

NOT AN OPTICAL ILLUSION

Sword Swallowing Really the Feat It Appears to Be.

Throats of Mountebanks Trained to Receive All Sorts of Objects—How the Trick Is Done—Valuable Service Rendered to Medicine.

Persons who visit those summer seaside resorts which are favored with a "boardwalk" with numerous small theatres along it, wherein are to be seen "continuous performances" of more or less merit, will have doubtless come across a "sword-swallower." This accomplished individual comes out dressed in a brilliant costume. At one side there are flags of different nations surrounding sabres, swords, and yatagans, and at the other a stack of guns provided with bayonets. Taking a flat sabre, whose blade and hilt have been cut out of the same piece of metal, he introduces the point into his throat, taps the hilt gently, and the blade at length entirely disappears. He then repeats the experiment in swallowing the blade at a single gulp.

Subsequently, after swallowing and disgorging two of these same swords, he causes one to penetrate up to its guard, a second not quite so far, a third a little less still, and a fourth up to about half its length. Pressing now on the hilt, he swallows the four blades at a gulp, and then he takes them out leisurely one by one. The effect is quite surprising, and the audience with a speculation of how it is done, is surprised to find that the performer produces an illusion, merely appearing to swallow the swords, which in reality find their way into some exterior receptacle. This is, indeed, sometimes the case, but the majority of sword swallowers really do introduce into their mouths and food passages the blades that they cause to disappear. They attain this result as follows:

Parts of the throat, despite their sensitiveness and their rebellion against contact with solid bodies, are capable of becoming so changed through habit that they gradually get used to abnormal contacts. This fact is taken advantage of in medicine. It daily happens that persons affected with disorders of the throat or stomach can no longer swallow or take nourishment, and would die of exhaustion were they not fed artificially by means of the oesophageal tube. This tube is of vulcanized rubber, which the patient swallows after the manner of sword swallowers, and through the exterior extremity of which milk or bouillon is introduced. But the patient before being able to make daily use of this apparatus must serve an apprenticeship. The first introduction of the end of the tube into the pharynx is extremely painful, the second a little less so, and it is only after a large number of trials, more or less prolonged, that the patient succeeds in swallowing ten or twelve inches of the tubing without the slightest disagreeable sensation.

With the sword swallowers it is absolutely the same, for with them it is only as a consequence of repeated trials that the pharynx becomes sufficiently accustomed to it to permit them to find the swallower objects as large and rigid as swords, sabres, canes, and even billiard cues.

All sword swallowers do not proceed in the same way. Some swallow the blade directly without any intermediate apparatus; but in this case their sabres are provided at the extremity, near the point, with a small bayonet-shaped appendage, over which they slip a gutta-percha sheath, the speculum perceiving it. Others do not even take such a precaution, but swallow the sabre or sword just as it is. It is said that an old French zénaïve, who has become a juggler, allows the spectators to touch the point of the sabre in his stomach makes on his skin.

The majority of sword swallowers, however, who exhibit upon the stage employ a guide, in which they have previously swallowed, so that the experiments they are enabled to perform become less dangerous and can be varied more. This guiding tube is made of thin metal. Its dimensions permit of the easy introduction of the flat-bladed sabres, among other things, and of the performance of the four-sabre experiment, and of the introduction of sabres and swords of all kinds.

To explain the trick from a physiological standpoint, the sabre swallowed by the performer enters the mouth and pharynx first, then the oesophagus, traverses the cardiac opening of the stomach, and enters the later as far as the antrum of the pylorus—the small cul de sac of the stomach. In their normal state these organs are not in a straight line, but they are forced so by the passage of the tubes pierced through the head as through a back so that the mouth is in the direction of the oesophagus, the curves of which disappear or become very slight, so that the oesophagus makes with the stomach a continuous curve, and, finally, the last-named organ distends in a vertical direction and the stomach is permitted to traverse the stomach through its greater diameter, that is to say, to reach the small cul de sac. It should be noted that the "back" in such a result can be attained, the stomach must have been emptied through fasting on the part of the operator.

