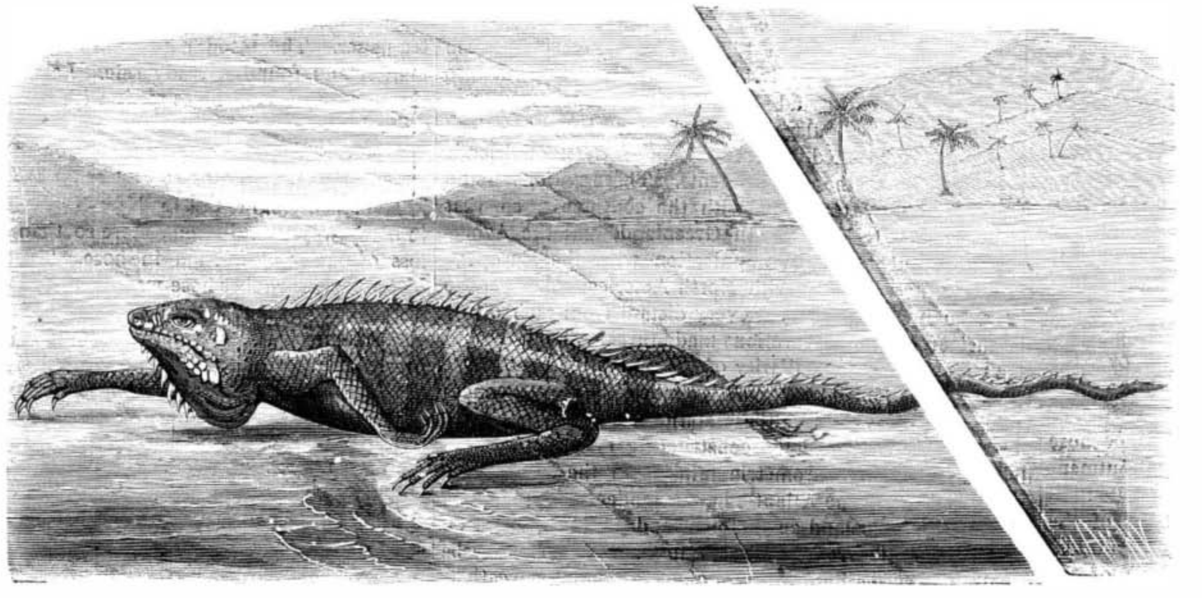
ments so that they may be easily caught in the field, [h]een patented by Mr. Charles J. Gustaveson, of Salt [Lake] City, Utah Territory. The improvement consists in [hoo]k bands connected to the ends of a chain by simple [d]urable connection.

CURIOUS FACT IN NATURAL HISTORY.

BY C. F. HOLDER.

