as the seizure of this man, had they been his enemies and willing to undertake it. Instead of which, he lived socially among them, that is, as social as an outlaw, always under a certain degree of alarm, could do; giving the education of gentlemen to his sons; frequenting the most populous towns; and, whether in Edinburgh, Perth, or Glasgow, equally safe—at the same time that he displayed great and masterly address in avoiding or calling for public notice.

“These instances of his address struck terror into the minds of the troops, whom he often defeated and out-generaled. One of these instances occurred in Breadalbane, in the case of an officer and forty chosen men sent out after him. The party crossed through Glenfalloch to Tynedrum, and Macgregor, who had correct information of all their movements, was with a party in the immediate neighbourhood. He put himself in the disguise of a beggar, with a bag of meal hung on his back, (in those days alms were always bestowed in produce,)

went to the inn at Tynedrum, where the party was quartered, walked into the kitchen with great seeming indifference, and sat down among the soldiers. They soon found the beggar a lively sarcastic fellow, when they began to attempt some practical jokes upon him. He pretended to be very angry, and threatened to inform Rob Roy, who would quickly show them they were not to give, with impunity, such usage to a poor and harmless person. He was immediately asked what he knew of Rob Roy, and if he could tell where he was. The sergeant informed the officer, who immediately sent for him.

“After some conversation the beggar consented to accompany them to Crianlarich, a few miles distant, where said Rob Roy and his men were; and that he believed their arms were lodged in one house, while they were sitting in another. He added, that Rob Roy was very friendly, and sometimes joked with him, and put him at the head of his table: ‘and, when it is dark,’ said he, ‘I will go forward, you will follow in half an hour, and, when near the house, rush on, place your men at the back of the house, ready to seize on the arms of the Highlanders, while you shall go round to the front with the sergeants and two men; walk in, and call out that all are your prisoners, and don’t be surprised although you see me at the head of the company.’ As they marched on, they had to pass a rapid stream at Dalrie, a spot celebrated on account of the defeat of Robert Bruce, by Macdougall of Lorn, in the year 1306. Here the soldiers asked their merry friend the beggar to carry them through on his back. This he did, sometimes taking two at a time, till he took the whole over, demanding a penny from each for his trouble. When it was dark they pushed on, (the beggar having gone before,)

the officer following the directions of the guide, and darting into the house with the sergeant and three of the soldiers. They had hardly time to look to the end of the table, where they saw the beggar standing, when the door was shut behind them, and they were instantly pinioned, two men standing on each side, holding pistols to their ears, and declaring that they were dead men if they uttered a word. The beggar then went out and called in two more men, who were instantly secured, and in the same manner with the whole party. Having been disarmed, they were placed under a strong guard till morning, when he gave them a plentiful breakfast, and released them on parole, (the bailie attending with his dirk, over which the officer gave his parole,) to return immediately to their garrison, without attempting any thing more at this time. This promise Rob Roy made secure, by keeping their arms and ammunition as lawful prize of war.

“Some time after this, the same officer was again sent after this noted character, probably to retrieve his former mishap. In this expedition he was more fortunate, for he took two of the freebooters prisoners, in the higher parts of Breadalbane, near the scene of the former exploit; but the conclusion was nearly similar. He lost no time in proceeding in the direction of Perth, for the purpose of putting his prisoners in gaol; but Rob Roy was equally alert in pursuit. His men marched in a parallel line with the soldiers, who kept along the bottom of the valley, on the south side of Loch Tay, while the others kept close up the side of the hill anxiously looking for an opportunity to dash down and rescue their comrades, if they saw any remissness or want of attention on the part of the soldiers. Nothing of this kind offered, and the party had passed Tay bridge,

near which they halted and slept. Macgregor now saw that something must soon be done or never, as they would speedily gain the low country and be out of his reach. In the course of the night he procured a number of goat-skins and cords, with which he dressed himself and his party in the wildest manner possible, and pushing forward before day-light, took post near the road-side, in a thick wood below Grandtully Castle. When the soldiers came in a line with the party in ambush, the Highlanders with one leap darted down upon them, uttering such yells and shouts, as, along with their frightful appearance, so confounded the soldiers that they were overpowered and disarmed without a man being hurt on either side. Rob Roy kept the arms and ammunition, released the soldiers, and marched away in triumph with his rescued men.