Sword swallowers have rendered important services to medicine. It was due to one of them—a swallower of both swords and pebbles—that, in 1771, a Scotch physician, Stevens, was enabled to make the first studies upon the gastric juice of human beings. In order to do this, he caused this individual to swallow small metallic tubes pierced with holes and filled with meat according to Reaumur's method, and got him to disgorge them again after a certain length of time. It was also sword swallowers who showed physicians to what extent the pharynx could become habituated to contact, and from this resulted the invention of the "ouchertube," the oesophageal tube, the washing out of the stomach by means of a rubber tube used as a siphon, and the recent methods of illumination and photographing of the stomach.

Railways of England. If our railways were at least well managed we should only have to pay three times more for their services than the Germans, Swiss, French, and Belgians pay to their railways. But the assured monopolistic position of our railways makes them reckless, and causes enormous waste of time and money, which also has to be paid for by the nation, which means out of the pockets of the wage-earners of our productive industries.

but these Pullman cars are of little use to the nation, and no use at all for the development of the country. They serve only for the comfort of a few individuals, and for the prosperity of the country. Our trains are made up of toy trucks, carrying five to ten tons of goods each, and are pulled by toy engines.

In other countries large engines pull large cars, towing goods in small parcels in small wagons, and in small trains. If large ones can be had, like emptying a tank with a teaspoon when a bucket is available. It means an enormous waste of time and money. An English goods train moves from 80 to 1,200 tons of goods. One thousand tons in an engine, and in ten trains means ten times the expenses for drivers, stokers, brakemen, shunters, machines, a shed, machine cleaning, machine repairing, a huge additional coal consumption, and a huge amount of water. The same thing applies to passenger trains. Two of our trains, which one can see on any of our main lines daily starting with two engines each, might be hauled by one strong engine, at little more than the cost of the engine, in this way the hard-won earnings of the nation are being wasted by our railway companies, which consequently charge us rates about four times larger than they ought to be charged.

In this country the legal maximum fare in the third class is about 1 penny per mile. In the United States the legal maximum in the first class is 1 penny per mile.—The Contemporary Review.

NEW LONDON SUBWAY.

Great Rapid Transit Scheme Now Being Developed.

There is now in process of development a rapid-transit scheme which, if it is carried out, would revolutionize the present traffic conditions of many of London's principal thoroughfares.

Briefly, the proposal is to construct a shallow underground tramway—the tram of course to be propelled by electricity—along the Strand, Fleet Street, Chancery Lane, and past the Bank of England to the London County Council's tramway terminus at Moorgate.

The "father" of the scheme is J. A. Burt, a prominent member of the London County Council and for several years chairman of the highways (tramways) committee. Mr. Burt, interviewed by a "Daily Mail" representative, willingly consented to be interviewed on the subject.

"We are sending," he said, "our tramways manager and our electrical engineer to Hungary and America to study the system of underground tramways at first hand. They go as the accredited representatives of the council, and when they return and hand in their report we shall be able to say approximately what we intend doing in the matter."

There were, however, Mr. Burt went on to point out, many obvious advantages attending the scheme as a whole, leaving details of construction and working temporarily out of the question. One was, of course, the rapidity with which this particular kind of subterranean transit could be introduced. At present a journey by bus from Westminster to Moorgate Street occupies from thirty to thirty-five minutes, even under favorable circumstances. The underground electrically propelled tram would cover the same distance in about five minutes, and it would be necessary for passengers, in order to reach the cars, to take a long journey by lift down into the bowels of the earth. A dive into a sort of ornamental shaft, which would be at the edge of the roadway, a trip down a dozen steps—and there you are. The top of the tunnel through which the trains would travel would be only about two feet below the level of the roadway, and the said tunnel, in addition to its primary and principal use, would also serve as a sort of conduit, through which could be carried the whole system of gas and water mains, electric underground wires, and pipes of every description.

There would thus be an end, at once and forever, to the eternal tearing-up and relaying of the thoroughfares affected, a nuisance dating back so far, at all events in London, to the days of the early part of 1790. Of course mains and pipes of all kinds would have to be taken up and relaid. Some would have to be diverted. Others would be abandoned, and an entire new system constructed. This part of the work would be very laborious, very difficult and expensive, but in the end it would pay.

