

# SCIENCE

NEW YORK, MARCH 25, 1892.

## THE PUMA, OR AMERICAN LION.<sup>1</sup>

THE puma is the only large, unspotted, native American cat. The general color of the fur is tawny, but on the under surfaces of the body it is whitish. The color of the central line of the back is darker than that of the sides and the end of the tail is dusky brown. The ears are black externally, with a central whitish area. The upper lip is white from the nostrils to the middle of the mouth, and at the latter point is a prominent black spot. The nostrils are flesh-colored. Baird compares the color of the puma to that of the Virginia deer, and states that it varies with the seasons as it does in the deer; that is, the summer coat is reddish and the winter coat grayish.

There is much variation in color among individuals of this species, but it has not been proven that this is correlated with the varying climatic conditions of its range. The occurrence of albino pumas in the Alleghany Mountains and in New Mexico has been reported, but not authoritatively.

Burmeister remarks on this point: "Very rarely individuals of this species of a brown, nearly black color have been found, while differences in color between yellowish-brown and yellowish-gray are not rare. I am aware that individuals nearly white and others nearly black have been observed, but I have never seen such myself."

New-born pumas are very different in appearance from the adults. Instead of being of uniform color, the back and legs are covered with large blackish-brown spots, and the tail is ringed with the same color. According to Dr. W. A. Conklin these markings disappear in about six months after birth.

The male puma in the National Museum is of the following dimensions: Head and body, measured along the curves, 53 inches; tail,  $26\frac{1}{2}$  inches; height at the shoulder,  $22\frac{1}{2}$  inches. Audubon and Bachman give the following dimensions of a male killed by J. W. Audubon at Castroville, Tex., Jan. 28, 1846. From point of nose to root of tail (whether measured along curves, not stated), 5 feet 1 inch; tail, 3 feet 1 inch; height of ear posteriorly, 3 inches.

The male puma measured by Azara was somewhat smaller, the head and body being  $51\frac{1}{2}$  inches and the tail 29 inches. The system of measurement is not given.

The average dimensions obtained from these three individuals are: For the head and body,  $55\frac{1}{4}$  inches, and for the tail,  $30\frac{3}{4}$  inches; total, 85 inches.

I have found no authentic record of any individuals measured before skinning of which the dimensions were greater than those of Audubon's specimen mentioned above. The total length in that case was 8 feet 2 inches. There are, however, records of measurements of flat skins of greater size. I have myself measured a skin from Colorado in the National Museum, No. 19,906, of which the total length in a straight line is 8 feet 4 inches. Mr. Livingston Stone states that the skin of a puma killed on the McCloud River, California, "measured  $8\frac{1}{2}$  feet when stretched." The average

total length of nine flat skins of adults in the possession of Mr. F. S. Webster of Washington is 7 feet 4 inches.

The area over which the Puma ranges extends from New England and British Columbia to the Straits of Magellan. On the Atlantic coast of North America the species has apparently not been found in the States of New Hampshire, Rhode Island, New Jersey, or Delaware. On our northern boundary I find no mention of its having been found in Michigan or Indiana. In Ohio it was extirpated prior to 1838, and probably more recently in Illinois and Indiana. I find no record of its occurrence in Nevada, but as it has been found in the surrounding States it seems improbable that it should be entirely absent there.

With these exceptions there are recorded instances, more or less numerous, of the occurrence of the puma in every State and Territory of the Union, dating from the beginning of the century. Like many other large American animals, however, the puma has retired before the advance of civilization, and in many of the more thickly populated States it is improbable that even stragglers could be found at the present day.

The puma occurs throughout Central America and in all parts of South America to the Straits of Magellan.

The first mention of the puma appears to be the remark in the letter of Columbus regarding his fourth voyage in 1502. In the narrative of his exploration of the coast of Honduras and Nicaragua he writes: "I saw some very large fowls, the feathers of which resemble wool, lions [*leones*], stags, fallow-deer, and birds."

There are also references to the occurrence of the puma in North America of very early date in the narratives of Laudonnière, Hariot, Coronado, Hawkins, and others.