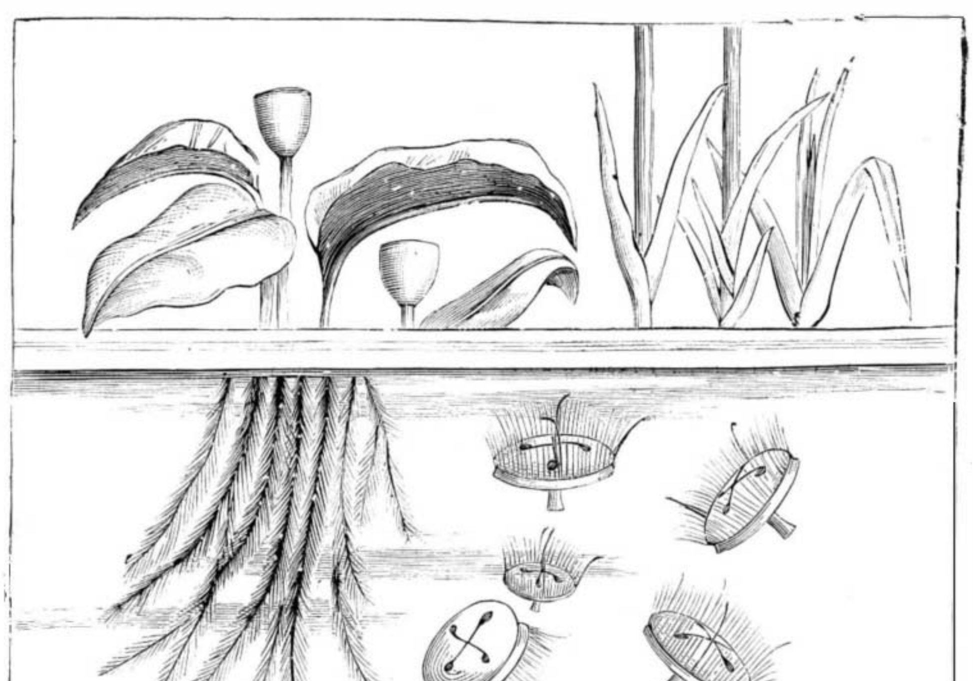
[Ou]r illustration represents the American iguana crossing [a riv]er, the Chagres, as wide as the Harlem at High Bridge, [on] the surface of the water, without sinking below it. [This] wonderful performance was witnessed by Mr. John G. [Bell,] the well known natural[ist an]d former companion of [Aud]ubon. Mr. Bell states [that] as he was approaching [the r]iver he came suddenly [upon] the reptile, and alarmed [it, so] that it sprang into the [water], but instead of sinking, [to h]is surprise, it rushed [alon]g over the water, making [its l]egs go like lightning, so [that] he could not see them, [and] thus keeping the whole [body] above the water. It [mad]e quite a foam behind, [and i]n about two minutes was [over] the river, up the bank, [and] out of sight. When it [is re]membered that this ani[mal] weighs from five to ten [poun]ds, and has slender claws [fitted] for tree-climbing, the [won]derful character of the [perf]ormance will be appre[ciate]d. It is from four to [five] feet long, and its general [color] is green shaded with brown. It has a strong and distinct [crest] running along the whole length of the back and tail, and [a lar]ge dewlap or pouch under the throat, the edge of which [is at]tached to a cartilaginous appendage of the bone of the [thro]at. The tail is very long, slender, compressed, and [cove]red with small, imbricated, keeled scales. It has a very [form]idable look at first sight, and when irritated it puts on [a ve]ry menacing appearance, swelling out its throat pouch, [rais]ing the crest on its back, and lashing its tail about with [grea]t violence. It is, nevertheless, a harmless creature, un[less] laid hold of, when it bites with considerable force. Al[toge]ther the occurrence is a most remarkable one and entire[ly a]ntagonistic to the supposed habits of the animal.



IGUANA CROSSING CHAGRES RIVER ON THE SURFACE.

FRESH-WATER MEDUSÆ.

[O]ur engraving represents the *Limnocodium sowerbii*, the [fresh]-water medusa, recently discovered in the Victoria [Reg]ia tank at Regent's Park, by Mr. Sowerby, the Secretary [of t]he Botanical Society. Our scien[tific] readers will observe in the struc[ture] of this unique jellyfish the excep[tion]al characteristics which distinguish [it f]rom other medusæ, as pointed out [by D]r. E. Ray Lankester in his report [to th]e Royal Society, at a recent meet[ing] of the Society; where also Mr. [Sow]erby showed a number of living [spec]imens which he had kept in con[finem]ent, and mentioned some of their [pecu]liar habits. If the water is not [kep]t up to a temperature of about 85° [Fahr]., the animal falls to the bottom of [the] water and remains torpid until the [tem]perature is raised, when it again [bec]omes active. He has also observed [the] medusæ feeding on the daphnia, [whi]ch abounds in the same water. [T]he diameter of the disk of the me[dus]a does not exceed one-third of an [inc]h. Dr. Ray Lankester, to whom we [are] indebted for the sketch from which [the] illustration is engraved, states that [thi]s the only medusa which inhabits [fre]sh water, and must have been intro[duc]ed with tropical weeds from the [West] Indies.—*Graphic.*



FRESH-WATER MEDUSÆ AT THE BOTANICAL GARDENS LONDON.

