

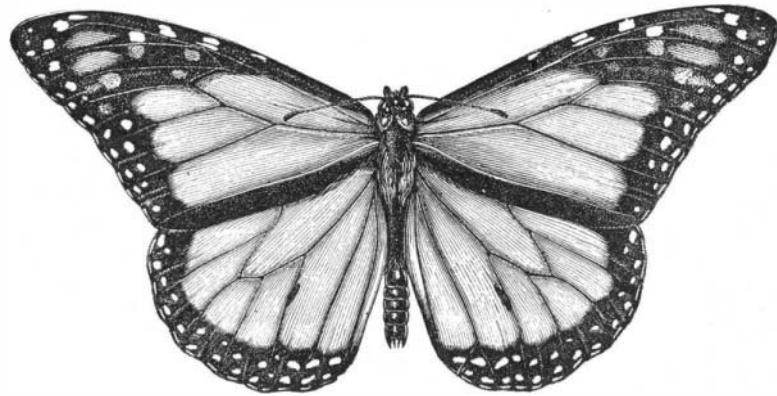
**MIGRATORY BUTTERFLIES.**

BY PROFESSOR C. V. RILEY.

Many quadrupeds that multiply rapidly acquire the migratory propensity. This is especially true of rats and lemmings, of the migrations of vast numbers of which numerous interesting accounts are recorded. Many insects normally non-migratory also exceptionally congregate and migrate in vast swarms, and this is especially the case with butterflies, flights of which, and particularly of the yellows (*Callidryas* and *Colias*) and the whites (*Pieris*), have been reported from equatorial and South America, and from different parts of Europe. Vast flocks have also been observed at sea. The newspapers in the Southwest and the Signal officers were constantly reporting the passage over Iowa, Kansas, Missouri, and Texas of swarms of butterflies during the months of September and October last. These consisted, in every case where determinations were made, of the archippus butterfly (*Danaus archippus*), herewith illustrated. This is the principal species known to thus migrate in North America. In an account of the swarming of this butterfly, published in 1870 (3d Mo. Ent. Rep., p. 151), I wrote as follows:

"It would be difficult to give any satisfactory reason for this assembling together of such immense swarms of butterflies. . . . There are two significant facts connected with them, from which some corollary might be deduced, namely, that only those species which have a very extended range are known to form such flocks, and that they always travel, under these conditions, in a southerly or southwesterly direction. Mr. Bates ('Naturalists on the River Amazon,' vol. i., p. 249) gives an interesting account of the uninterrupted procession of butterflies belonging to the genus *Callidryas*, which passed from morning till night in a southerly direction across the Amazon, and as far as he could ascertain these migratory hordes were composed entirely of males. As I have abundantly proved, by examination of specimens since the above was written, the individuals composing the swarms of our archippus butterfly comprise both sexes; if anything, the females prevail. No satisfactory explanation of these swarms has been given, but I think they are for the most part due to an instinctive tendency to reach a warmer country in which to hibernate, and to a failure of food in the country where they developed. The flights almost always occur in autumn, when the milkweeds (*Asclepias*), upon which the larva of this butterfly feeds, have perished. The instinct to propagate is therefore at the time in abeyance. The butterflies, unable to supply themselves with sweets from flowers, are either attracted in quantities to trees that are covered with honey-secreting plant lice or bark lice, or else they must migrate southward, where flowers are yet blooming. All insects acquire the migrating instinct when crowded together through excessive multiplication. The archippus butterfly hibernates within hollow trees and in other sheltered situations. Southerly timber regions offer most favorable conditions for such hibernation. Under the most favorable conditions a large majority perish. A small portion of the females survive the winter. Such hibernated individuals, up-

on waking from their winter torpor, make at once for the prairies, where the milkweeds most abound. Faded, and often tattered, they may be seen flying swiftly over such prairies, for the wings of the species are strong and large. I have no doubt but that they travel thus for many hundreds of miles, keeping principally to the north, and, ere they perish, supplying the milkweeds here and there with



THE ARCHIPPUS BUTTERFLY.

eggs. A fresh brood is produced in less than a month, and these extend still further north, until we find the species late in the growing season as far up as the Saskatchewan country, where it can scarcely successfully hibernate, and from whence the butterflies instinctively migrate southward.