“The terror of his name was much increased by exploits like these, which, perhaps, lost nothing by the telling, as the soldiers would not probably be inclined to diminish the danger and fatigues of a duty in which they were so often defeated. But it is unnecessary to repeat the stories preserved and related of this man and his actions, which were always daring and well contrived, often successful, but never directed against the poor, nor prompted by revenge, except against the Duke of Montrose, and without an instance of murder and bloodshed committed by any of the party, except in their own defence.”

QUADRUPEDS.

YOUR ideas of animal life appear to be pretty correct. I am pleased to find you have paid so

much attention to my essay on that subject. We will now proceed to quadrupeds.

If we take a comparative view of the different animals which people the globe, we shall immediately perceive, that quadrupeds, next to man, demand the pre-eminence of rank, for their strength, utility, and sagacity, and the near similitude in their structure between us and them.

In the early ages of the world, before they were subdued to our use, it is probable that they disputed the sovereignty with man. Man, while uncivilized himself, in every wild beast found a formidable rival, but since arts have been invented, quadrupeds have either become his assistants, or have been forced to retire from his presence. Yet the independent spirit of animals, though now domesticated and tame, was not broken without reiterated efforts; and several generations must have passed away, before they became perfectly docile. Take a wild dog or a cat from their native retreats, and you will find their ferocious dispositions in some measure transmitted to their young: yet not only their dispositions, but even their very forms, may be gradually altered by human application and ingenuity.

In a state of nature, animals are subject to few variations. In shape, size, and colour, they remain nearly the same; but cultivation and care essentially change their character, and vary their colours and their figures.

Observe the horse, the dog, and the cow: how many varieties have arisen from one parent stock! The fierceness of nature has been subdued and reclaimed; and animals once domesticated, feeling the necessity they are under of relying on the protection of man; from their inability to provide for themselves, submit to the duties of their station, and

become tractable and resigned. The very appetites and habitudes may indeed, be changed by human ingenuity. They may be taught to live on food, which, in a state of nature, they would not touch; and to perform labours that not only show docility but sagacity, acquired by an intercourse with the sons of reason.

On the other hand, some animals lose their natural instincts, in the vicinity of man. In those solitudes where they are seldom disturbed, beavers possess abundant ingenuity, and live in social order. But let man intrude, and their union is partially dissolved, their native instincts lost.

Next to human influence, the climate seems to have the most powerful effect on quadrupeds. Providence is bountiful to all its creatures. In cold countries, animals have naturally a long, warm covering—remove them to warmer latitudes, and the hair becomes short and thin; again transplant the natives of the tropics to the hyperborean regions, and they soon assume a dress adapted to their wants.

On the disposition too, the influence of the climate is perceptible. Under the line, and near the pole, quadrupeds are fierce and untractable; in temperate latitudes they are generally docile and mild. Has not the clime an effect on us also? Are not the perfection of the human powers, the sublimities of genius, and the best and mildest virtues of the heart, in some measure affected by situation? The contemplative mind will see an analogy between rational and irrational beings, under external impressions; and he who is a denizen of temperate regions ought to be thankful for the advantages of his situation, without censuring those who are less fortunate, and consequently less culpable, if they are deficient in knowledge, or erroneous in practice

In this general account of quadrupeds, we shall only farther observe, that the smaller the animals, the more prolific they are. Providence has wisely balanced the strength of the great against the fecundity of the little, that no species may be entirely lost; and that man may enjoy all the advantages which can be derived from the useful, without being too much annoyed by the formidable.

From these cursory remarks we shall now proceed to the systematic arrangement of quadrupeds.—Their essential characters are, that their bodies are covered with hair; that they have four feet; that the females are viviporous; and that they suckle their young. “Oh!” you will say, “all this you already know; and that quadrupeds must have four feet, or they would not deserve the appellation.” Patience! what do you think of men, bats, and whales being ranked among quadrupeds? Such is the system of Linnæus.

Animals with paps, or such as suckle their young, he calls MAMMALIA. The MAMMALIA, he divides into seven orders; the distinctions of which are principally established on the difference in the number, situation, and form of the teeth, though he does not entirely neglect the structure of the feet.

