

FARM.

Stock Notes.

A good many farmers have the idea that milk is not just right for pigs until it is soured. This is a very serious mistake. No possible good can come from souring it, but very serious harm. After you take out the cream and the water, the most that remains is casein and sugar of milk. Both are valuable. But when you sour it you change the sugar of milk into lactic acid and lose nearly half the entire value of your milk. Feed milk sweet to calves and colts. Never let it sour if you can help it. Why will you throw away half its value? The Farmer's (Irish) Gazette gives the following different ways of treating bulky horses, which are recommended for trial: First, pat the horse on the neck, examine him carefully, first one side, then the other; if you can get him a handful of grass, give it to him, and speak encouragingly to him. Then jump into the wagon, and give the word go, and he will generally obey. Second, taking the horse out of the shafts, and turning him around in a circle until he is giddy, will generally start him. Third, another way to cure a balky horse is, place your hand over his nose and shut off his wind until he wants to go. Fourth, then, again, take a couple of turns of stout twine around the fore legs, just below the knee, tight enough for the horse to feel it; tie in a bow knot. At the first click he will probably go dancing off. After going a short distance you can get out and remove the string to prevent injury to the tendons. Fifth, again, you can try the following: Take the tail of the horse between the hind legs, and tie it by a cord to the saddle girth. Sixth, the last remedy I know, is as follows: Tie a string around the horse's ear, close to head. This will divert his attention, and start him.

POULTRY NOTES.

The farmer who keeps a flock of twenty-five to thirty hens, with the usual accompaniment of a hundred or more lively chicks, and allows them to share his domain in common with himself, his other stock and farm utensils, finds perplexity and most abominable company at every turn. The hen at large, in her multiplied form, is worse than an army of locusts, and her following as offensive as a pestilence. An experienced poultryman thinks the essential cause of failure in so many of the attempts to keep fowls in large numbers is due to a lack of care. A farmer will rise at four o'clock in the morning to feed and milk his cows, will carefully clean out the stalls and prepare the beds for the cows, and his work does not end till late; but he will not do so much work for the hens. Yet the hens will pay, when properly cared for, five times as much profit, in proportion to labor and capital invested, as the cows. If young chicks and turkeys appear stupid and ailing; examine them for lice. A little grease put on top of the head and under the wings will generally prove efficacious. Treat the mother in like manner. Fumigate the hen house by burning sulphur therein, making the house as close as possible for a few hours. Also wash every part with kerosene, or whitewash with caustic lime at least twice a year, and give the fowls plenty of dust or dry ashes, and there will be no trouble from lice. The only sure way to clean out a nest should the contents become soiled, is to carry the box outside, burn the hay, and then dip a sponge in kerosene and apply a lighted match to the box, first rubbing it over with the sponge. The oil will burn for a few moments over the box and then cease. If there are any lice they will have but a poor chance. If an egg is broken in the nest the result is usually lice, unless the nest is at once cleaned, and the best mode is to begin anew with the box very clean and fresh cut hay put in. An correspondent of the London Journal of Horticulture says, in reference to the question of sex in eggs: Last winter an old poultry keeper told me he could distinguish the sex in eggs. I laughed at him, and was none the less skeptical when he told me the following secret: Eggs with the air bladder on the centre of the crown of the egg will produce cockerels; those with the bladder one side will produce pullets. The old man was so certain of the truth of this dogma, and his poultry yard so far confirmed it, that I determined to make experiments upon it this year. I have done so, registering the egg bladder vertical, or bladder on one side, rejected all in which it was not one or the other, as in some it is only very slightly out of the center. The following is the result: Fifty-eight chickens were hatched, three are dead, eleven are yet too young to decide upon their sex; of the remaining forty-four, every one has turned out true to the old man's theory. This, of course, may be an accidental coincidence, but I shall certainly try the experiment again.

DAIRY NOTES.