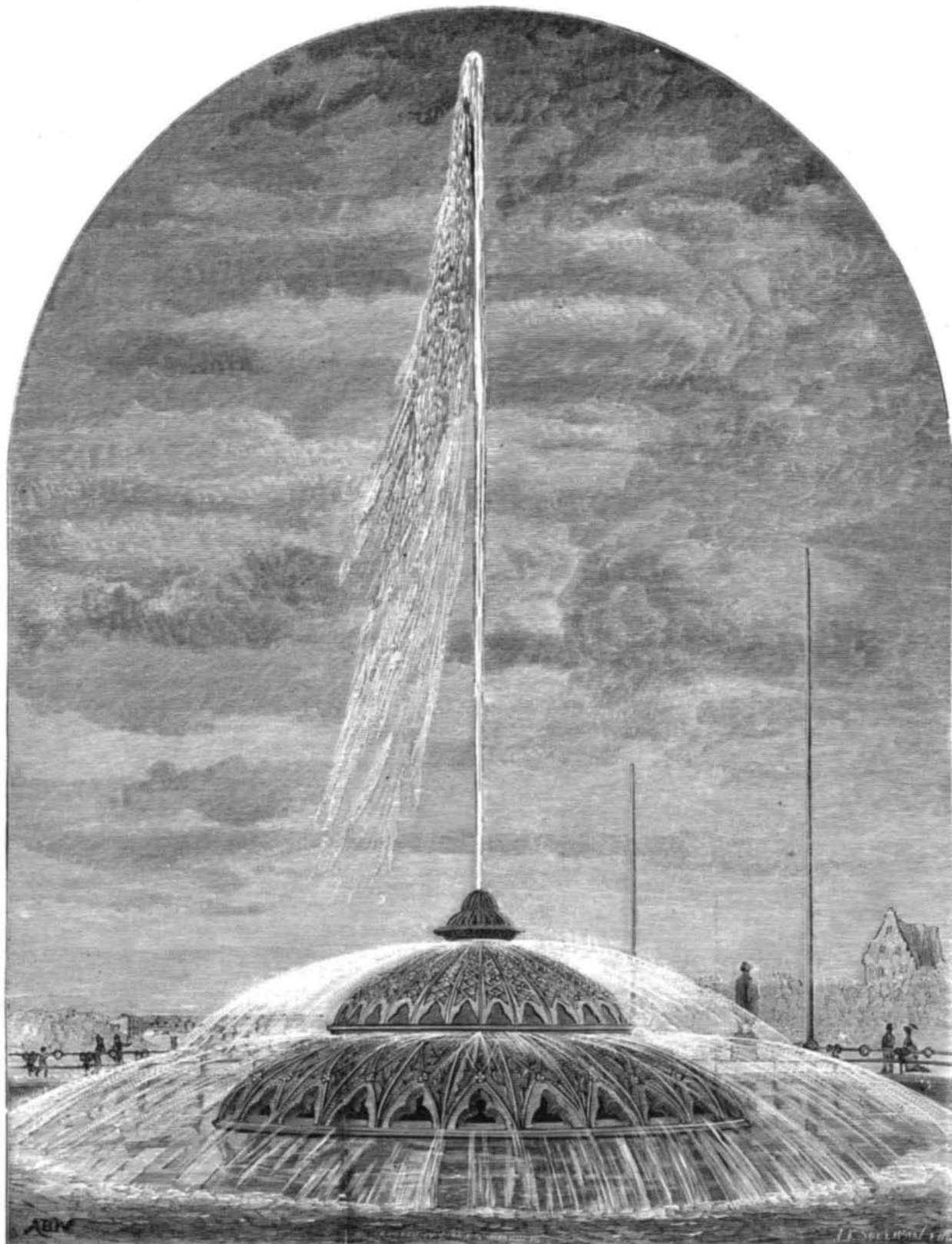
"We can thus understand how there are two, three, or more broods in southerly regions, but only one toward British America. The exceptional flights noticed in the spring, and which, so far as recorded, take place quite early and in the same southerly direction, find a similar explanation. They

may be looked upon as continuations of the autumn flights. Hibernating in the temperate belt, they are awakened and aroused upon the advent of spring, to find the milkweeds not yet started, and they instinctively pass to more southern regions, where spring is more advanced. In short, these migrations find their readiest explanation in the instinct of the species to lengthen the breeding season and to extend its range; and the prevailing winds at particular seasons are of a character to assist it. There is a southward migration late in the growing season in congregated masses, and a northward dispersion early in the season through isolated individuals. It is a notable fact that the two butterflies which most display this instinct, namely, the species in question and the "painted lady" (*Cynthia cardui*), have the widest range of known species. The last is cosmopolitan, occurring in all four quarters of the globe; while our archippus, originally confined to America, though ranging from Canada to Bolivia, appears to be following the milkweeds wherever these are, through chance or purpose, introduced. It has lately spread over some of the islands of the Pacific, to Queensland and New Guinea, and over the Azores to Europe, such spread necessarily indicating great power of long-sustained flight, since the milkweeds are not plants of commercial value, and it is highly improbable that the species has been carried in any of the preparatory states on ships."

