

rate them, were the two last of the herd of thirteen that were put on board the Anchor line steamer Funnessia recently.

They reached their pens at half past eleven, just five and a half hours after the first one went aboard. Trouble had been anticipated with these two, but they proved the most docile of all. To avoid separating them by hoisting them on board singly, as the others had been, they were led up a specially made gang plank, Columbia first and her mother following.

It took all of Saturday night to get the ponies, sacred cows, and zebras below and the band wagons and chariots on the upper deck.

The valuable buffalo which Mr. Bailey had sent on from Montana died in his box on the pier. Superintendent McLean said that the animal had fretted and worried himself to death.

The yak, a beautiful, silver-haired animal, had a fall at midnight. He was slung in a breeching, and just as everything was ready to lower him down the after hatch he slipped out of the sling and fell at least twenty-five feet, striking full on his left side, breaking two ribs and fracturing several others. He got up and staggered about, and for a time his keepers expected to see him die.

Felix McDonald, the animal trainer and veterinary surgeon who goes with the show, said the animal's chances of recovery are fair, if the weather is good and peritonitis doesn't set in. This and the death of the buffalo were the only accidents which occurred during shipment.

The Messrs. Henderson of the Anchor line and Capt. Martin remained on board all night to see the elephants put on board, but they were disappointed, for it was just six o'clock in the morning when Gyp, the first elephant, was hoisted aboard. She is a careful old body. She sniffed at the big oak cage on the wharf and trumpeted a little, but at a word from Keeper Newman she walked in and allowed herself to be shut up and chained. Then a big derrick hoisted her on board. She was placed facing inboard on the starboard side just abaft the fore rigging. She is twenty-six years old. Nine-year-old Nick was the next elephant put on board. They let him walk out of his cage into the space forward of Gyp. Mandarin, twenty-four years old, came next. He didn't like the cage a bit, but when it was lifted by its three five-inch manila cables, the old fellow showed his presence of mind by getting his sea legs on and bracing himself in sailor fashion. There wasn't any trouble until it came to Don's turn. Don is ten years old, and he appeared to think he knew a thing or two about ships. Up the gangplank he wouldn't go, at least he didn't mean to if he could help it, and the way he smashed boxes and ripped up bales on the pier for a few minutes astonished even his keepers, who finally, however, got steam power at work on him, and fairly dragged him up the gangplank by the neck. When he got half way up, he surrendered. Tip is fourteen years old. He was hoisted aboard next, and then big Fritz, who is twenty-one years old, and generally ugly, but this time he made no trouble. Twenty-eight-year-old Juno followed. Then came Hat, who is 13, and Palla, 22. These two behaved very well, and so did Lena, who is twelve years old, and the little trick elephant Mary, whose age is doubtful. Newman says seven is near it. Babe is twenty-one. Her daughter Columbia is the only elephant ever born in America. Her birthday was March 10, 1880, and her birthplace Philadelphia. Her mother was then owned by the Cooper & Bailey circus. The little elephant was the best attraction that year in any show. The heaviest of them all was Mandarin. He weighs 9,000 pounds. Six heavy oak-framed cages, twelve feet long by eight feet high and about six wide, and weighing about a ton each, were used to hoist the monsters on board and to keep six of them in during the passage. The rest stand in spaces between and at the ends of the cages.

THE JAPANESE PAPER FROG.

THE Minister of Public Instruction, of Japan, sent to the exposition an interesting series of industrial and artistic designs and various samples of joinery, pottery, etc., executed by the male and female children of the infant schools of the country. The specimens exhibited were interesting, and showed much intelligence and taste on the part of the young Japanese designers; but there were also other objects to be seen that were none the less curious. Such were the works of recreation done by the little children of the Azabu private

new regular points as shown in Fig. 4. This operation performed upon the eight faces of the folded paper will give the result shown in Fig. 5. It will be necessary to again fold each face and bend the points, *s*, toward the central axis (Fig. 6), and to take care to form the folds of the points, *a*, as well as possible. Fig. 7 shows what remains to be done to finish the frog. The two upper points, *a*, are raised and bent in order to form the fore legs, and the two other and lower points, *a*, will serve for forming the hind legs.