The puma, regarded as a species, possesses in a remarkable degree the power of adapting himself to varied surroundings. He endures severe cold in the winter in the Adirondack Mountains and other parts of our northern frontier, and tracks his prey in the snow. He is equally at home in the hot swamps and canebrakes along the river-courses of our southern States. In South America he inhabits the treeless, grass-covered pampas as well as the forests. In the Rocky Mountains, as I am informed by Mr. William T. Hornaday, he ascends to the high altitudes in which the mountain sheep are found. Mr. Livingston Stone saw tracks of the puma on the summit of Mount Persephone in California, at an elevation of 3,000 feet. Similarly, Darwin states that he saw the footprints of the puma on the cordillera of central Chili, at an elevation of at least 10,000 feet. According to Tschudi, the puma is found in Peru in the highest forests and even to the snow-line (though seldom here). A writer in the "Encyclopædia Britannica" states that "in Central America it is still common in the dense forests which clothe mountain ranges as high as 8,000 or 9,000 feet above the sea-level."

In these different regions the puma always selects for his abode such spots as afford some shelter, but we find him in the thickets and copses, rather than in the great forests. "Those panthers that we have observed," writes one of the naturalists of the Mexican Boundary Survey, "were always

<sup>1</sup> Abstract of a paper in the latest Report of the National Museum

found in the most solitary places, generally where there were thick bushes, and in the vicinity of rocky spots, affording caverns for secure concealment, and in which to bring forth their young."

The puma seeks his prey chiefly at dawn and twilight and under cover of night, but he also sometimes hunts by day. The different species of American deer are his principal quarry, but he preys also upon smaller mammals. He will even feed upon the different species of American porcupines, despite their quills, which lacerate his mouth and face. Audubon and Bachman state that raccoons and skunks, as well as birds, form a part of his food, and that he will eat carrion when hard pressed by hunger. To this list Brehm adds the South American coati, agouti, and paca, and the rhea, or American ostrich. Dr. Coues and Yarrow state that in New Mexico and Arizona the puma kills hundreds of wild turkeys and has indeed broken up many of the former breeding-places. Pennant asserts that the wolf serves the puma for prey. This is improbable. Nevertheless, he reports that there was in the Museum of the Royal Society of London the skin of a puma which was shot shortly after it had killed a wolf.

Of the larger domestic animals, such as the horse and cow, the puma attacks only the young, but he will carry off a full-grown sheep from the fold, and not unfrequently preys upon the llama in South America.

In the less settled portions of America the puma has proved at times a great hindrance to stock raising. Kennerly states that in Sonora, Mexico, it kills many colts and calves, and is poisoned with strychnine by the herdsmen. Mr. C. H. Townsend remarks, in 1887: "It is practically impossible to raise colts in the Shasta County hills, California, on account of these pests. They destroy many hogs and young cattle also, but do not present so serious an impediment to the keeping of these animals as in the case of horses." I have recently received similar reports from other sources.

The puma does not ordinarily attack men, but, on the contrary, when surprised attempts to flee from them. Nevertheless it seems probable that some individuals, when strongly pressed by hunger, or moved by other unusual circumstances, may be emboldened to make such attacks. Hensel affirms that such is the case. Darwin states that he had heard of two men and a woman who were killed by pumas in Chili. McMurtrie mentions that a woman was killed by a puma in Pennsylvania, January, 1830. That the puma sometimes kills the hunter who has wounded him is doubtless true, as any wounded animal is likely to turn upon its persecutor, but this is quite different from an unprovoked assault.

It is the habit of the puma to spring upon his prey from an eminence, such as a ledge of rock or a slight rise of ground. If he fails to strike his victim, he seldom pursues it for any considerable distance. In northern regions, however, he sometimes pursues the deer when they are almost helpless in the deep snow. It was reported to Darwin that the puma killed its prey by jumping upon the shoulder and turning the head back with its paw until the vertebræ of the neck are broken or dislocated. Azara ascribes the same habit to the jaguar.