The first step in the building of the tramway would be the excavation of a vast trench, which would be deep throughout the entire length and width of each street, the whole of the wheeled traffic being meanwhile necessarily diverted to the side streets. But after this great work, there would ensue an era of ease and comfort. It would never be necessary to open the streets again.

As has previously been intimated, the details of the scheme have yet to be formulated, but enough is known of similar schemes already in operation in Glasgow, Boston, New York, and elsewhere, to indicate the main lines upon which London's must of necessity be carried out. Supposing the scheme is finally approved by the authorities concerned, the initial work will be the cutting of the trench alluded to above, and which will, of necessity, in our comparatively narrow streets, extend in width from pavement to pavement. This may, and probably will, be done in stages, so that the amount of traffic as little as possible. Then will follow the process of "roofing in." Steel girders laid transversely will form the top of the tunnel, and will be supported at either end by perpendicular pillars of like construction already in existence. The girders will carry a layer of two feet (thick) of solid concrete, and this will form the new roadway, over which buses and cabs (but not so many, it is hoped) will travel in the usual manner. The roadway will whirl either way every two or three minutes. The cost of such an innovation must naturally be considerable, more especially in the Strand and in the city, where many old cellars run underneath what is the roadway. These, of course, would have to be negotiated for and acquired.

For the rest, it may be mentioned that there will be absolutely none of the gloomy, unwholesome atmosphere of the underground lines; the interior of the stations will be lined with white enameled bricks and illuminated throughout by electricity, while the cars will be comfortable, airy, upholstered and well-lighted. It is probable that the third rail system of supply will be used, an permitting of a lower pitched tunnel than the overhead trolley system. Finally, it should be stated that the proposed line from Westminster to Moorgate is in the nature of an experimental line, and would prove to be the success its projectors hope and desire, then similar lines will be carried underneath Piccadilly, the Strand-to-Holborn thoroughfare, and other streets, until the construction of surface tramways would be undesirable or impracticable. The benefits of the system in such a huge city as London are obvious. Lumbering, crawling "buses" with the immense stops at all the principal crossings where the traffic is regulated, will be things of the past. The trams will glide smoothly and quickly, carrying passengers from point to point without any annoying waits. In connection with the underground lines, people living in the suburbs will be able to reach their places of business in even quicker time than by train when the walk to and from the station is taken into consideration, and not only will time be saved, but it is expected that the cost of traveling will be considerably cheaper than the railway—London Mail.

SCULPTURED BY GLACIERS

Beautiful Geological Specimens at the National Museum.

Rock Surfaces Delicately Carved and Grooved by a Glaciers' Gravel, of Antiquity—How Facts Are Established by the Scientists.

In the section in the National Museum devoted to geology are specimens of rock surfaces curiously and sometimes beautifully grooved and carved. The carvings in some cases are so perfect as to suggest the work of the skilled artisan. As a matter of fact, these apparent moldings are not moldings at all, nor are they the handiwork of man. They represent a convulsion of nature at a period so remote that there is no mode of reckoning it. In other words, they are the rock-scorings of the glacial invasion of the northern part of this country. Whether the ice came down by land or sea, whether by glaciers or by icebergs and ice floes sailing over submerged waters, science is unable to determine. Be that as it may, that the ice came sweeping down over the face of the earth in huge quantities and with irresistible force these rocks in the Museum attest.

These rock-scorings are the trails left by the invader. To the geologist their character reveals the nature of the icy visitant, and they reveal the key to the glacialist's distinction with as much certainty the tracks of a glacier or of an iceberg or ice floe as a hunter the track of a bear or a moose or a serpent. A glacier may be likened to a prehistoric monster which leaves a print of its foot imbedded in the rock. From such slight tokens of its sometime existence Prof. Owen builds the semblance of the entire animal, classes it, and describes its habits.

For purposes of convenience in geology the common term "grooving" is used to describe all the effects of the glacial invasion on rock surfaces alluded to. Respecting their mode of origin glacial grooves belong to two classes, which it is of some importance to distinguish. The one class had an existence as grooves prior to the incursion of the ice and were simply molded and modified by it. The other class were their origin solely to glacial action.