[Influ]ence of Ligh[t] on the Trans[s]piration of Plan[ts].

[Th]e *Comptes Rendus* of the Fr[ench Aca]demy gives the following *résumé* [of a] paper, by M. H. Comes, on the [tran]spiration of plants, being the re[sult] reached after numerous experi[men]tal researches:

[(1.]) The emission of aqueous vapor [whi]ch takes place in plants is submit[ted] ... to the action of the physi[...] of ... influence the ordinary [a]gents which ... free surface of [eva]poration from ... light. Con[...]er, but also to that o[f] ...itions, a [...]ently, under equal con[di]tions ... more under the ac[tion] [of l]ight than it does ... [in] darkness ... by light on [...]

[(2.]) The action exerte[d] ... the transpir[a]tion of plants augments in proportion to its intensity. Co[n]sequently, under equal conditions, transpiration reaches its [m]aximum shortly after midday.

(3.) Light favors transpiration only in the portion which absorbs it through t[he] coloring matter of the organ. Consequently, under equa[l] conditions, the organ which has the deepest color transpires most, and transpiration is most active in that part of the sp[ectr]um in which the light is most absorbed.

(4.) The luminous rays which are absorbed by the coloring matter of an organ alone [fav]or the transpiration of such organ. Then, conditions be[i]ng equal, the transpiration of a colored organ will reach its minimum under the influence of a light of the same color as the organ, and its maximum under the influence of a light of complementary color.

NATURAL HISTORY NOTES.

Digestion in Plants.—Dr. Lawson Tait has recently been investigating anew the structure and digestive principles of plants. While he has obtained complete proof of the existence of a digestive process in *Cephalotus, Nepenthes, Dionæa*, and the *Droseraceæ*, he entirely failed with *Sarracenia* and *Darlingtonia*. The fluid separated from one of the sundews (*Drosera binata*) he found to contain two substances, to which he gives the names "droserin" and "azerin." Dr. Tait confirms Dr. Hooker's statement that the fluid removed from the living pitcher of *Nepenthes* into a glass vessel does not digest. A series of experiments led him to the conclusion that the acid must resemble lactic acid, at least in its pr[o]perties. The glands in the pitchers of *Nepenthes* he states to be quite analogous to the peptic follicles of the human stomach; and when the process of digestion is conducted with albumen, the products are exactly the same as when pepsine is engaged. The results give the same reactions with reagents, especially the characteristic violet with oxide of copper and potash, and there can be no doubt that they are peptones.

How Flying-fish Fly.—*Apropos* of an article on this subject in the *American Naturalist*, Prof. D. S. Jordan, the well known ichthyologis[t], gives the following statement in regard to the behavior of the large flying-fish *Exocœtus californicus*: This fish flies for a distance sometimes of nearly a quarter of a mile, usually not rising more than three or four feet. Its motions in the water are extremely rapid, and its motive power is certainly the movement of its powerful tail in the water. On rising from the water the movements of the tail are continued for some seconds until the whole body is out of the water. While the tail is in motion the pectorals are in a state of very rapid vibration, and the ventrals are folded. When the action of the tail ceases, the pectorals and ventrals are spread, and, as far as can be seen, held at rest. When the fish begins to fall, the tail touches the water and the motion of the pectorals recommences, and it is enabled to resume its flight, which it finally [f]inishes by falling in the water with a splash. When on the [w]ing it resembles a large dragonfly. The motion is very swift; at first it is in a straight line, but this becomes defle[c]ted to a curve, the pectoral on the inner side of the arc being [b]ent downward. It is able to some extent to turn its course to shy off from a vessel. The motion seems to have no refe[r]ence to the direction of the wind.