The female brings forth her young in some secluded spot. In the Adirondacks, according to Dr. Merriam, "the lair is usually in a shallow cavern on the face of some inaccessible cliff or ledge of rocks." "In the Southern States," says Audubon, "where there are no caves or rocks, the lair of the cougar is generally in a very dense thicket or in a cane-brake. It is a rude sort of bed of sticks, weeds, leaves, and grasses

or mosses, and where the canes arch over it, as they are evergreen, their long pointed leaves turn the rain at all seasons of the year.

From two to five young are born at a time. Bartlett states that in captivity the number is usually two, but sometimes one. Their young are reared without difficulty. They are brought forth at the close of winter or early in spring in the northern parts of the United States, and at the beginning of summer in South America, that is at the end of December. The period of gestation is from thirteen to fourteen weeks. The young first open their eyes when nine or ten days old. Their total length when born is from 10 to 12 inches. Dr. Merriam is of the opinion that in the Adirondacks the puma does not breed oftener than once in two years.

The age which the puma attains in the state of nature is unknown. It may be remarked, however, that one lived in the Zoological Garden at Frankfort, Germany, sixteen years, one month, and nine days. It died from injuries received by accident, Oct. 13, 1878. Dr. W. A. Conklin states that the various species of cats live in captivity fifteen or sixteen years, but show signs of decay at twelve years.

Authoritative writers upon the habits of the puma in North America agree that the adults do not commonly or frequently make use of trees except when traversing precipitous cliffs or when pursued by dogs. Under the latter circumstances they do not climb into a tree, but jump upon the nearest branch, even though it be at a considerable distance from the ground. Rengger, in his "Travels in Paraguay," however, states that both the puma and the ocelot climb well, and that in the forest they make their flight not only on the ground, but also by springing from tree to tree. He tells us in another place that he once saw a puma chase a troop of monkeys through the forest by jumping from bough to bough among the trees. However incredible this may at first appear, it becomes less so when we consider the wonderful denseness of the South American forests, described by Humboldt and other writers.

The puma, like the cat, has the habit of scratching the bark of trees with its claws, for the purpose of sharpening or smoothing them. Having mentioned this habit as possessed by the jaguar, Darwin writes: "Some such habit must also be common to the puma, for on the bare, hard soil of Patagonia I have frequently seen scores so deep that no other animal could have made them."

Many reliable authorities are agreed that the puma does not ordinarily emit loud cries or screams, but Kennerly, one of the naturalists of the Mexican boundary survey, states that on one or two occasions the cry of the puma was heard at a distance, and Schott writes as follows: "After dark his mournful note is heard resounding through the solitudes of the deserts. The note, listened to once attentively, is apt to make a deep, lasting impression. The different native names, as pronounced in Spanish, sound very appropriately to the note, and it is likely that the cry of the animal forms the base of its names. The note itself is often several times repeated, with intervals of from two to four minutes. As night advances the cry is heard but rarely." He also writes: "A puma was killed on the Rio Bravo, between Fort Duncan and Laredo. During his struggle with the hunters and dogs he raised a terrible cry, twice or thrice, to express his rage, and perhaps also to give his family the notice of danger." Dr. J. A. Allen reports that he once heard the puma's cry near his camp in Montgomery, Colorado. Elliot likewise states that he heard the cry of the puma at night, while camping on the St. John's River, Florida. He did not, how-

ever, see the animal, Darwin states that the puma does not often utter cries. He writes: "It is a very silent animal, uttering no cry, even when wounded, and only rarely during the breeding season."

In captivity the puma purrs when pleased, after the manner of the cat, and the female has been heard to utter a mewling sound.

The flesh of the puma is eaten by certain of the South American Indians, and was likewise eaten by the natives of North America, according to Catesby. Darwin, who tasted it himself, states that it is white in color and has the flavor of veal. Numerous other explorers and travellers make the same comment. Azara says on this point: "I have known my peons to eat it in preference to beef, even when that meat was to be had in abundance."

The puma is known under a multiplicity of English names. Among these are panther, painter, cougar, catamount, wild cat, American lion, California lion, silver lion, mountain lion, and tiger.

The word *puma* is the native Peruvian name, according to Garcilasso de la Vega, La Condamine, Tschudi, and other authors.