**A BETON FOUNTAIN, PROSPECT PARK, BROOKLYN.**

Our engraving represents the Plaza Fountain in Prospect Park, Brooklyn, one of the most tasteful and beautiful ornaments in that pleasure ground. It is fed with water from the city water works, which are supplied from a chain of ponds some nineteen miles from the city, and extending from Jamaica east to Hempstead Plains. From these sources the water is brought in a brick-covered conduit to Ridgewood reservoir, into which it is forced by three powerful engines. This reservoir has a capacity for about 160,000,000 gallons, and is located at an elevation of 170 feet above the East River. Besides this, Mount Prospect Reservoir has a capacity for 20,000,000 gallons, with an elevation of 28 feet above that of Ridgewood. From these two reservoirs the water is distributed throughout the city through about 277 miles of pipe. To secure a supply in case of drought, a storage reservoir, having a capacity for 1,055,000,000 gallons, is in process of construction. The daily consumption of water in the city is about 30,000,000 gallons.

The fountain we illustrate is especially remarkable both for its design and for the material in which the same is carried out. In the center of the basin is a grand dome 113 feet in circumference. The base is a series of Gothic arches, up the sides of which are defined beautifully trailing vine leaves. From a ring of smaller circumference issue innumerable jets, so as to form one sheet of water, which falls into the basin, leaping over the arches. The space beneath the dome is illuminated at night, producing an exceedingly beautiful effect, as the light is reflected on the water. From the summit of the structure a single strong jet rises perpendicularly in the



A BETON FOUNTAIN, PROSPECT PARK, BROOKLYN.

air. The entire stonework of the fountain is made of beton-coignet, an agglomerate of sand, hydraulic lime, and hydraulic cement in suitable proportions. These elements are ground and mixed by machinery until they reach a plastic state. The moulds are then filled by a peculiar process which entirely excludes the air, and are immediately removed. The stone within a few days is ready for transportation, and continues to increase in density. It is impervious to water, is not affected by frost, and will withstand a crushing pressure of about 4 tons to the square inch. Structures composed of it are lighter than those of natural stone, while the strength is equal, if not in many instances greater. A cubic foot of beton-coignet weighs about 146 pounds. The fountain was built by the New York Stone Contracting Company, at their factory in Brooklyn.

In the SCIENTIFIC AMERICAN SUPPLEMENT (current issue) we present a large number of applications of this very valuable material, which are remarkable as indicating the wide range of purposes to which it may be devoted, and also its special utility in particular cases where any other substitute could hardly accomplish the desired end. Of especial interest is the employment of the beton in strengthening the foundations of bridge piers, it being thus used in the case of the Portage viaduct on the Erie Railroad. On the same road a weak culvert has been lined with the agglomerate, and thus as strongly supported as if upheld by solid stone. Similarly, in the tunnel under Bergen Hill, N. J., a part of the rock which could not be retained by brick or other arching is lined with beton. This application of the material bids fair to be of great engineering importance, and the above examples, which are fully illustrated in the SUPPLEMENT, may be commended to the careful attention of all engineers. Among the other utilizations of the beton which we describe and illustrate, are its employment for ornamental architectural work, to which it is admirably suited, and its substitution for stone as a building material.

#### Remarkable Voyages in a Life-Preserving Suit.

Captain Paul Boyton, who a couple of years ago made himself and the Merriman life-preserving suit famous by successfully floating across the British Channel, has recently accomplished another feat which puts all previous achievements in the same line far in the shade. Beginning at Toledo, Spain, he undertook the navigation of the river Tagus to its mouth at Lisbon. The distance traversed was 600 miles, and the voyage occupied eighteen days. Captain Boyton's account of his journey is not calculated to render any one desirous of repeating the experiment. In some places the river became a torrent, dashing among sharp rocks at the rate of a dozen or two miles an hour; for miles it ran between precipices, and in a country seemingly destitute of human habitations. The swimmer "never knew but that the next angle in a cañon would land me in a whirlpool or over a precipice." During the voyage 102 waterfalls and rapids were passed, one cataract being fully fifty feet in height.

