

of the brain by culture would add effectiveness to the hand. The reason for this, is because man is a composite being. His muscles were not made for non-use more than his brain, and the right use of each is a pleasure and not a pain. After a few generations we shall have what is now the prayer of thousands, more culture for the laboring man, and more physical labor for the cultured man. This will establish a harmony between the two, which will add greatly to the prosperity, happiness, and health of both."

RAILWAY CARRIAGES IN DIFFERENT PARTS OF THE WORLD.

Chambers' Journal complains that railway fares are with few exceptions higher in England than in any other country, and argues therefrom that English people ought to get better accommodation than is afforded in other countries. It asserts, however, that such is not the case, and to make good its assertion, facts are given in relation to royal and luxurious railway carriages, luncheon carriages, sleeping cars, etc., etc., used in various parts of the world, some of which will interest our readers.

"The most right-royal production in the world in this way is the imperial train of France. It may be that each of the great French companies has a similar train of its own; but at any rate the one which is selected as an example is on the Paris and Orleans line—the highway to Biarritz. It is a veritable train, not merely one carriage in a train. First, after the engine and tender, comes a luggage-carriage—not an uninhabitable van, but a structure which, besides ordinary luggage, contains pantry arrangements for refreshments, and accommodation for some of the company's and imperial servants. Next is a carriage adapted as a dining-room—or at least as a refreshment room—with a center table, arm-chairs, and hinged seats; and when, at night, the seats are drawn away from the wall, they fall back so as to form bedsteads for the attendants. Third in the list stands an open or platform carriage which may be opened or closed at the sides at pleasure, and used either as an open-air look-out or as a refreshment room. Then comes the grand carriage, the imperial saloon, with a retiring room attached, and doors at the sides and ends. All that luxury can do is here done in the provision of couches, arm-chairs, folding-chairs, movable chairs, small tables and stands, curtains, wire-gauze blinds to exclude dust when the windows are open, a time-piece, pendent lamps, and mirrors. The fifth is a sleeping-carriage, divided off into seven distinct compartments; these comprise a sleeping-chamber or bedroom, two dressing rooms, two rooms for the empress' ladies, one for the emperor's valet, and a retiring room. The sleeping chamber contains two beds, on opposite sides of a compartment nine feet wide. Next to the sanctum of the imperial papa and mamma is a carriage for the Prince Imperial, with numerous snuggeries for sleeping, dressing, and attendants. Lastly, there is a luggage carriage the counterpart of the one at the head of the train. All the carriages have doors at the ends, and platforms which make a convenient gangway from carriage to carriage; and there are electric bells from the imperial saloon to all the other carriages and to the engine-driver and guards.

"The Czar of all the Russias should by rights have everything as grand as the Emperor of the French; but instead of an imperial train, he has only an imperial carriage. Such a carriage, however—no less than eighty-five feet long! The saloon for the emperor and empress, in the center of the carriage, has all the luxuries which curtains and carpets, sofas and settees, timepieces and chandeliers, can give it; the emperor's study is a little more like a gentleman's own room, while the empress' boudoir is all that a boudoir should be; and beyond that are rooms for attendants—gentlemen next to the emperor's study, ladies next to the empress' boudoir—with all the knick-knackeries and comforts to make a journey go smoothly. As this carriage is made for comparatively short lines of railway near St. Petersburg, there is no provision for sleeping or night-journeys."

Our American sleeping car system comes in for a good deal of well-merited praise, especially mentioning the celebrated sleeping car, Omaha, which cost \$28,000, and which "carries luxury to the extent of a small organ in the middle of the chief saloon; whereby a passenger, whether or not he has rings on his fingers or bells on his toes, can at least have music wherever he goes."

From these extremes of northern luxury, the writer plunges us suddenly into East Indian heat, dust, and squalor, introducing us to the two storied cars, which "are in use on the Bombay and Central India Railway; constructed to hold a hundred and twenty passengers each—seventy on the lower story, and fifty on the upper. As nineteen out of every twenty railway passengers in India are third class (they would travel fourth, fifth, or any other class if cheapness could be thereby obtained), these two-storied carriages are crammed with Hindus of all castes (for the Brahmin and the Rajpoot may be poor as well as the Pariah), who squat on their hams as a compact mass of humanity; seeing that some of the carriages, like the third class originally used on our Greenwich line, are without seats. On the western and eastern railways of France (Paris to Brest, and Paris to Strasbourg), two-storied carriages are used on some of the branches, where slow speed would render loftiness possible without danger. Some of these carriages are composite, the lower story having first and second class compartments, and the upper third class; some are third class throughout, the upper having open sides, and the lower closed with windows and glazed panels. These carriages accommodate about eighty passengers each. They are nearly fourteen feet in height by nine broad, and would therefore be unavailable under low-crowned arches and bridges."