*Cougar* is an English form of the word *couguar*, which Buffon derived by abbreviation from *cuguacu-ara*. This latter word, lengthened to *cuguacuarana*, is, according to Markgrave, the native Brazilian name. Azara, however, states that the ancient name, used by the Guarani Indians of Paraguay was *güazüard*. Others called it *yagüá-Pitá*, meaning red *yagüá*, or *yagüatí* meaning white *yagüá*.

The word "painter" is a corruption of panther. It is unfortunate that this latter name has gained general acceptance in the United States, since the true panther is a spotted, Old World cat, very different in appearance from the puma.

The name mountain lion is not altogether inappropriate, as the puma somewhat resembles the female lion in color and general form. From the earliest days the puma has been called the lion (*Leon*) by Spanish Americans and the name is still used.

The names catamount, or catamountain, and wild cat have no special applicability to the puma. They have been used by English writers to designate the European wild cat (*Felis catus*) and lynxes, and by Americans have been applied to the lynxes of this country.

Besides those names which are in common use, there are some which have been invented from time to time by various authors, and are known to zoologists as "book-names." Buffon's name *Couguar* really belongs to this class, as do also the names Brazilian cat (die brasilianische Katze of Müller), the brown tiger of Pennant, and the red tiger (*Tigre Rouge* of Barrère).

As already stated, the puma is called the lion (*Leon*) by Spanish-Americans, while the jaguar is styled the tiger (*Tigre*). Early Spanish writers, however, did not always distinguish between the two, and sometimes mentioned the puma under the name of tiger, or used the name in some modified form, as red tiger, etc. Molina states that it is called *Pagi* in Chili, and according to Clavigero, it was known to the Mexicans as *Mitzli*.

The puma is the *Felis concolor* of Linnæus. This name has been adopted by subsequent authors, almost without exception. Schreber, however, has two figures of the species in his work on mammals, one of which is styled *Felis discolor*.

Molina, in 1782, gave it the name of *Felis puma*, and Lesson, that of *Felis unicolor*.

FREDERICK W. TRUE.

## ASTRONOMICAL NOTES.

### A New Comet.

A VERY faint comet was discovered by Denning of Bristol, England, on March 18. Its position is, R.A. 22 h., 44 m., Dec. + 59°. The daily motion is north, preceding. The comet has been observed by Spetator of Vienna, and the following is his position: March 19.4338 G.M.T., R.A. 22 h., 46 m., 47.1 s., Dec. + 59°, 17', 43".

### Winnecke's Comet.

Winnecke's periodical comet has been found and observed. The observation is from Vienna, and the following is the position: March 18.4041 G.M.T., R.A. 12 h., 43 m., 27.5 s., Dec. + 30°, 35', 38". It is of the twelfth magnitude.

### New Planets.

A planet of the twelfth magnitude was discovered by Wolf on March 18. The following is the position: R.A. 11 h., 7 m., 20.6 s., Dec + 4°, 44', 49". A planet of the eleventh magnitude was discovered by Palisa on March 19. The following is the position: R.A. 13 h., 27 m., 0.0 s., Dec. + 9°, 55', 9".