The Use of Chlorophyl in Vegetable Growth.—This question appears to be as yet by no mean[s] definitely settled. Pringsheim, it will be remembered, recen[tl]y suggested that chlorophyl was chiefly of use as a screen to protect the subjacent cells and their contents from those rays of light which would be adverse to the secondary processes tha[t] have been distinguished as growth. But Dr. Gilbert, in h[is] recent address to the Chemical Section of the British Asso[c]iation, points out that the plant may receive abundance of [n]itrogen, may produce abundance of chlorophyl, and be subj[e]ct to the influence of sufficient light, and may yet not assimilate a due amount of carbon. He shows that the presence of a due supply of potassium salt and of sufficient available nitrogen is necessary for the proper assimilation of carbon by plants. The amount of carbon assimilated evidently does not de[p]end on the protective power of the chlor[o]phyl alone, nor on its chemical action. In connection with the coloring mat[t]er of leaves it has been observed tha[t] the leaves of the Virginia creeper chan[g]e to the well known beautiful red hue sooner on walls exposed to the north and east, and that if the weather be wet during the time when they usually chang[e] color the red tint is only sparingly developed.

Influence of Colored Lights on Animal Development.—M. Yung, in a note to the French Academy (*Comptes Rendus*, p. 440), gives some of the results obtained by him in his experiments on the action of colored lights on the development of animals. Eggs of the squid and cuttlefish, laid at the same time, were put into vessels in which the water was regularly renewed. These vessels were placed in glass bowls of the same form, but larger, and the intervening space was filled with different colored liquids. The upper surfaces were covered with thick cardboard, so that the eggs received light that was nearly monochromatic. Under such conditions the eggs developed unequally, as had previously been found the case with the eggs of the frog, trout, etc. The development was stimulated by violet and blue lights, but retarded by red and green. Yellow light, in its action, came nearest to white. In experimenting with the beautiful ascidian *Ciona intestinalis*, M. Yung found that those larvæ which were reared in vessels submitted to violet light grew more rapidly and developed into much more vigorous individuals than those reared under other colored lights. These results, taken in connection with the like ones obtained by M. Serrano-Fatigati on infusoria, seems to show one general character for aquatic animals. It now remains to be seen whether terrestrial animals are influenced in the same way.

TRANSACTIONS OF THE AMERICAN SOCIETY OF ENGINEERS.

The above named publication for the month of November contains some important papers.

The subject of

"WEB STRAINS IN SIMPLE TRUSSES WITH PARALLEL OR INCLINED BOOMS,"

is ably discussed in a paper read by Mr. Elnathan Sweet, Jr., at the twelfth annual convention of the society, held May 25, 1880. Mr. Sweet, in this paper, aims at greater directness and simplicity in the treatment of the subject than has hitherto been attained; and he asserts that the handbooks hitherto published base their solutions of the problems relating to this class of trusses upon a false assumption. This assumption is, that as a moving load passes over the panels of a truss, each panel is fully loaded before the adjacent triangle in advance bears any part of the load.

"In trusses with a single system of triangulation, or those in which the web strains of any panel pass to the abutment through the web members of the adjacent panel, this assumption is obviously erroneous, for the instant the head of the load passes a panel joint of such a truss a part of it is transmitted by the floor system to the adjacent triangle of the same system."

With this proposition in view, the author proceeds to a somewhat abstruse mathematical discussion, in which he adopts as the most natural unit of length the panel length. By this means he is able to simplify the formulæ necessary so considerably as to justify the wisdom of the adoption of the panel length as the unit of length, and to determine the maximum shearing strain at any panel joint by much less complex expressions than have been heretofore required.