THE TOAD AS AN ENTOMOLOGIST.

(BY A. S. RITCHIE.)

The toad is of a retiring disposition, loving dark corners and shady places. It has a slow, crawling motion, and is of a very timid disposition. Numerous instances might be cited of pet toads, and of their becoming quite tame.

The toad differs in some respects from the nearly related frog. The structure of the mouth is, however, nearly the same. The tongue is attached by the root, as it were, to the base and front of the mouth, the tip being reversed and pointing down the throat when the animal is at rest.

The moment it sees an insect its eyes brighten and sparkle, the toes twitch, and quicker than the eye can follow, the tongue is thrown out, the insect transfixed, and withdrawn into the mouth.

Unlike the frog, the toad does not spring after its prey, but remains seated. Having kept frogs in the aquarium, I have noticed that they will spring two or three times their own length from the moss to catch a fly on the glass, using their tongue, as it were, on the jump. They seldom miss their mark. As far as my experience goes, neither of these animals will eat anything without life or motion. I have, however, often deceived a frog by moving a dead fly in the sight of the creature, which it always took readily. Many stories have been told of toads in rocks, and reasons have been given by authors as to the way in which they have become so embedded. My subject has, however, nothing to do with these "old great toads," but to one of our own day and generation. After this digression, I shall now introduce my friend, the toad, in his capacity as a collector of beetles.

The true naturalist, in the pursuit of his study, is a very teachable individual; he never refuses assistance from any one, whatever his station in life is, or however meager his knowledge of the science may be. The many ways he uses the animal creation to advance his knowledge, in the particular branch of study, may be illustrated as follows:

The conchologist wearies of the pleasant days of summer, to take a trip to the sea-side, with his dredges and lines, his bottles and store-boxes, where he adds to his collection many interesting and perhaps new forms of molluscan life.

A trip to the sea-side is not always easily obtained; but the naturalist may be seen in the market buying the several species of flat fish, such as flounders and other species which live and feed at the bottom of the sea. Knowing them to be good collectors, he takes advantage of this fact to procure many and sometimes rare species, and thus adds to his cabinet, without the trouble of dredging for them.

The entomologist, likewise, has recourse to different methods to obtain the object of his interesting study. The following is one of many:

Starting at six o'clock one morning, in the summer of 1864, for a walk to our beautiful mountain, to collect insects, provided with the requisite apparatus, a wide-mouthed bottle, with spirits, for beetles, and a small flat box, lined with cork, for butterflies, etc., my success was particularly good. The first captures were eleven specimens of carrion beetles, comprising three species, viz., *Silpha pectata*, *S. marginata*, and *S. inaequalis*. These were obtained from the body of a dead hawk-owl (*Surnia ulala*). Having secured them in the bottle, and walking leisurely along, I noticed a toad (*Bufo Americanus*) sitting contentedly at the root of a basswood-tree (*Tilia Americana*). Having never made use of my dingy friend as an insect-collector, although aware of his propensity that way, my mind was made up to press him into the service—but how? He must be dead first. As he sat looking at me with his beautiful eyes (for although his appearance is not very prepossessing still those beautiful, bright, yet languid eyes go a great way to improve his appearance), I had certain qualms of conscience about taking life; still it was in the cause of entomology, and for the furtherance of science his life was sacrificed. Now he was dead; how was I to proceed? I had cut up and dissected many insects as well as birds, but to cut up a toad, and before breakfast—"there's the rub"—that gray, warty toad, no beautiful eyes now. One slash of the knife through the skin, another through the walls of the stomach, and the poor creature's breakfast was exposed.

I was a little disappointed at first, as one or two common forms of beetles presented themselves, that might have been obtained without sacrificing the poor animal; still, I reasoned as he had been up nearly, or perhaps all night, collecting, and I had not, he must have taken some species not in my collection. Having scraped the contents of his stomach into my bottle of spirits, I started home, resolved to see what the insects were before breakfast.

I spread them out on a sheet of blotting paper and counted them; the result being thirteen perfect specimens.

I have killed several toads since, with similar results; one, I may mention, had the stomach filled with a species of *Chrysomelida*, *Doryphora trimaculata*, amounting to eleven specimens. He had evidently come across a colony of that insect, and made a hearty breakfast. I may state that this insect was in great abundance, during 1864, on the Island of Montreal. The same may be said of last summer, 1868; taking them by the score on the Mountain, along the river at Hochelaga.