The orders are:

- I. PRIMATES: including men, apes, &c.
- II. BRUTA: including the sloth, armadillo, &c.
- III. FERÆ: including the lion, tiger, &c.
- IV. GLIRES: including the hare kind, mouse, &c.
- V. PECORA: including the sheep, goat, cow, &c.
- VI. BELLUÆ: including the horse, &c.
- VII. CETE, or the WHALE kind.

The whole number of known quadrupeds does not amount to three hundred.

Our ingenious countryman, PENNANT, has, per-

haps given the most accurate system of quadrupeds that ever appeared. His general divisions are into hoofed, digitated, pinnated, and winged quadrupeds.

But it is time I should finish my account of quadrupeds. You will be tired, I fear, before I get through all the other classes. None, however, are so important as this, and therefore greater brevity will suffice, should your attention flag, which I trust it will not. Quadrupeds are the least numerous of all the classes of nature, yet by far the most distinguished and useful, for the reasons already assigned.

INFLUENCE OF FRENCH PRINCIPLES.

“**I**F Atheism be true, all men undoubtedly ought to be governed by it. What would become of such a world, and of the atheist himself in the midst of it? No man could exercise confidence towards any other man. Without confidence no society can be happy—no friendship—no union—no connection between intelligent beings—can exist. Even thieves and robbers cannot without confidence form even their dreadful state of society. The world, dispossessed of it, would become an image of hell; and distrust, jealousy, wrath, revenge, murder, war, and devastation, overspread the earth. In the midst of millions, the atheist would find himself in a desert. His situation would be that of a hermit, his character that of a fiend. By day, he would hide himself in his den; by night he would prowl, as a wolf, for the prey on which he was to live.

“The only instance in which infidels of any description have possessed the supreme power and

government of a country, and have attempted to dispose of human happiness, according to their own doctrines and wishes, is that of *France*, since the beginning of the revolution. If we consider this government as established over a nation educated for ages to the belief and obedience of many doctrines of Christianity, and retaining, as to a great majority of the people, the habits formed by that education, the state of that nation will evince, beyond a question, that all which I have said is true without exaggeration. *France*, during this period, has been a theatre of crimes, which, after all preceding preparations, have excited in the mind of every spectator amazement and horror. The miseries suffered by that single nation have changed all the histories of the preceding sufferings of mankind into idle tales, and have been enhanced and multiplied without a precedent, without number, and without a name. The kingdom appeared to be changed into one great prison; the inhabitants converted into felons: and the common doom of man commuted for the violence of the sword and of the bayonet, the sucking-boat and the guillotine. To contemplative men, it seemed, for a season, as if the knell of the whole nation was tolled, and the world summoned to its execution and its funeral. Within the short time of ten years, not less than three millions of human beings are supposed to have perished in that single country, by the influence of atheism. Were the world to adopt, and be governed, by the doctrines of *France*, what crimes would not mankind perpetrate? what agonies would they not suffer?

“The whole of the atheist’s creed, with respect to the future world, is comprised in the following summary: that his body began by chance or necessity, is continued without design, and perishes

without hope—that his soul is a mere attribute of his body, useless and worthless while he lives, and destined, at his death, to rottenness and corruption. ‘*Death, or eternal sleep,*’ he engraves on the gate-posts of every church-yard; and consigns, by his mandate, the numerous inhabitants to the dark and desolate regions of annihilation.” Dr. DWIGHT.

THE SILLY QUESTION DEFENDED.

AN observant boy, passing along a street, saw a sign hanging before an inn, on which was painted, ENTERTAINMENT FOR MAN AND HORSE. What amusing tricks thinks he, can be exhibited here—how are *horses* to be *Entertained*? The idea of play was inseparable from the association his mind had formed. He could not rest, however, till he had put the question to his father, about the “entertainment of horses;” and when he had obtained an explanation, he was at a loss to conceive, how one word, as it appeared to him, should be used in such opposite acceptations.

You will probably smile, my young readers, at this; and think the boy was very silly. I tell you he was not: his curiosity was a laudable one; his observation on what struck his senses, shewed that he possessed an ambition to know more; and how was he, in such a case, to receive information, but by asking for it.

A proper acquaintance with things, when only casually obtained, is long in acquiring. Thousands overlook objects which every day fall in their way; and perhaps, to the end of their lives, are ignorant of the properties of many articles, and the meaning

of many terms, in common use, merely for want of reflectior .

To ask questions, provided they are not impertinent ones, argues a thirst for knowledge, and is one of the readiest means of laying in a stock of correct ideas.