From Lisbon Captain Boyton went to Gibraltar, and there on the 21st of March swam across the straits to the African shore, direct distance 30 miles. The passage took seventeen hours, and the swimmer was swept far out of his course by the strong spring tides. The trial is regarded as one of the severest to which he has yet been subjected.

#### Cinders in the Eye.

Persons traveling much by railway are subject to continual annoyance from the flying cinders. On getting into the eyes they are not only painful for the moment, but are often the cause of long suffering that ends in a total loss of sight. A very simple and effective cure is within the reach of every one, and would prevent much suffering and expense were it more generally known. It is simply one or two grains of flax seed. It is said they may be placed in the eye without injury or pain to that delicate organ, and shortly they begin to swell and dissolve a glutinous substance that covers the ball of the eye, enveloping any foreign substance that may be in it. The irritation or cutting of the membrane is thus prevented, and the annoyance may soon be washed out. A dozen of these grains stowed away in the vest pocket may prove, in an emergency, worth their number in gold.

The foregoing remedy, from the *Mining and Scientific Press*, appears to be based on the homeopathic principle, "Like cures like." Whether the sticking of flaxseeds into an inflamed eye is likely to prove beneficial is questionable. Better pull out the cinder with a looped horse hair.

#### Glove Cleaner.

Castile soap, white.....	3 troy ounces.
Javelle water .....	2 fluid "
Water .....	2 "
Water of ammonia.....	1 drachm.

Dissolve the soap by the aid of heat in the water, and when nearly cold add the Javelle water and the water of ammonia. The preparation should form a paste, to be rubbed on the soiled part of the glove with a piece of flannel.

#### The Effect of Drink.

A country attorney writes to the *London Times* to say that an old woman has just died at Ashcott, Somersetshire, aged 104 years and 8 months, who for the last 40 years was found in gin by one of his clients, at an aggregate expense of more than \$1,000. It was given her to add to her comforts, under the supervision of the *squire*, who testifies to its beneficial effect. The *Times* observes that if the gin was injurious it must have been "a very slow poison."

[For the Scientific American.]

#### PLANT MIND.

II.

#### SELF-PROTECTION BY PLANTS.

Conspicuous among well ascertained facts of plant life are those which relate to construction and voluntary movement. There is an analogy which would seem to associate plants with animals in the vegetable contrivance of the *Cyripedium* (see illustration), from South America, apparently to prevent the humming bird from devouring its honey. An American spider, called by Linnaeus *Aranea avicularia*, and by M. Lonvillers de Poincy *phalange*, has a convex orbicular thorax, with the center transversely excavated. It catches small birds as well as insects, and has the venomous bite of a serpent. The body is described as being the size of a pigeon's egg, with a hollow on its back like a navel, and it is said to catch the humming bird in its strong nets.



CYRIPEDIUM.

Side by side with this terrible spider we find, in South America, the *Cyripedium*, of large size and bright colors, having a globular nectary of a fleshy color and the size of a pigeon's egg, with an incision or depression on its upper part. Attached to this globular nectary are divergent, slender petals, not unlike the legs of the spider. This curious similitude to the great spider seems to be designed as a protection from the humming bird, who would plunder its nutritious honey and thus arrest its existence.

Near Matlock, in Derbyshire, we find the *Flyophorus*, a flower so much resembling the small wall bee that it might be easily mistaken for it at a short distance. This resemblance lies in the nectary, and thus it may escape premature rifling. The importance of the nectary in the economy of vegetation is well known, supplying food to the vegetable males and females until they have propagated their species and are ready to die. It may be questioned, How fare the plants which are not thus protected from the depredations of the animal kingdom? In reply, botanists suggest that they either acquire

means of defense, or make more honey than is absolutely necessary for their own welfare. These resemblances and protections are to be found in all quarters of the globe. In Java there is a parasite plant, *Epidendrum flos aeris*, with flowers resembling spiders. Bees and butterflies are supposed to be thus deterred from plundering the nectaries. The common nettle has a bag at its base, and a perforation near its point exactly like the stings of wasps and the teeth of adders.

In the columbine (*Aquilegia*) the nectary is imagined to be like the neck and body of a bird, and the two petals standing upon each side to represent wings,

APOCYNUM ANDROSEMIFOLIUM.  
(Dog's Bane.)

whence its name (*columba*, "dove"), as though resembling a nest of young pigeons fluttering while their parent feeds them.