A DISCUSSION UPON INTER-OCEANIC CANAL PROJECTS,

referring to former papers which have appeared in the *Transactions*, together with additional information obtained by recent surveys in Nicaragua, by Mr. A. G. Menocal, throws much light upon current questions relative to the problem of communication by means of canals between the Atlantic and Pacific oceans. As an abstract of this paper cannot be given without reference to the papers criticised in it, we can only glance at one or two salient points. One of these is ably taken. In speaking of a canal on the Nicaragua route, the time of transit ought to be estimated not as though the whole distance were canal transit, but the transit ought to be separated into its component parts, to wit: "Canalization, 62 miles; slack water navigation, admitting nearly ocean speed, 63 miles; and lake navigation, admitting ocean speed, 56½ miles;" total, 181½ miles. The time of transit would, therefore, be shortened very much below that estimated by some engineers; indeed, it could be accomplished in 38½ hours, the transit including a lockage of 108 feet.

The practicability of utilizing the channel of the river Grande is another point strenuously urged by the writer in favor of the Nicaragua route.

Minutes of meetings and the annual reports of the Board of Direction, Committee on Finance, the report of a Committee on a Uniform System of Tests for Cements, and a list of members, with additions, changes, corrections, and resignations, complete the contents.

The Committee on Tests for Cements make only a brief report, enumerating an extensive series of papers received from different parts of the world bearing upon the subject, stating that they will commence an interchange of views during the present winter, and announcing that they will endeavor to complete their duties on or before the date of the next annual convention.

Meteorological Observations by Telegraph.

Mr. N. Hoffmeyer, of Copenhagen, observes that "in meteorological prognoses we cannot expect a scientific certainty; these prognoses are based upon empirical suppositions, and are, therefore, subjected to all possible errors which may be caused by that method. So long as the causes and the real nature of meteorological disturbances have not yet been explained, so long as we are only able to know the *how* and not the why of meteorological phenomena, so long a very exact observation only of the storms which by telegraph is transmitted from one coast to another, will be of practical value to the mariner."

This observation, however, is connected with greater difficulties than has been hitherto supposed. Mr. Hoffmeyer has, during a period of 21 months, made the closest investigations in regard to the storms and winds on the Atlantic Ocean, and he maintains that the conditions upon which these meteorological phenomena depend are so highly complicated that the telegraphic reports sent by the "*Herald* Weather Department" from America to Europe—although being a proof of the energy and ability of Mr. Bennett—have an imaginary value only.

It has been proved that the atmospheric disturbances usually move in the same direction across the ocean as across the continents, viz., from west to east, and that about 61 per cent of the storms which we have to encounter on the Atlantic have arrived there from the American continent; but it is also known that 39 per cent of the storms—a number not to be overlooked—are originated upon the Atlantic itself, and that besides only 50 per cent of the storms observed on the Atlantic arrive at Europe. The direction which the atmospheric disturbances show in America, before they arrive at the coast of the Atlantic, can be no secure basis for conclusions regarding the further course of these disturbances and the phenomena connected with them. Even if the observations on the European and American coasts were to be combined, a reliable prediction of what will happen on the ocean will be impossible. If, therefore, meteorological observations shall have a real benefit for our mariners, such observations must not only be made on the coast, but also on the Atlantic itself, and Mr. Hoffmeyer proposes to erect for this purpose a regular meteorological service, the stations of which are situated upon the ocean—*i. e.*, upon islands which lie between the two continents. These stations should be connected by telegraph with the continents, so that Faroe Island, Iceland, South Greenland, and the Azores may be brought into communication with the European coast and the Bermudas with North America.

Although these stations are very distant from each other, the meteorological observations made there will, on account of a meteorological peculiarity of the Atlantic, be of value for predicting the weather and atmospheric disturbances which will occur between these stations.