Never, then, be ashamed to ask, what is proper to be asked; nor to say what ought to be said. Ignorance is no disgrace, till the means of obtaining information have been neglected; and early youth, having every thing to learn, can never be reflected on, unless it suffers the season and the opportunity to pass, unimproved and unregarded.

When in company with your parents and tutors, apply to them respectfully, when you are at a loss: they will love and admire you for the anxiety you display of becoming wiser. But in wishing to become wiser, study also to become better. All your acquirements without goodness, will be of no avail. Try to employ whatever learning you possess to some beneficial purpose—to be a guide to yourself, or to enlighten others.

Utility and ornament ought to be the objects of every study, as they are the only valuable fruits of all knowledge.

PERSEVERING SPIDER.

ROBERT BRUCE, the restorer of the Scottish monarchy, being out one day reconnoitring the enemy, lay at night in a barn belonging to a loyal cottager. In the morning, still reclining his head on his pillow of straw, he beheld a spider climbing up a beam of the roof; the insect fell to the ground;

but immediately made a second essay to ascend. This attracted the notice of the hero, who, with regret, saw the spider fall a second time from the same eminence. It made a third unsuccessful attempt. Not without a mixture of concern and curiosity, the monarch twelve times beheld the insect baffled in its aim; but the thirteenth essay was crowned with success—it gained the summit of the beam. The king upon this, started from his couch and exclaimed, “This despicable insect has taught me perseverance: I will follow its example. Have I not been twelve times defeated by the enemy’s superior force? on one fight more hangs the independence of my country.” In a few days his anticipations were fully realized by the glorious result to Scotland of the battle of Bannockburn.

MEANS OF CHEMICALLY DETECTING SOME OF THE

Deleterious Ingredients in Food, &c.

1. Alum in Bread

POUR half-a-pint of boiling distilled water upon a small piece of the suspected bread, pass the liquid through filtering-paper, and boil it down to half its original bulk in a florence flask; then add a few drops of muriate of barytes to the liquid thus obtained, and if a white precipitate fall down, which does not appear upon adding a few drops of pure nitric acid, the presence of alum may be inferred. Now alum is a triple salt, being a compound of sulphuric acid, alumine, and potash. In the process just mentioned the sulphuric acid is the substance detected. The detection of the other ingredients of the alum

is more difficult, and can only be accomplished by an experienced chemist.

2. *Lead in Wines.*

MIX equal parts, by weight, of powdered oyster-shells and sulphur, and keep this mixture exposed to a red heat, in a covered crucible, for fifteen minutes; and when cold, mix it with equal parts of cream of tartar; put these into a strong bottle with common water to boil for an hour: then decant the clear liquor into ounce phials, to each of which add twenty drops of muriatic acid. This liquid precipitates lead of a dark brown or blackish colour.

Sulphate of soda (Glauber salts) also precipitates lead from wine of a dark colour. Water saturated with hydrogen gas, to which a few drops of muriatic acid has been previously added, has the same effect.

3. *The Purity of Vinegar.*

VINEGAR is often adulterated with sulphuric acid, sometimes with lead. To ascertain if sulphuric acid be present, take a glass containing a little vinegar, and add to it a few drops of a solution of acetate of barytes. If a white precipitate be formed it may be inferred that sulphuric acid is present; and if a precipitate of a dark colour be formed upon adding a little water saturated with sulphuretted hydrogen, the presence of lead or tin may be inferred.

4. *Purity of coloured Confectionary.*

MANY of the preparations of sugar and flour are coloured with red-lead; and preparations of copper and pipe-clay are sometimes employed. The

presence of red-lead may be detected by pouring a little water saturated with sulphuretted hydrogen gas on the article. If it contain lead, the liquid will become of a blackish colour.—Copper may be discovered by pouring on it liquid ammonia, which soon acquires a blue colour if this metal be present.—Clay may be detected in articles composed of sugar, such as comfits, by dissolving them in a large quantity of boiling water, and letting the mixture stand for twenty-four hours. If clay be present it will fall to the bottom; and when the clay liquid is poured off, it may be had in a separate state. It should then be exposed to a strong heat, and if it contracts and becomes hard, the adulteration with clay is proved.

5. *Purity of common Salt.*

DISSOLVE a little of the salt in water, then add a few drops of carbonate of soda to a glass of the solution, which will precipitate any earthy substance which may be combined with the salt. Lime and magnesia are the substances which are most likely to be found in common salt.