When a cow steps in the milk pail she also steps into the butter. If she only kicks over the milk she simply wastes her food. Butter shrinks as well as other articles and such is often the cause of errors in reports of sales when butter is shipped long distances and remains unsold for several weeks. There is no time, says a wise man, to waste with kicking cows. If you have one, just put a hame-strap in her mouth and buckle it tightly behind her horns. Take it off when done milking, of course. It is always best to milk rapidly, so as to get the milk out of the stable as soon as possible, in order to prevent the absorption of gases by the milk, as the cooler it becomes the more readily the milk is affected by odors. An Iowa Agricultural College bulletin makes the following classifications of the relative values of foods as milk producers: Potatoes, per 100 pounds..... 10 Corn, per 100 pounds..... 50 Timothy, per 100 pounds..... 50 Barley, per 100 pounds..... 55 Oats, per 100 pounds..... 60 Wheat, per 100 pounds..... 65 Wheat bran, per 100 pounds..... 70 Clover hay, per 100 pounds..... 80 Oil meal, per 100 pounds..... 1.45

A great many people are under the impression that in feeding ground food to stock it is better to make it into a slop that the animal can drink. Prof. E. W. Stewart truly says: "The saliva is an important agency in the digestion of food, and saliva is caused to flow by the act of mastication. When sloppy food is given there is

no mastication. This sloppy food, then, is deprived of the usual proportion of saliva, and must depend wholly upon other agencies of digestion."

GARDEN NOTES.

A remedy for rot and mildew in grapes, said to be effectual, is stated as follows: One pound nine ounces sulphate of copper, dissolved in two gallons of water, three pounds quick lime slaked in two and a half quarts of water. Mix, and apply lightly with a whisk brush or by other means of spraying. The application is used as a preventive, and not as a cure, and the first two weeks in July are stated to be the proper time of application in the North. The fruit itself should not be sprinkled.

A Chinese Gambling Station.

The Portuguese possession of Macao, one of the oldest European settlements in the Orient, would be of little importance to its rulers were it not that it is to the Chinese of the island and some of the foreigners what Monte Carlo is to Europeans. It is one of the gambling places of the world. One company pays to the Portuguese proprietors of the island \$150,000 a year for the privilege of running its several houses. Fan tan, the gambling game played here, one of the simplest of games, allowing neither the excitement nor the possible large winnings of roulette, is irresistibly fascinating to the Chinese. They throng the fan tan place, crowding around the tables and placing their little earnings upon a corner of the 1, 2, 3 or 4. It is not at all uncommon to see them, when all their money is lost, take gold or silver ornaments from their dress or even parts of the dress itself and stake them against sums considerably lower than their value. The game of fan tan is learned at a glance. A flat piece of lead or other metal, about a foot square is placed in the center of the gambling-table. Its sides are numbered from 1 to 4. The gambler places his money on one side of the corner, betting upon one of the numbers or upon a combination of numbers. In the former case, should he be successful, he receives three times the amount of his stake, less about 10 per cent. commission for the bank. Should either of the numbers upon the corner or combination of which he has made his wager win he receives his stake, minus the same commission. There are no cards or wheel, but a pile of small round coppers having a little square hole in the centre of each and called cash. A handful is taken and placed in the center of the table under an inverted bowl. When all bets have been made the proprietor of the bank moves the bowl and carefully takes from the pile four cash: then four more, and so on until four, three, two or only one is left, which is the winning number. It is a most tedious game, for the central pile must be so large that the number of cash which it contains cannot possibly be told, and the process of drawing them out by fours takes considerable time. But the poor Chinese who have staked their all upon one of the numbers hang over the table and watch that gradually diminishing pile, intensely fascinated. Having won, they try again, until they have at last lost. Losing, they go off to beg, borrow or steal more capital with which to try their fortune once again.

The Working Man.

The Co-operative Congress, which met at Carlisle on May 30, insisted, and not altogether without reason, that the saying that "co-operation is the new law of civilization" is likely to be borne out by the growth of the movement in Europe. It is not a little singular that in Canada and the United States co-operative labor does not find favor with the artisan. At any rate, if he be favorable to it, he appears to be unable to make it pay. At the Congress Mr. Holyoake, the well-known labor reformer, made the following extraordinary statement regarding what has been accomplished in the United Kingdom: "By co-operation the working class, represented by this congress, have attained what competition never gave signs of giving them. They now own land, they own streets of dwellings, and almost townships, they own vast and stately warehouses in Manchester, in London, in Newcastle on Tyne, and in Glasgow. They own a bank whose transactions amount to £16,000,000 a year. They possess more than 1,400 stores, which do a business of over £30,000,000 a year; they own share capital of £9,500,000 in amount, and are making now for their 900,000 members, more than £3,000,000 of profit annually. The mighty power of co-operation has enabled the working class in the last twenty-five years (from 1861 to 1886) to do a business of £361,000,000, giving them a profit of nearly £29,500,000. Their splendid Wholesale Society has buying stations in the chief markets of Europe and America. Their ships are on the sea. The lifeboats they have given ride on our coasts. They aided in establishing a Mississippi Trading Company; they have invested £80,000 in the Manchester Canal. They issue a newspaper, minor journals and records, and a wholesale annual volume of no mean bulk and quality. They erect public fountains, they subscribe to hospitals and charities, as gentlemen do. They own libraries, news-rooms, and establish science classes."