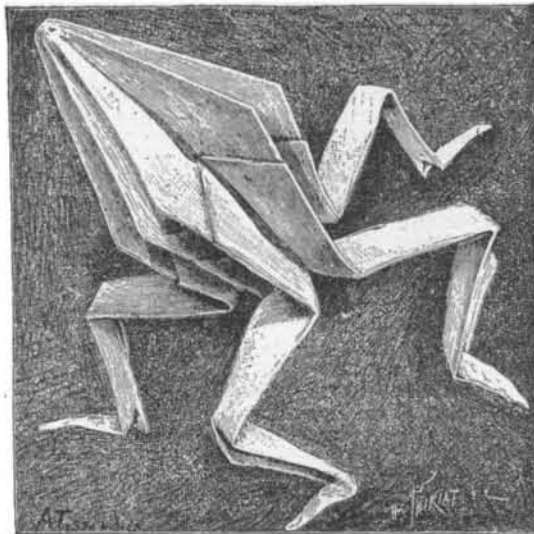


FIG. 8.—JAPANESE PAPER FROG.

The left hand side of Fig. 7 shows the unfolded points of paper, and the right hand side gives the aspect of the finished legs of the frog.—*La Nature*.

THE FOOD AND CARE OF HORSES.*

By GEO. G. MULHERN.

THOUGH the place of that noble animal, the horse, is now being usurped by his powerful rivals, electricity and the cable, still he is yet and probably will be for some time the motive power of many a street railroad.

Managers differ greatly as to the subject of this paper, and after an experience of twenty-seven years I find that in this, as in all other business, there is still more to learn.

We have yet to arrive at that state of perfection in the feeding and care of horses when each animal shall receive just the right amount of food at exactly the right time, and be cared for and groomed with regard to his own peculiar physical condition. If that state of perfection is ever reached, it will indeed be the horses' millennium.

BUYING THE STOCK.

I have always attended to the choosing and buying of the stock personally; but with all possible care in selection, as to the proper weight, build, etc., for our use, I often find that the animal which seems perfectly fitted for the work "goes all to pieces" in a short time, while the one which I hesitated to purchase as seemingly inferior proves an excellent "railroader."

Places differ so materially, in climate, construction of roads, whether level or hilly, etc., that the kind and size of horse suitable for one part of the country would be entirely unsuitable for another. In this connection I will state that I am inclined to the opinion that horses should be bought near the place where they are to be used. I have found that for our use Ohio stock is best. The experiment of bringing in horses from other States has never been successful with us. Whether the same holds true in other States or is the effect of our peculiar raw climate, I have no knowledge.

We buy horses weighing from ten hundred and fifty to twelve hundred pounds, and prefer "blocky" ones.

A new horse should be trained gradually, by driving him, one-quarter of his work at first, with an old horse, at a time of day when travel is dull. One can soon

day has become as much a matter of course as the luxurious car which he pulls or the neatly uniformed and polite conductor, so far advanced are we in these modern days.

FEEDING.

Much of this improvement is doubtless due to the system of feeding now universally conceded to be the best, *i. e.*, mixed ground feed in small quantities and at short intervals. No set rule can be given, as no two horses are alike.

The habits of each horse should be thoroughly learned by the feeder, whose position is a very important one. He should have a certain proportion of horses allotted to his care (not too many), should always feed and tend them himself and become perfectly familiar with the peculiar needs of each.

When a team comes in from their trip, a handful of loose hay should be thrown down to them. Then when their regular time for feeding comes (which should never be just after or just before a trip), they are fed from six to eight quarts of ground oats and corn mixed with cut hay and dampened. They are watered every half trip, oftener in summer. The sponging out of the mouth and nostrils at the end of the trip is very refreshing in hot weather. On our short lines each team does half its work in the morning and half in the afternoon. On our long lines one round trip of fifteen miles constitutes a day's work, with a lay-over of ten minutes at the end of the line, when, on hot days, the sponging referred to above is very beneficial.

We groom our stock twice a day, and I think we will all agree that too much grooming is hardly possible, as the more a horse is groomed the better he feels and therefore gives better satisfaction.