6. *Purity of Citric or Lemon Acid.*

TO a saturated solution of citric acid, in water, add a few drops of a concentrated solution of muriate of potash. If a precipitate ensue, the citric acid is not perfectly pure; for muriate of potash does not occasion a precipitate in citric acid, but it has this effect in tartaric acid, which is often substituted by fraudulent dealers for citric acid.

HISTORY AND MANUFACTURE OF SUGAR.

SUGAR is obtained from the juice expressed from a plant called *Saccharum Officinale*, or *common sugar-cane*, which grows in great plenty in the East and West-Indies. It is said to grow spontaneously in America; but on the other hand it is asserted that it was not known in those regions till the Europeans colonized them. For a considerable time, however, it has been most industriously and successfully cultivated in the American islands within the tropics, and it is from these plantations that we now derive the greatest part of our supply of sugar.

It is a question not yet decided among naturalists, whether the ancients in general were acquainted with this plant, and whether they knew how to employ the juice expressed from it. All that we can gather from the arguments on either side is, that if they knew the properties of the sugar-cane, they did not understand the method of condensing, hardening, and whitening it; and, of course, they knew nothing of our sugar.

Very many vegetables secrete a sweet juice easily converted into sugar. From a species of maple *Acer Saccharinum*, sugar is annually obtained in America in considerable quantities. In Mexico it is extracted from the American Aloe, *Agave Americana*, and at Kamschatka from the *Heracleum Sphondylium*, and *Tucus Saccharinus*. Many roots also afford sugar; as beet, carrots, parsnips, &c.

In cultivating the sugar-cane the following is the method generally adopted. The soil chosen is a rich vegetable mould, in such a situation that it can be easily watered from the river. About the end of

May, when the soil is reduced to the state of mud, either by rain or artificial watering, slips of the cane, containing one or two joints, are planted in rows, about four feet from row to row, and a foot and a half asunder in the rows. From three to six canes spring from each of the slips which are set. They are cut in January and February, about nine months after they are planted; at which time they reach the height of eight or ten feet, and the naked cane is from an inch to an inch and a quarter in diameter. They do not suffer the canes to flower; for when this take place the juice loses much of its sweetness. The newly cut canes are put through the rollers of a mill, and their juice collected into large iron boilers, preparatory to its being made into sugar.

In North America it was noticed that sugar is procured from the *Acer Saccharinum*, or sugar maple tree, which abounds in its woods. The following is the method they adopt. When the tree is about twenty years old, it is then considered by them as having reached its maturity, its diameter being from two to three feet; and in the months of February, March, and April, when the sap most plentifully rises, they bore the tree with an auger to the depth of three quarters of an inch, and in an ascending direction. The hole is then deepened to two inches, and a wooden spout is introduced into the hole to direct the flow. The sap flows from four to six weeks. When it ceases on the south side, that on the north is bored. This process does not injure the tree, but on the contrary improves it. An ordinary tree yields, in good seasons, from twenty to thirty gallons of sap, from which are made from five to six pounds of sugar; or every forty pounds of sap yield about a pound of sugar; so that it is only about one sixth as rich as the East-India sugar-cane.

In order to make sugar, the expressed juice is boiled, with the addition of quicklime, or the vegetable alkali, (potash,) to saturate the superabundant acid. The boiling is afterwards repeated in smaller vessels, during which process it is often necessary to scum off the impurities, and to employ additional alkali. When the juice acquires a due consistency, it is suffered to cool in a proper vessel, and the sugar concretes in a crystallized or granular mass. This, after it is separated from the molasses, is sold under the name of brown or moist sugar. This same sugar, more purified, becomes white; and, being cast into conicle moulds in the process, is then the loaf-sugar of the shops.

Moist or brown sugar is the state in which it is generally imported from the West-Indies. When refined, it yields the following products from a cwt. of 112lbs.—

Refined loaf-sugar, about	64lbs.
Bastard sugar	—————17
Treacle	—————28
Extraneous impurities	— 3=112.

The bastard sugar is easily distinguished from other brown sugar by its dulness, for it has lost the shining, sparkling appearance of the moist sugar. It is an inferior article, being merely a residuum from making the refined, or loaf sugar, containing less of the saccharine principle, and is ground up to a very fine powder, and in that state sold at an inferior price.