Mrs. Imogene Fales, a delegate to the Congress from the United States, deplored the failure of the movement on this side of the Atlantic, and gave a gloomy account of the state of the labor market across the line. She said the average of industrial incomes had within ten years fallen from \$400 to \$200. The purchasing power of wages had declined 16 per cent. The wage-earner was worse off than he was a few years ago. The idle labor in 1885 was 7 1/2 per cent. of the whole. Capital owned labor, and wages were fixed by pools and conferences. An English labor journal, in discussing the proceedings of the Congress, asks "how it comes that co-operation has hitherto proved a failure in America?"

AN AESTHETIC WARFARE.—A humane German chemist has hit upon an idea which, if adopted, would be worth a dozen new explosives. He makes a bullet so brittle that it breaks when it strikes, and a powerful anesthetic being enclosed, that renders instantly and completely insensible any persons that may be wounded by it. The insensibility lasts at least twelve hours, during which time the bodies may be comfortably removed to a hospital, with a great reduction of suffering on the battle-field. Such, at least, is what is claimed.

HOUSEHOLD.

My Charming Little Housekeeper.

BY HELEN CLARE.

She dusts the Sevres and bric-a-brac, With just the daintiest little knack, And always puts my papers back— My charming little housekeeper.

Rare jellies makes—meringues and creams More far than ever poet's dreams— Like drifted snow your frosting gleams— My charming little housekeeper.

Nor doth the prose of cooking slight, Her bread is sweet, and white and light, Her biscuits are a goodly sight— (Ah, charming little housekeeper.)

She reads with me the magazines, Although to one she always leans; She makes the most artistic screens— My charming little housekeeper.

She sings to me with dulcet voice (Fair Patti's notes are not so choice,) She doth my classic soul rejoice, My charming little housekeeper.

What wonder that I love her—then— As much—and even more—than when Last May, the church beside the glen— Oh, charming little housekeeper.

Received a bright and joyous throng, Rich voices swelled a marriage song, To me you promised to belong— My darling little housekeeper.

HOUSEHOLD HINTS.

To brighten stove-zincs, rub with kerosene.

Iron rust is removed by salt mixed with lemon juice.

Use a warm knife in cutting warm bread and the like.

A layer of leather in the iron holder makes it cooler to use.

A little molasses upon a mustard draft will prevent blistering.

Medicinal herbs should be dried, put in paper bags and labeled.

A paste of whiting and benzine will remove spots from marble.

A bit of soda dropped in the cavity of an aching tooth will afford relief.

Tissue or printing paper is the best thing for polishing glass or tin ware.

To remove ink spots, dip the spotted part in pure melted tallow, then wash.

Herbs used in cooking should be pounded, sifted, and put into bottles or tin boxes.

Egg shells crushed and shaken in glass bottles half filled with water will clean them quickly.

The juice of half a lemon in a glass of water, without sugar, will frequently cure a sick headache.

Paper will stick to walls that are washed in a solution of one-fourth pound of glue to a gallon of water.

A pretty hammock pillow is made of bright awning cloth, with some simple design set between the stripes.

Peach leaves pounded to a pulp, and applied to bruise or wound from rusty nail, or a simple cut, will give immediate relief.

Cayenne pepper blown in o the cracks where ants congregate will drive them away. The same remedy is also good for mice.

Sunshine on mirrors will injure their lustre, therefore do not hang opposite a door or window.

As far as possible iron by the thread—that is, pull the material straight and endeavor to move the iron in the same line with the thread of the cloth.

Rain water is the best for toilet purposes and keeps the skin soft and smooth. Boiled rain water is considered as effective as a Turkish bath in removing tan.