Mr. Hoffmeyer, by daily constructing synoptical maps, discovered that the barometric minima in the atmosphere which rests upon the Atlantic have a tendency to approach Greenland and Iceland on the one hand, and the Azores on the other, while from the latter to the Bermudas may be usually observed a high pressure of the air and fine weather. Even a slight change taking place at this part of the ocean predicts almost to a certainty great disturbances in the other regions. This barometric maximum, according to Hoffmeyer, forces the depressions of the atmosphere to take a certain direction and influences their velocity of movement in a high degree. Therefore it is absolutely necessary to be acquainted with these atmospheric maxima which prevail upon the ocean, and they can naturally be observed only upon the ocean itself—*i. e.*, upon those islands mentioned; therefore observations made there, in connection with those made on the coast, will be perfectly sufficient for all practical purposes. Mr. Hoffmeyer hopes, proceeding upon this basis, to perfectly transform our meteorological service, and to enable our scientists not only to predict the weather for a day or two, but for a longer period of time. The importance of such predictions for the transatlantic navigation is evident. The synoptic maps will enable the ships leaving the ports to enter regions which are subjected to great atmospheric changes, and to choose those ways which, during a certain time of the year, are the least exposed to danger; they will give important information about the condition of the monsoons near the Azores, which are much more irregular than they are generally supposed to be; and they will be valuable for the owners of vessels in making it possible for them to account for possible delays of their ships.

Mr. Hoffmeyer's labors have been communicated to the meteorological institutions of Europe, and necessary steps will probably be taken to make a practical use of the suggestions of this gentleman, as the resolutions, taken April 3, 1880, at an assembly of the presidents of the German meteorological stations at Hamburg, highly recommend the suggestions made by Mr. Hoffmeyer.

Paper Pulp from Wood.

The following interesting description of the process of making wood pulp is from an account of the opening of the Thorold Pulp Paper Company's establishment published by the Thorold *Post*, Canada:

"The wood, four feet in length and of any thickness, is brought in at the basement, placed in the barking-jack (one stick at a time), where two men, with draw knives, rapidly peel off the bark. It is then conveyed by the elevator to the first floor, sawed in two foot lengths with cross-cut saws, passed on to the rip saw, where it is slabbed (that is, a small portion of wood on opposite sides taken off), to permit it resting firmly in the grinding engine. It is then passed to the boring machine (an upright one and a half inch auger, with foot attachment driven by power), where the knots are bored out. The wood is then placed in racks of the same size as the receptacle in grinding engine and carried out to be ground. The grinding engines are upright, and receive at a filling one-twentieth of a cord of wood. The wood is placed in a receptacle, and by a simple, variable, automatic feed process is pressed flatwise between two outward revolving rolls, composed of solid emery, which are flooded with a spray of water, carrying off the fibrilized pulp in a stream through revolving screens to the tank or stuff-chest in the basement. It is then pumped up into a vat that forms part of the wet machine. In this vat is constantly revolving a large cylinder faced with fine brass wire cloth, which picks up the particles of pulp out of the water and places them on the felt (an endless piece of woolen goods which makes between rolls, for different purposes, a continual circuit of the wet machine). On the cylinder is turning a heavy roll, called the concha; between the two, where they meet, the cylinder leaves the pulp, with most of the water pressed from it. The pulp now makes its appearance on the felt above the concha roll in a beautiful sheet, thirty-eight inches in width, and is carried along in a steady flow a distance of about eight feet, where it passes between (the water here again being pressed from it) but set beyond two heavy rollers, the upper iron, the lower wood; it adheres to the upper roll, which is constantly turning, wrapping it up, and when a sufficient thickness is attained, is cut off by a knife being pressed to the roll, attached to the machine for that purpose. It now leaves the roll in a thick, white sheet, 36 x 38 inches, which is received by the boy in attendance on a table conveniently attached to the machine, and folded into sheets 14 x 26 inches. It is then placed on scales until the weight is one hundred pounds, when it is placed in the press and firmly tied into square compact bundles. It is now ready for shipment to the paper mill to be made into printing and tea paper. The wood paper pulp has been placed in the market and found a ready sale. Last week a contract to the amount of $1,000 was made with one of our large paper mills."