The sugar spoken of above is produced either from the sugar-cane, or the maple sugar tree: but there are besides this various other kinds, sugar of figs, sugar of grapes, Botany Bay sugar, mushroom sugar, and sugar of manna. All of these chemically differ, and vary likewise in their degree of sweetness.

But besides these we should mention the sugar of starch; for it is a curious fact that this substance is capable of being converted into a sugar possessing exactly the same properties as the sugar of grapes. This singular discovery was made by Kirchhoff, a Russian chemist, as he was employed in a set of experiments to convert starch into gum. He conceived that the starch would be rendered soluble in water by boiling it with very dilute sulphuric acid; and by prolonging the boiling he gradually observed the conversion of the starch into sugar. Saussure ascertained that an hundred parts of starch, when converted into sugar, became one hundred and ten parts. Hence he drew as a conclusion that starch sugar is merely a compound of starch and water in a solid state.

This process of converting starch into sugar is exceedingly simple. The starch may be procured either from wheat or potatoes. It must then be mixed with four times its weight of water, and about one hundred part its weight of sulphuric acid, and the mixture boiled for thirty-six hours, fresh water being supplied from time to time as fast as it evaporates. After the boiling is over, lime must be added, so as to saturate the sulphuric acid, and the sulphate of lime thus formed must be separated by filtering. The liquor which remains is only sugar and water, and if concentrated by sufficient evaporation the sugar only will appear.

Sugar, is a part of our necessary food, or as adding to our luxuries, is too well known to require description. But its use as an aliment is by different medical men differently appreciated. While the great Boerhave supposed it to have a tendency to emaciate the human body, John Hunter recommended it as a restorative in cases of debility. How-

ever, in a moderate proportion, there can be little doubt but that it is nutritious, for all animals supported in their earlier state by milk, are nourished by on food containing a great proportion of sugar; and Dr. Cullen is of opinion that all food is nutritious in proportion to its saccharine quality. Still there are well authenticated cases in which an excess of sugar has been found to have done much harm.

To the Editor of the Youth's Instructor,

SIR—If the following Answers to the Arithmetical Puzzles and Questions are correct, you will oblige me by inserting them.—Your's respectfully,

* J. H.

ANSWER TO THE PUZZLE.

Suppose the value of each of the loaves to be equal, and each of the pieces of money to be equal—and suppose each man to eat $\frac{1}{3}$ of the loaves, then the man that had five loaves must have given $2\frac{1}{3}$ or 7-3 loaves to the stranger, and he that had three loaves only $\frac{1}{3}$ of a loaf—therefore $7-3 + \frac{1}{3} = 8-3$; now by rejecting the denominator the proportion will be as follows:—

<i>thirds.</i>	:	<i>pieces.</i>	::	<i>thirds.</i>	:	<i>pieces.</i>
As 8	:	8	::	7	:	7
As 8	:	8	::	1	:	1

ANSWER TO THE QUESTION.

Suppositions	140	$\div 2 = 70$		$120 \div 2 = 60$
	70	$\div 2 = 35$		$60 \div 2 = 30$
	35	$\div 2 = 17\frac{1}{2}$		$30 \div 2 = 15$
	$17\frac{1}{2}$	$\div 2 = 8\frac{3}{4}$		$15 \div 2 = 7\frac{1}{2}$
	$8\frac{3}{4}$	$\div 2 = 4\frac{3}{8}$		$7\frac{1}{2} \div 2 = 3\frac{3}{4}$
	$4\frac{3}{8}$	$\div 2 = 2\frac{3}{16}$		$3\frac{3}{4} \div 2 = 1\frac{7}{8}$
	$2\frac{3}{16}$	$\div 2 = 1\frac{3}{32}$	result	$1\frac{3}{32} \div 2 = 15-16$
	$1\frac{3}{32}$	$- 15-16$	$: 140-120$	$: 1\frac{3}{32}-1$
		$5-32$	$: 20$	$: 3-32$

12 which subtracted from 140 leaves 128 the answer.

I now propose the following Puzzle for the consideration of your readers, and would be glad to see it answered—

Suppose there are more persons in the world than any of them has hairs upon his head, it then follows as a necessary consequence, that some two of them at least must exactly have the same number of hairs on their heads to a hair.—Required the proof.