Vinegar is better than ice for keeping fish. By putting a little vinegar on the fish it will keep perfectly well, even in very hot weather. Fish is often improved in flavor under this treatment.

To clean windows, wash with luke warm water, rub with any clean, dry cloth to take off the first dampness, then finish with a piece of chamois. A large one can be purchased for 50 cents, and it will last a lifetime and will save so much hard work. When soiled, wash in soapuds, rinse well and dry, then rub it in the hands to make it soft. For silver it is unequalled. Also wring it in tepid water, and use it to rub off the finger marks on the piano, then rub with a dry one.

Domestic Life in Japan.

Generally speaking, the Japanese men make kind and affectionate husbands, and the women make virtuous and exemplary wives and mothers; and the children are certainly the happiest little imps in the world; their parents fondle and spoil them most effectually, and at the same time never lose their control over them. The non-irritating nature of the native diet has much to do with such serene nerves and temperaments. One never sees a child whipped in Japan; a reproving mother may administer a mild slap over the head, which correction invariably brings the little recalcitrants to order. The husband has absolute control over the person of his wife; at the same time, one never sees a man strike a woman in Japan; yet there is considerable pinching and slapping done on occasions when those strange and ungovernable spells of exasperating ugliness known as tantrums settle down upon their matrimonial horizon. On these occasions there is considerable free hitting, biting, and scratching indulged in on both sides of the house; but the greater strength of the husband invariably leaves him master of the situation, and the belligerent household speedily resumes its serene and happy course. On such occasions, unless physical force were resorted to, it would be difficult to say where matters would end; for the women are very childish, and in their paroxysms of fury might speedily demolish the household, unless restrained. These family jars are not of frequent occurrence, but they make up in intensity for their rarity.—Brooklyn Magazine.

SKIN HEAT.—Though the interior of the body retains a quite constant heat of 98 to 100 degrees, the temperature of the skin varies considerably in different parts. Prof. Kunkel, at Wurzburg, has just found that in the face in adult men it ranges from 85 to 89 degrees. The skin of the more exposed parts of the body, the nose and the ears, shows a lower temperature, seldom exceeding 75 degrees, and even descending to 71.5. The highest surface temperature appears in men in the full vigor of life, and the remarkable fact is observed that the skin of children is cooler than that of adults—being from 77 to 84 degrees.

STATISTICS.

VERMONT PRODUCTS.

The annual product of butter in the State of Vermont is stated at 27,400,000 pounds; of maple sugar at 10,000,000 pounds; of wool at 3,000,000 pounds, and of hay at 1,000,000 tons.

THE CHICAGO ELEVATORS.

Chicago elevators contained last week 15,202,521 bushels of wheat, 5,583,433 bushels of corn, 1,311,895 bushels of oats, 120,912 bushels of rye, and 27,762 bushels of barley; total, 22,246,523 bushels of all kinds of grain, against 11,827,937 bushels a year ago.

THE BIBLE SUPPLY.

The American Bible Society issued during the year, 1,675,897 copies of the Scriptures, making the total number of volumes issued by the society since its organization in 1816 48,324,910. The last year has been the fifth in which the society has been engaged in its fourth resupply of the Bible to the United States. In the course of its work it has found that every eight family visited is without a Bible. Of families visited 400,000 received it when offered, and more than 150,000 rejected it.

THE EMIGRATION OF THE WORLD.

Recent statistics show that 19,000,000 of people are residing in other than their native country. In England there are 203,000 foreigners; in Russia 344,000; France 1,001,000; Switzerland, 211,035; Austria, 182,676; Belgium, 1145,665; Holland, 69,971; Italy, 59,856; Scandinavia, 50,968; Spain, 41,703. In North America there are 7,300,042 foreigners; in South America, 6,033,105; in Asia, 1,584,344, and in Africa, 140,383. England takes the lead in the number of people who leave her shores. At the present time 4,200,000 of her sons are scattered over the world. Germany comes next, with a total of 2,601,000; strangely enough 82,000 of these are residing in France alone, while 2,000,000 are in the United States. The other nations rate in following order: Italy, 1,000,000; Scandinavia, 795,070; Belgium, 497,000; France, 382,662; Spain, 453,400; Austria, 337,000, of whom 118,000 reside in Germany.

COST OF WAR AND EDUCATION.