After the horses have stopped eating, the feeder should see that each feed box is thoroughly cleaned out, and he can soon judge of the capacity of the different animals by the amount of food left in the boxes. After he has once learned this there is no necessity for under or over feeding the stock. This cleansing of the boxes is just as essential as the cleanliness of the stable itself, which should be kept thoroughly neat at all times. That it should be well ventilated and lighted we all know. Disinfectants are necessary, especially where there are a large number of horses, when they should be constantly used.

DRIVING.

If the feeder should devote his whole time and attention to the care of his proportion of the stock, so also should the driver. I cannot lay too much stress upon this point. It is a proved fact in my experience that when a team is driven promiscuously, first by one man and then by another, they grow thin and broken down in a comparatively short time; when, if driven constantly by one man, they become accustomed to his voice and touch and keep in good condition.

The man also becomes attached to the team he handles and is much more careful of them, to prevent any unnecessary strain at starting, than if he drives every team in the barn. He is more apt to be watchful and report slight bruises or cuts that, attended to at once, may prevent permanent injury. I would say, right here, that there should be a positive rule, in every barn, that each driver should have his own stock and should report at the end of each trip the slightest slip or bruise, which, for fear of reproof, they seldom do.

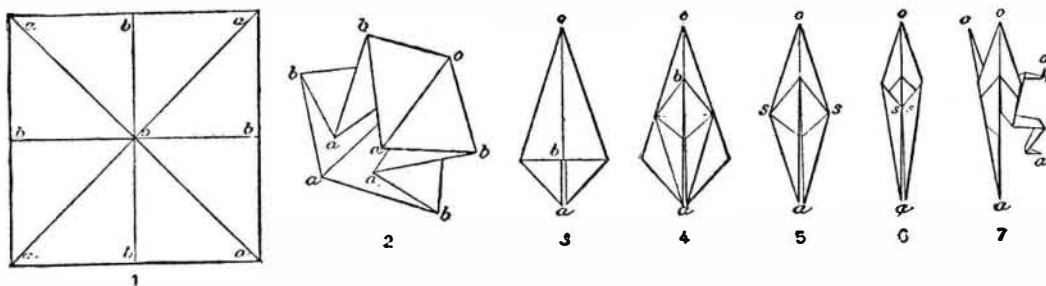
In closing, I feel that I have omitted much that I might wish to say, but have tried to present a few of the more important points of this much debated subject; and though I cannot hope to bring anything new before you, as it has been ably discussed at former conventions, still there is much yet to learn, and in discussing this paper we may receive from your remarks upon it some profitable ideas. Respectfully submitted.

GEO. G. MULHERN.

A vote of thanks was tendered to Mr. Mulhern for his able paper.

Mr. William Richardson, of Brooklyn: Mr. President, I think that this paper is of sufficient importance to demand the attention of every man who has the running of a horse railroad. There is not a word in it, I think, that is superfluous, and every word in it conveys useful information and valuable teaching. I feel very thankful to Mr. Mulhern, whom I do not know, for the valuable paper that he has prepared, and which I think should be carefully pondered over by every one of us. What he says about careless driving, the driving by one man, the cleaning out of the feed boxes, the running of teams working on a long distance of fifteen or sixteen miles, so that they may do all their work in one portion of the twenty-four hours and have their entire rest for the other portion, and the manner in which we all find disappointment in the selection of horses. In New York and its vicinity we cannot do as he suggests, get horses raised in the State in sufficient supply and at sufficiently low cost to meet our demands. We have to depend on horses from other States. From his State we get some good horses, but we now get very few, because the home demand takes nearly all of them.

We could get a first class horse from Vermont; but it is very much more costly generally than we can afford to pay. We find that horses from Michigan are good; in fact, from any rolling country State, while the horses from Illinois and Indiana are generally flat footed, and therefore not good for our city pavements. The horses from Minnesota, Iowa, and other rolling or mountainous States are very much better for our use, both on account of the shape of the foot and the greater toughness of the horse. The system in New York is perhaps as nearly perfect for our supply as we can get. We make the best selection of horses that we can, and we get ten days' trial of every horse, to see whether he will answer our purpose, with the perfect right of return to the seller, either with a reason or without one. After ten days we are supposed to have a sufficient trial to enable us to judge whether the horse will suit us; but we find just that same difficulty which Mr. Mulhern alludes to, and that is some of the horses which we think will answer best and have years of service in them would in three months be used up or fit only to be sent on a farm in the country, and others that we expect but little of when we take them—perhaps taking them on an agreement for a longer trial than ten days—will prove the toughest and best horses.