Previous to the sweeping down of the ice the surface of the rock had been subjected to various destructive agencies which produce great inequalities in it, among which were surface furrows, which the invading ice found furrows formed already. Where these lay coincident with its course its work was merely to rasp them out and polish and straighten the edges of the rounded form they sometimes have the aspect of channels due wholly to glacial action; but the observation of the expert often discovers features which, in their nature, indicate that they could not have arisen solely from glacial abrasion. There must have been a pre-existent channel to guide and mold to itself the abrading ice.

A main element in the grooving was, of course, inequality in the hardness of rock. This finds its simplest expression where beds of unequal hardness were slightly upturned so as to present their beveled edges to the ice, which acted along them like a heading plane. In such cases the soft beds were easily removed, while the harder ones were left standing forth as ridges, the whole assuming a ridged surface. Grooves of this sort, which are to be seen in several specimens at the National Museum, are little more than an expression of the unequal hardness of the rock beds. On a large scale this is thought to have been sometimes an important factor in determining the topography that resulted from glacial action.

That streams of water flow beneath glaciers has been determined by most abundant observation, but excepting in the immediate vicinity of the ice border, the stream channels are deep, and the precise relations of the ice to the stream are chiefly matters of conjecture. Whether the ice continually tends to press down upon the stream and to force it hither and thither at will or whether the stream maintains itself by melting and wearing back the encroaching ice as fast as it presses upon it, and so retains a constant channel, is unknown. In the case of the river, however, that such subglacial streams have much abrasive power, because they are loaded with fine, rasping glacial silt, a most effective abrasive agency. That they cut for themselves rock channels is well attested; that into these the ice subsequently molds itself and in turn molds them by its own abrasions is attested by observation. The curious form of some of the rock-scorings suggests that they were partially worn by a stream of water, while their engraving points to their occupancy by ice which was molded to their tortuous courses, and which in turn refashioned their walls, reducing them to those smooth, striated surfaces and those beautiful curves that attest to the eye of the trained observer, the work of a glacier.

TRAVELING IN ENGLAND.

One American Who Prefers British Methods to Those Used Here.

It is still, in my mind, an open question whether the English mode of railway travel is the more comfortable. One oscillates between the two systems in a state of painful indecision, with views that vary according to the experiences of each journey. At present the English system has my vote. Nothing at any rate could have been more easily managed than yesterday's journey. My companion and myself took a hansom from our doorstep and drove to the platform, where we were equally simple in getting on. The station the difficulty was not to get waited on, but to prevent more than one porter from forcing his services upon us. In three minutes after dismissing the hansom we bought the tickets and had found ourselves seated in an empty compartment. The baggage was labeled and put in the luggage van a few yards ahead of us, and the porter pocketed a tip of a penny and only without grumbling, but with a respectful regard to his duties, services might have been had for a penny or even twopence less. Nothing so far could have been simpler. We had the carriage to ourselves, and neither at Willesden nor Coventry, the only two places at which we stopped, did anyone attempt to get in.

The English railroad carriages are of three classes, first, second, and third. The first class seats only six persons, leaving ample elbow room for each; the second and third seat ten, five on each side. The difference between the last two classes is mainly one of upholstery and price, and sometimes of position. The holders of third class tickets are usually placed next to the engine, where they may be the brunt of a collision or at the end of the

TO PROTECT SHADE TREES.

Dr. L. O. Howard Offers Suggestions on the Subject.

The Entomologist of the Agricultural Department Tells How Defoliation May Be Averted in Washington—Insects That Cause Havoc.

The beautiful shade trees of Washington are in a fair way to become defoliated. This is not the common caterpillar that is doing the most mischief this year, but an ubiquitous little creature that rejoices in the pseudonym of thyrupteryx ephemeriformis, or bagworm.

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Dr. L. O. Howard, entomologist of the Department of Agriculture, has been called upon to the kind of insect which is working such havoc in the verdure of the parks and public places of the National Capital, stated that this did not seem to be a new year for caterpillars as usual. Discolored leaves are not so generally found as in the past, and he said that most of the defoliation was due to the bagworm, which seems to have visited Washington in greater force this summer than for some years. This rather exclusive insect has the habit of spinning a web or bag about the plant, and is fed as to the kind of insect which is working such havoc in the verdure of the parks and public places of the National Capital, stated that this did not seem to be a new year for caterpillars as usual. 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