The Pall Mall Gazette gives the following figures, showing the contrast between the expenditures per head on war and education in the various European States, as compiled by M. Leon Donnât, a Belgian statistician:

	War	Education
	s. d.	s. d.
France.....	20 0	1 5
England.....	13 6	3 1
Holland.....	17 9	3 2
Prussia.....	10 11	2 5
Russia.....	10 2	0 1 1/2
Denmark.....	8 8	4 7
Italy.....	7 6	0 8
Austria.....	6 8	1 6
Switzerland.....	4 10	4 2

This comparison, of course, takes no account of the frightful waste entailed by the sacrifice of the labor of able-bodied men during the period of military service.

WHY THEY RAISE GOOD HORSES.

As shown from authentic reports, the French government expends annually upon its horse-breeding establishments no less than \$1,348,600. The government of Austria gives something over \$400,000, and that of Hungary \$582,500 toward the encouragement of horse-breeding, but a large amount (\$80,000) in Austria alone is spent on the purchase of promising-looking young horses from private breeders for incorporation in the government establishment. The total asked for the purpose of improving the breed of horses in Austria alone is little short of \$700,000 a year. In Prussia there are eighteen establishments, three of which consist of stallions and brood mares. The remaining fifteen are situated in the various provinces, and are depots for the stallions bred in the three studs referred to. The cost of the breeding establishments may be roughly estimated at \$400,000.

A New Apple Pest.

As long ago as 1872 I found the larvæ of a little flea beetle known as *Haltica punctipennis* in Missouri, feeding upon hawthorn. In 1877 I found it again in Colorado, but the species has never been considered injurious until the present year. This spring, however, it has appeared in great numbers in the vicinity of Dallas, Tex., and of Gainesville, Tex. Mr. J. R. Johnston, of Dallas, writes that they appeared in great numbers about the first week in May, and that within two or three days thereafter they had destroyed his entire lot of apple and pear grafts. They then removed to his one and two year old apple trees. Mr. Johnston had never been troubled with them before, although he remembers to have seen them in limited numbers in 1883 upon his young apples.

The habits and general appearance of this new apple pest are quite similar to those of the grapevine flea beetle (*H. Chalybea*). The larva is rather slender, dark yellow-brown in color, with darker head, and prothoracic shield, and each segment bears four transverse dorsal warts. The legs are black, and project out at the sides of the thorax.

The adult beetle is shining green rather than steel blue, and is distinguished from the grapevine flea beetle by its small size and by the numerous minute impressed dots on its thorax and wing covers. This insect, although exciting considerable alarm, will easily be subdued by arsenical poisons, the use of which is well understood in Texas. Mr. Johnson has already applied Paris green in its dry form with good results.

A severe electric shock was felt by a telegraph operator of Nice during the earthquake of February 23. A study of the phenomenon has convinced M. Obimus that earthquake movements are normally accompanied by strong electric currents.

In late experiments a red-hot wire was made to serve as a telephone transmitter. A fine platinum wire, several inches long, was placed in a circuit with charged accumulator, an induction coil and a receiving telephone; and when the current had heated the wire, words spoken to the latter were audible in the telephone.

An American inventor announces a combination of telegraph and type-writer by which seventy or eighty words per minute can be sent and automatically received in printed form. Among its advantages he claims that the stealing of messages, by cutting the wire and inserting a sounder, as is sometimes done in the Morse system, will be impossible, since the signals would be meaningless without his complete apparatus.

THE COASTGUARD'S WIFE.

When Hal married me in London, mother was caretaker of a house set apart for officers, and Hal first saw us when he came on business to a shipowner's. Our life was restricted, as we lived underground, and only appeared upstairs after office hours. You can fancy what a change I found it when he took me away to his seaside home at Morthoe, in North Devon, where he was coastguard. I first saw the sea in September, when a gale blew. I shall never forget what I felt when Hal put his arm round my waist and led me along a jagged path to a point where we overlooked the Mort Rock. The waves were rolling inwards like heaving mountains, which tried their strength against the rock of death, and then gathered themselves together again to break on the shore in a voice of thunder.

Was this the sea of which Hal had said that it laughed in the sunshine, and sang soft melodies when the moon lit a track of light to the heaven's above? He had spoken of the joy of a fresh breeze and a full sail when the *Petrel* skimmed the waters more lightly than his namesake; and now he showed me this—this awful seething deep, where brave men perished and left their wives to weep.