FIGS. 1 TO 7.—METHOD OF FORMING THE PAPER FROG.

infant school at Tokio. The series of pictures showing colored paper cut out or combined so as to form flowers, butterflies, or marquetry designs were very attractive. It is true that we know in France as well as they do in Japan the pleasing pastime of folding papers, but we must admit that the Japanese have much more ingenious models. The frog that we put before the eyes of our young readers (Fig. 8) is an example of these. It is due to the politeness of the Japanese commissioners that we have been able to trace the figures necessary to form it. It is necessary in the first place to cut a sheet of paper so as to make a perfect square (Fig. 1). This paper is then folded so as to form the diagonals, *a* and *a*, and is then turned in the other direction and folded so as to form the creases at right angles, shown at *bb*. After the folds have been thus well determined it will be easy to form Fig. 2, and then to turn down the ends, *b* and *a*, as shown in Fig. 3. We shall then have a series of eight small panels around the axis, *o a*. After this, it is necessary to take the paper by the point, *b*, and to fold the sheet well so as to make two

tell whether he will stand the test or if it is best to sell him as soon as possible. It is a waste of time trying to doctor up a horse whose feet become sore quickly; he will render good service for years on country roads, while on pavements he is useless.

I agree with an able predecessor of mine writing upon this subject, that if it were possible to learn from the owner "the former habits of the animal purchased," it would simplify matters much as to the method of treating him. But as it is a well known fact that in most horse trades the truth is conspicuous by its absence, I fear that reliable information could not be thus obtained.

The comfortless, rattling "bob-tailed" car, drawn by any decrepit old skeleton of a horse that could be bought for a song, and driven by a rusty-looking tramp, is a thing of the past; and the plump, well-groomed and carefully tended street car horse of to-

* A paper recently read before the American Street Railway Association.

I would like to have heard from him as to what he finds the average life of a horse. We find considerable differences on different portions of our road, where we run several lines. On some it will not be over three and a half to four years. I think the average life in Brooklyn is about a year longer than it is in New York City, judging from my experience in both cities. We will average four or five years, taking one with another. Of course we all know that some will run and keep right along and with but little rest for periods of eight, ten, and even twelve years. It is astonishing, and I think unaccountable, why this difference exists. I do not feel like discussing this, and yet I certainly felt that it was so important in its character that it ought not to be passed without some comment.

For a horse suitable for our use, weighing about eleven hundred pounds, a good, chunky, well built horse, fifteen and a half to sixteen hands high, active and light on his feet, free from tricks and defects, we are willing to pay one hundred and fifty dollars, if we get ten days' trial. We want first to see if he is a kicker, biter, or balky, or has any other bad traits.

THE COLOR OF HORSES.

Mr. C. D. Wyman, of New York: It may be possible that I can give the experience of the Parisian tramway companies in relation to the matter of color, although I have no doubt that any characteristics of the horse that are revealed by the color would possibly vary as to their utility according to the locality in which they were employed. The Parisian tramcar companies are especially particular in all their statistics relating to their horses, keeping very accurate statistics as to the height, color, and other particulars, to see if there is established thereby any special difference in that respect. They report that the grays are in their experience the longest lived and give them the greatest amount of service, and the blacks the least. In our stable in New York our experience has been somewhat similar. After noticing the French system I made for some years memoranda concerning our own stock, and find that it corresponded somewhat. We found that grays and roans, other things being equal, seemed to be the best for us; while creams and blacks were, as a rule, soonest used up. Particularly we found it true in hot weather that black horses did not seem to have the staying powers that the other horses did. The bays were an average.

WATER FOR HORSES.