The earlier you go out in the morning the better; before sunrise, if possible, before the process of digestion has gone too far.

Latent Heat of Metals.

The quantity of heat latent in the metals, and which becomes apparent when they are compressed, is admirably illustrated by the faint flash of light which is emitted when a bullet from a steam gun strikes a wrought-iron target. The bullets are completely flattened, and when directed against a

plate of lead placed in front of the target, the two surfaces of lead become firmly united as if melted or soldered together. The flash of light is only visible in a darkened room. Another still more striking illustration is seen in the flash of light produced when the 80-lb. hexagonal bolts fired from the Whitworth gun strike the thick iron-plated sides of a floating battery: "Notwithstanding the immense resisting power of the iron plates, the hexagonal bolt passed completely through them. The shot when discovered was found to be so hot that no one could touch it, and was ascertained to have been compressed to the extent of an inch in length. It was noticed that at the instant of concussion between the shot and the vessel, a broad sheet of intensely bright flame was emitted, almost as if a gun had been fired from the vessel in reply."

The same effect has been repeatedly noticed when the balls from the heavy Dahlgren guns of the monitors struck the stone fortifications against which they were directed. The heat, in these cases, was that previously latent in the iron, made sensible by the compression of the metal and the diminution of its specific heat. In like manner, the intense heat which is evolved when iron bars are subjected to the process of rolling, and not unfrequently by the axles of cars and carriages when in rapid motion, and in the processes of boring and planing metals, is due to the same cause. It is the heat previously latent in the metals, evolved and converted into heat of temperature by the diminution of their specific heat in consequence of compression. The heat set free in the simple operation of boring a hole with a gimlet, is sufficient to inflame a friction match. The heat produced by the rapid drawing of a string tightly around the neck of a glass flask, is sufficient to crack it. And in the whale fishery, the heat evolved by the inconceivably rapid motion of the rope over the side of the boat, after the whale is struck, would be sufficient to set it on fire if it were not kept cool by the continual pouring of cold water. In the best constructed steam engines, the bearings of the shafts are made hollow, and a steady stream of cold water caused to circulate through them, in order to prevent them from becoming excessively heated, and the axles from expanding to such a degree as to be incapable of moving. These are illustrations of a general principle. Whenever any body is expanded, heat is absorbed and temperature sinks. Whenever any body is compressed, latent heat is given out and temperature rises. This is true of solids, liquids, and gases. Liquids, if compressed, grow warm; if relieved from compression, they grow cold again. Gases, if compressed, grow hot; if released from compression, temperature declines. So, in like manner, when bodies change from the solid to the liquid or gaseous state, there is an absorption of heat, because of the large amount which is expended in making the change. The difference between the same substance as a solid and as a liquid is, that in the latter case the particles are so far removed that they can slip readily upon each other. This separation can only be maintained by the addition of a large amount of heat. Consequently, whenever a solid is liquefied there is an immense absorption of heat, and temperature sinks; whenever a liquid is solidified, the reverse takes place and temperature rises. The latent heat, no longer required, becomes sensible. When a liquid is vaporized, heat is absorbed, and temperature sinks. When a vapor is condensed into a liquid latent heat is given out, and temperature rises.—*Pynchon's Chemical Forces.*

What a Man Knows.

What a man can write out clearly, correctly, and briefly, without book or reference of any kind, that he undoubtedly knows, whatever else he may be ignorant of. For knowledge that falls short of that—knowledge that is vague, hazy, indistinct, uncertain—I for one profess no respect at all. And I believe there never was a time or country where the influences of careful training were in that respect more needed. Men live in haste, write in haste—I was going to say think in haste, only that the word thinking is hardly applicable to that large number who, for the most part, purchase their daily allowance of thought ready made. You find ten times more people now than ever before who can string words together with facility, and with a general idea of their meaning, and are ready with a theory of some kind about most matters. All that is very well as far as it goes, but it is one thing to be able to do this and quite another to know how to use words as they should be used, or really to have thought out the subject which you discuss.—*Lord Stanley.*

An Ingenious Method for Drying Vegetable and Animal Substances.

A method recently adopted for drying vegetable and animal substances, consists in filling a vessel half full with fused chloride of calcium, pouring ether upon it, and then placing above it a vessel containing the material to be dried. The vessel is placed upon a glass plate, and over this a bell glass, fitting completely to its surface. The chloride of calcium abstracts the moisture from the ether, which then constantly takes away a new quantity from the substance in the vessel above, until it is quite dry. Articles dried in this manner have quite a different appearance from those from which the moisture is removed by the ordinary process; vegetables retaining their natural color, and animal substances their elasticity and flexibility.

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