"Oh, Hal!" I cried, "I shall never dare to let you set sail on that dreadful sea. I shall not know a happy moment while you are abroad in such danger."

Experience, however, made me brave. Many times Hal faced the terrors of the deep in his performance of duty, and God gave him back to me unharmed. I grew to love the sea, and our babies knew no sweeter lullaby than his song; for, like their father, they were born sailors—yes, every one of them, for they were all boys.

The September gales had not harmed me during twelve years. Other wives on that dangerous coast had cause to remember them with grief, but God permitted us to tread a prosperous path heavenwards, and our earthly home was unbroken while we together strove to prepare for a more abiding one, where "there shall be no more sea."

But there came a day when my first dread of it returned, reinforced by a mother's fears as well as a wife's. Hal had started out betimes, taking our eldest boy with him in his own boat. They had put off from a creek close by, crept round the point, and made towards Rockham, where they had set their lobster pots, and then intended to put in to Lea, where they hoped to sell their lobsters to the visitors who crowd that little place during the autumn season.

I was busy at home all day. The wind blew fresh and the waves broke heavily, though I did not heed them. Evening closed in, but father and the child did not come. The wind rose to a gale, and the waves broke like turbulent giants. Later on the neighbors came in and asked whether Hal had returned, and one went in to Lea but came back without tidings.

Oh, that weary night when I waited and watched alone!

At the first streak of dawn I woke Dick, my second boy, and together we braved the gale and fought our way to Lea—the only place where it would be possible for a boat to run in. How quiet the little harbor looked! How safely anchored the one ship which lay in port!

Not a soul was astir but Dick and me. We stood in the shelter of the trader and looked yearningly for those whom we waited. The sun rose, and still we waited. The village awakened, and kindly faces gathered round us, but our watch was unended. Gentle hands tried to lead us home, but Dick and I were not to be moved. We waited.

It was again evening when at last a hand—the hand I had despaired of ever clasping again—took mine firmly, and my husband said, in strangely altered tones, "Come home, wife. Come home, Dick."

Hal, thank God, was safe! But where was my boy?

In the darkness and storm God had called a little child unto Himself. The *Petrel* had gone down, and father and son were lost to each other in the shock of striking the rocks. Hal was saved by a fishing smack which safely outrode the storm, but we all, father, mother, and boys, wait till the sea gives up its dead "for the touch of a vanished hand, and the sound of a voice that is still."

But out in that fierce storm "Christ walked upon the waters," and when death seized our darling his clear, childish faith would exclaim with the sailors of old, "Save, Lord, or I perish!"

We know he did not perish, so we still wait. Yes, we wait for the dawn of the eternal day, for we sorrow not as those without hope. And yet—oh! tears are bitter, and mine are a mother's tears!—

Is Borrowed Money an Injury.

Some very extraordinary views and opinions were expressed in the Senate the other day by a number of gentlemen on the subject of Canadian loan companies and their operation. The immediate cause of this curious criticism was the second reading of a bill to enable the Canada Permanent Loan and Savings' Company to register its stock in Britain as well as in Ontario, and to do business in other provinces of the Dominion than this. Mr. Wark, in denouncing to the passage of the bill, desired "some proof that these institutions were really doing good to the country." He spoke sadly of the Ontario farmers, who owe these concerns some \$30,000,000, and pay \$5,000,000 or \$6,000,000 for the use of it, and had "strong doubts whether it is really for the advantage of the Maritime provinces to allow these companies to go there and lend money on the terms they lend at in Ontario. Our country is too poor to bear such burdens."

STELLAR INFLUENCE ON CLIMATE.—In a paper to the Liverpool Astronomical Society, Mr. W. H. S. Monck suggested lately that the puzzling climatic variations recorded by the rocks may have been produced by the near approach to the earth of intensely hot stars. This may have been due to the traveling of the star itself, or to the motion of the solar system in space. Moving with the earth's own rate, a celestial body would traverse in 50,000,000 years the distance separating our globe from the most remote of the 70,000,000 stars visible in the most powerful telescopes, making it possible that, with suitable proper motions, any or every star known may have visited the solar system during the period commonly assumed by geologists to have elapsed since the first dawn of life. Intensely hot stars may have added materially to the earth's heat without coming sufficiently near to greatly derange the planetary orbits.