There is one other point that I would like to speak of in this connection, and that is in relation to the water that we give our horses. It has been our experience that a microscopical examination of our Croton water revealed at different times different conditions in it of different grades of purity; and it was thought best by the management some four or five months ago to make some experiments in filtering the water. We devised a sort of home-made filter, by placing over the troughs in our stable, of which we have some ten or twelve, a barrel about the size of an ordinary oil barrel, and placing therein charcoal, coarsely ground, with brush and gravel to keep it in position, and we added to that mixture some sulphur. We were led to add this sulphur by reason of the fact that some time ago at Richfield Springs, the sulphur springs, I found that the farmers whenever they had a horse that seemed in poor condition, rather debilitated, brought their horse to drink of the sulphur water. I found that the horses were fond of it; it was necessary to limit the amount of their drink. They would drink until they would almost drown themselves, they were so fond of it. I concluded, from such advice as I could get, that sulphur would be of benefit. We have now been using that filter, with the addition of the sulphur, for about four months. Our cases of colic have decreased seventy-five per cent. In fact, we have hardly had any. Whether it is due to this sulphur and the filtered water I cannot say positively; but that is our opinion. The horses enjoy the water very much. One thing we do know, pretty nearly, as we have examined the water under a microscope, and that is that the horses are getting a pure and good water. I do not know whether the water of other localities might not carry in it as many impurities as ours; nevertheless I give you this suggestion, as it is possible that sometimes the origin of these epidemics that seem to strike a stable and for which we cannot satisfactorily account may lie in the water that we are giving the horses to drink.

Mr. Hall, Illinois: I would like to corroborate Mr. Wyman's statement in regard to the water. I would like to give the convention the benefit of my experience, as a great many will have to continue the use of animal power. I have been managing a road for about sixteen years. For nine years of that time we used the water supply of our city in the barn. My animals got disgusted with it apparently. I went to an expense of a thousand dollars to dig a spring a little distance from the barn to supply them with the water. Before introducing the spring, our medicine bills would run from six to twenty dollars a month for medicine for colic and kindred complaints. Since we have introduced the spring water, I do not remember the passage of a bill by our auditing committee for medicine, except for liniments. Our mules have improved at least fifty per cent. I have not had a case of colic in the barn for two years, and I am here every day when at home.

THE BEST FEED TROUGH.

In this connection I would like to speak in regard to feed troughs. I used primarily the wooden trough, when I used to feed oats and corn whole, and uncut hay. I found that my wooden troughs being square, the corners would get foul and sour. I looked about for a metallic trough, and in investigating the matter wherever I found in use the cast iron trough, I found that it would get rusty and objectionable. The result was I procured some twenty-gallon enamel kettles, and have used them for several years, and never have a sour or foul trough. The stablemen can take a sponge and in ten minutes can clean the troughs for a hundred animals. I never have an animal leave his food in the trough or refuse to eat it.

A LAW has been enacted by Chili, to take effect January 1, 1890, abolishing import duties on machines and tools for use in agriculture, mining, trades, and industries.

FERMENTATIONS.*

By Professor PERCY F. FRANKLAND, Ph.D., B.Sc., GRACE C. FRANKLAND, and J. J. FOX.

THE authors point out how very few of the bacterial fermentations hitherto studied have been performed with ferments of undoubted purity, as well as the insufficiency of the description of the morphological characters of the organisms in question. Such scanty descriptions generally render it impossible for other investigators to know whether they are dealing with the same or with different ferments.

The authors have isolated and fully characterized by the modern methods of cultivation an organism, a small bacillus, which sets up fermentation not only in solutions of glucose, cane sugar, milk sugar, and starch, but also in solutions of mannite, glycerin, and calcium glycerate. The fermentations of mannite and glycerin have alone been so far studied.

In each case the products are essentially the same, viz., principally ethyl, alcohol, and acetic acid, together with smaller quantities of formic acid and a trace of succinic acid. The alcohol was separated by distillation and the quantity determined, while the several acids were estimated by conversion into their barium salts in the case of the acetic and formic acids, while the succinic acid was extracted and weighed in the free state.

In the case of the mannite fermentation it was found that the amount of alcohol and acetic acid formed stood in the proportion of two molecules of alcohol to one molecule of acetic acid, while in the glycerin fermentations there were three molecules of alcohol to one of acetic acid.

Of particular interest is the fact that the organism has no fermentative action on dulcitol, the isomer of mannite, which thus furnishes a very striking instance of the selective power of micro-organisms between the most closely allied isomeric bodies. The authors were also unable to cause the organism to ferment solutions of either erythritol, ethylene glycol, calcium lactate, tartrate, citrate, or glycolate.