The word *coccyx*, in Greek, signifies both a young fig and a cuckoo, which is supposed to have arisen from the coincidence of their appearance in Greece. A similar coincidence between the blooming of the rose and the birth of the nightingale in Persia, the wood anemone and the swallows in Sweden, and the marsh marigold, *Caltha*, when the cuckoo sings, was observed by Linnæus.

In the Persian iris, the end of the lower petal is purple, with white edges and orange streaks, creeping, as it were, into the mouth of the flower, like an insect, by which deception it probably prevents a similar insect from plundering it of its honey.

When a fly inserts its proboscis between the anthers of the *Apocynum androsemifolium*, one kind of dog's bane (see illustration), to reach the honey, they converge more closely and with such violence as to detain the fly, which is generally caught by a trunk or proboscis, sometimes by the trunk and a leg. The flowers of this plant are not known to sleep, at least they remain open at night, and the flies sometimes escape.

There is another plant, *Medicago polymorpha*, which may be said to assume at will a great variety of shapes, as the seed vessels resemble sometimes snail horns, at other times caterpillars, with or without long hairs upon them, by which means it is probable they sometimes elude the depredations of the insects they resemble. *Salicornia* also assumes an animal similitude. The seeds of *Calendula* (marigold) bend up like a hairy caterpillar, with their prickles bristling outward, and may thus deter some birds or insects from preying on them.

Not the form alone, but also coloring matter appears to be bestowed upon plants as a defense against depredations from the animal kingdom, being often either nauseous or deleterious, and not apparently essential to the life or growth of the plant. The glands of the vegetable are believed to separate from their blood, not only mucilage, starch, or sugar for the support of their seeds, bulbs, and buds, but also bitter, acrid, or narcotic juices as a defense from insects and larger animals; but as yet some of the finest vessels of plants have not been exhibited to the inspection of our microscopes, and we do not presume to extend this article into the domain of conjecture, but propose to group together at different times only well known and interesting facts relative to the structure, lives, and habits of those singular creations, which are, we believe, unjustly and incorrectly classed as belonging to an inanimate rather than an animated sphere of being. As yet, the anatomy of plants has not been generally recognized as correspondent to that of the animal economy, but with the aid of our improved microscopes and summer science schools, the day is close upon us when our dearly loved vegetable kingdom will be placed where it rightfully belongs, namely, in the unbroken analogy which entitles it to be recognized as differing only in degree, not in kind—no longer below, but on an equality with, the animal kingdom. R. C. K.

#### THE FIRST SHAD.

The first shad of the season was taken in the North River off Weehawken, March 12, an uncommonly early appearance. Formerly the first shad was expected about St. Patrick's Day; but of late years its arrival has been delayed until the 20th or 25th of the month. A large catch is expected this season, as nearly 5,000,000 young fry were turned loose in the river in 1874 by the superintendent of the North River shad-hatching establishment, and now they are of age to return. During the past five years the yearly product of the Hudson has averaged about 120,000; the average price has been about twenty-five cents each at wholesale. The season is at its height in April, and lasts three months. The arrival of shad at the mouths of Southern rivers is much earlier. At St. John's river, Florida, the run begins early in December; the fish are small and of inferior flavor. About a month later shad make their appearance in the Ogeechee river, Georgia. They are larger, fatter, and of better flavor, and are known as Savannah shad. The best of the Southern shad come from the Neuse river, North Carolina, where they appear in the latter part of February. Virginia shad, from the James and the Potomac, begin to be taken early in March. The James river shad are held in high favor in our markets. The Potomac shad are inferior both in size and quality. The shad of the Delaware are sold chiefly in Philadelphia and other Pennsylvania cities, where they are highly esteemed. They are excelled by the shad of the Hudson, and these in turn by those of the Connecticut. Further north and east the shad are few in number and of decreasing excellence. The catch in the Connecticut river begins about the first of April, and the fish excel all others in size and quality.

The United States Fish Commission have taken steps to secure fuller and more accurate statistics of the proceeds of our river fisheries than have been had heretofore.

#### Death of Patent Office Examiners.

Two members of the Examining Corps of the Patent Office, Professor Brainard and Dr. Mercer, have recently met with sudden deaths, the former of neuralgia of the heart and the latter of apoplexy. Professor Brainard was one of the oldest examiners in the office, and was well known outside of his connection with the examining corps, having much knowledge of many other branches of science not connected with his official duties. He formerly had charge of the class of agriculture. Dr. Mercer was a first assistant examiner, who had been in the office for about eleven years.