Loss of Water Pressure in Hose Pipes.

The recent engine test in New York city was interesting in many ways, but in none more so than as exhibiting the loss of power by friction in hose. Two hundred feet of Maltese cross rubber hose were laid from the engines, and at the base of the playpipe a gauge was inserted in the line. The steamers were working at from 100 to 120 pounds steam pressure. The following table exhibits the average general pressures taken every three minutes simultaneously:

Engines.	Steam Pressure.	Water Pressure at Engine.	Water Pressure at Pipe.	Loss by Friction in Hose.
Clapp and Jones	110·83	173·55	93·03	80 50
Ahrens	120·33	166·70	88 38	78·32
Amoskeag	101·64	143·14	74·54	68·60

From this it will be seen that the loss of power by friction in 200 feet of hose was very nearly 50 per cent. Had there been 1,000 feet of hose, the loss would have been very much greater, of course. The size of the hose used was 2½ inches. Had it been 4-inch hose, as the *Journal* has advocated for fire service, the friction loss would have been far less. In his little book entitled "Fire Streams," Chief Leshure, of Springfield, Mass., gives numerous valuable tables illustrating the friction loss in hose. He says: "It may be stated as near enough for most practical purposes, that when delivering the same number of gallons per minute, the friction loss in two pipes (or hose) of equal lengths, the diameter of one of which is twice that of the other, the loss in the larger will be one thirtieth of that in the smaller, or the loss in the smaller will be thirty times that in the larger." A better argument for increasing the size of hose for fire service could not be put forth. The weight of the hose need not be materially increased, for the present hose is made unnecessarily heavy to withstand fictitious pressures: that is to say, hose is now made and warranted to withstand anywhere from three to six hundred pounds pressure. When in actual service the pressures seldom exceed those given above. In a 4-inch hose it would be almost impossible to get 200 pounds pressure on the hose at any point in the line, and the hose could be made correspondingly lighter. As a matter of fact, 4-inch cotton hose is now made in large quantities for mining purposes that weighs but 70 pounds to the section, while much 2½ inch fire hose weighs fully as much or more —*Fireman's Journal.*

ENGINEERING INVENTIONS.

An improved rotary engine has been patented by Mr. John H. Newell, of Scottville, Ill. The invention consists in mechanism for operating the valve, and the combination therewith of a variable cut-off.

An improved stock car has been patented by Messrs. James V. Brown and Benjamin R. Neal, of De Soto, Ill. The object of this invention is to construct a car for transporting cattle and other live stock, so that the car can readily be divided into two or more stalls, and the food and water be conveniently transported and fed to the animals.

Mr. Daniel Kunkel, Sr., of Oregon, Mo., has patented an improved car coupling, so constructed that the cars will be coupled automatically as they are run together, also permitting their convenient uncoupling.

Chemistry of Plants.

Dr. S. Ringer, who has for some time past been experimenting upon the physiological action of *Narcissus, Galanthus, Hæmanthus*—genera belonging to the natural order *Amaryllidaceæ*—has recently examined the properties of an alkaloid from the common garden tulip—a liliaceous plant, and communicated his results to the *Practitioner*. It has been found by him that nitrate of tulipine differs almost entirely from the alkaloids derived from the amaryllids, it being a muscle poison which affects the muscles like veratria, but to a less degree. These results are interesting from a botanical as well as a physiological standpoint, as going to confirm the theory that the relationships between natural orders may, to a certain extent, be indicated by the nature of their chemical constituents. The nearer relationship of the *Liliaceæ* to the *Melanthaceæ* seems shadowed forth by the fact that a liliaceous plant has yielded an alkaloid like veratria. In the same manner the position of the Australian genus *Duboisia*, as belonging to the *Solanaceæ* rather than to the *Scrophulariaceæ*, was demonstrated by the elimination of the alkaloid duboisine, and the discovery that its physiological action was analogous to that of the solanaceous alkaloids.