In view of the characteristic products—ethyl, alcohol, and acetic acid—of the fermentations, the authors propose for the organism the name of *Bacillus ethacetivus*.

* Read before the British Association, Section B, Newcastle meeting.

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TABLE OF CONTENTS.

	PAGE
I. BIOLOGY.—Darwinism.—Prof. E. RAY LANKESTER'S review of Dr. Wallace's recent work on Darwinism, with special reference to the position of man in natural history.....	11585
Fermentations.—By Prof. PERCY F. FRANKLAND and others.—A review of fermentation from the bacteriological standpoint.....	11590
II. CHEMISTRY.—Caustic Soda Lye, and How it is Tested.—The preparation of caustic soda lye from the recovered ash in paper mills and details of the method of testing it in the laboratory.....	11579
To Prevent Bumping in Distillations.—A new method of preventing this annoying trouble in chemical work.—1 illustration.....	11579
III. GEOLOGY.—Meteorites and What they Teach Us.—By H. HEN-SOLDT.—Continuation of this highly interesting article, with application of our knowledge of meteorites to determining the composition and constitution of the interior of the earth.....	11586
IV. HYGIENE.—Shaken Milk.—By JOHN C. MORGAN, M.D.—A very important subject ably discussed, affecting the propriety of milk as a diet for invalids.....	11584
The Sanitary Congress, England.—A review of the proceedings of this congress, more especially as regards the hygiene of infant life and the avoidance of disease.....	11584
V. MECHANICAL ENGINEERING.—Knight's Oil Engine.—An English engine burning the vapor of paraffine oil in the cylinder described, with dimensions, etc.—2 illustrations.....	11580
Locomotive Practice in America.—By an American engineer.—An interesting comparison of English and American practice in this important branch of steam engineering.—9 illustrations.....	11581
Spring Railroad Rail.—An attempt to produce an elastic rail, with illustrations of several profiles.—4 illustrations.....	11580
VI. METALLURGY.—Platinum.—Curious points in the early history of platinum, with statistics of its production and the different uses to which it has been put in the world.....	11585
The Strength of Alloys at Different Temperatures.—By Prof. W. C. UNWIN.—A very practical and interesting investigation affecting the strength of alloys as used in engineering, with tabulated table of results.....	11584
VII. MISCELLANEOUS.—A Journey to the Headwaters of the Orinoco.—A region hitherto almost unknown.—Note of its recent exploration.—2 illustrations.....	11585
The Chilean Nitrate of Soda Mines and Works.—A view of the nitrate of soda mines and works of Tarapaca.—1 illustration.....	11575
The Japanese Paper Frog.—A curious example of paper folding, with exact account of how to execute it.—8 illustrations.....	11589
The Utilization of the Elephant.—The use of elephants in war and methods of shipment adopted by the British government.—1 illustration.....	11589
VIII. NAVAL ENGINEERING.—Rigging Torpedo Net Defenses.—An illustration of this work in progress on the ship Iron Duke, of the British navy.—1 illustration.....	11589
IX. PHYSICS.—Instruments for Measuring Radiant Heat.—By C. V. BOYS.—The first of a series of Cantor lectures before the London Society of Arts by the great experimenter, giving a most interesting description of the present aspect of the subject.....	11577
The Molecular Structure of Matter.—A review of the world's work in this department, including its more practical application, forming the second installment of Mr. Anderson's British Association address.....	11575
X. SANITATION.—Purification of Sewage and Contaminated Water by Electrolysis.—By WILLIAM WEBSTER, F.R.S.—A novel method of purifying sewage described at length, including a valuable table of different sewage purification processes proposed during the last hundred and twenty-seven years.—3 illustrations.....	11582
XI. TECHNOLOGY.—Ramie.—By JULES JUVENTE.—A recent Franklin Institute paper, describing the ramie industry, as affecting its growth, treatment, and utilization in the arts.....	11587
The Manufacture of Perfumes and Essential Oils in Southern France.—Notes and statistics of this important industry, of its practical details, and results attained.....	11579
XII. VETERINARY SCIENCE.—The Food and Care of Horses.—By GEORGE G. MULHERN.—A very interesting paper on the care of horses, with a discussion elicited by it, read before the American Street Railway Association.....	11589

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