G. A. H.

## VENEZUELA AND COLOMBIA.<sup>1</sup>

M. CHAFFANJON, in a paper read before the Paris Society for Commercial Geography (*Bulletin*, Tome xiii., No. 4), has given a description of these countries and a narrative of the journeys he made there during the years 1889-91. Venezuela has about 750 miles of coast line. From the mouth of the Essequibo to Guiria Point, known also as Cape Peñas, opposite Trinidad, the coast is low and sandy, whereas from this point westward to the Gulf of Maracaibo it is in general high and skirted by mountains rising in some places to a considerable elevation. The chief exports of the country are coffee, cocoa, and tobacco, cattle, copper and gold. Colombia is very favorably situated, possessing about 600 miles of coast on the Atlantic and nearly as much on the Pacific. Its harbors are certainly not very accessible, but Cartagena might be converted into a safe and important port. The coasts are low and dry, or else swampy. The Sierra Nevada produces excellent coffee and cocoa, and travellers speak very hopefully of its minerals. Gold, copper, nickel, mercury and coal have been found. In the neighborhood of Lake Maracaibo and the peninsula of Coro coal is abundant, and rich springs of petroleum exist. At a distance from the coast the country consists of immense savannahs, on which grow here and there, like oases in the desert, clumps of the palms known in this part of America as *moriches*, which send down their roots perpendicularly into the soil, and by capillary action draw up the water to the surface, making the ground around them muddy and even dangerous. If from any cause these trees disappear, the soil soon becomes extremely arid. Large fortunes are made by cattle grazing, and the cultivation of sugar is also an important industry, herdsmen eating as much as three or four pounds daily of a kind of loaf made of sugar. On the high plateaus wheat, oats, maize, and potatoes are grown. Caoutchouc and resins of various kinds may be collected in the forests.

<sup>1</sup> From the Scottish Geographical Magazine.

## NOTES AND NEWS.

THE laboratory of experimental psychology of Columbia College is established in four rooms, occupying the upper floor of the president's house. These include rooms for instruction and research, and a dark room for the study of vision. A collection of apparatus has been secured at a cost of about \$2,500, and this will be further increased during the present year. The liberal regulation recently adopted by the trustees makes it possible for men of science not connected with the college to use the laboratory and apparatus for special research.

—Mr. George W. Field of Johns Hopkins University has been appointed to the American table at the International Zoological Station at Naples for three months, beginning Sept. 1. The table is at present occupied by Professor Wilson of Columbia University. The Americans at the station in 1891 were Dr. C. W. Stiles, Mr. W. L. Russell, and Miss Julia Platt.

—Steps have been taken towards the organization of Alumni Associations of Johns Hopkins University in the North-west and on the Pacific Slope. Preliminary meetings were held on Feb. 22, at Madison, Wis., where nine graduates and fellows of the university, members of the faculty of the University of Wisconsin, were assembled, and at Berkeley, Cal., where eleven persons met. The graduates meeting at Madison were: C. H. Haskins (Ph.D., 1890), assistant professor of history; G. L. Hendrickson (A.B., 1887), professor of Latin; H. W. Hillyer (Ph.D., 1885), assistant professor of organic chemistry; W. H. Hobbs (Ph.D., 1888), assistant professor of mineralogy and metallurgy; C. F. Hodge (Ph.D., 1889), instructor in biology; J. Jastrow (Ph.D., 1886), professor of experimental psychology; H. B. Loomis (Ph.D., 1890), instructor in physics; F. J. Turner (Ph.D., 1890), professor in history; C. A. Van Velzer (fellow, 1878-81), professor of mathematics. The graduates meeting at Berkeley were: Henry Crew (Ph.D., 1887), Lick Observatory; F. G. Hubbard (Ph.D., 1887), instructor in English, University of California; A. C. Lawson (Ph.D., 1888), assistant professor of mineralogy and geology, University of California; F. Lengfeld (Ph.D., 1888), instructor in chemistry, University of California; W. H. Miller (A.B., 1888), instructor in mathematics, Leland Stanford, Jr. University; E. M. Pease (fellow, 1884-85), professor of Latin, Leland Stanford Jr. University; G. M. Richardson (Ph.D., 1890), assistant professor of chemistry, Leland Stanford, Jr. University; C. H. Shinn (A.B., 1884), Niles, Cal.; M. D. Stein (A.B., 1886), Oakland, Cal.; W. I. Stringham (Ph.D., 1890), professor of mathematics, University of California; H. A. Todd (Ph.D., 1885), professor of Romance languages, Leland Stanford, Jr. University.

—Until the present century the policy of Europe, in dealing with crime and pauperism, was the best possible if the object had been to propagate and increase them both. The States of the New World necessarily copied many of the methods of the old. Unfortunately, along with much that was true and wise, they copied and perpetuated many old blunders. But with the advance of modern thought, especially with the enormous widening of the sphere of scientific knowledge, have come new and better ways of dealing with the defective, the criminal, and the pauper. To spread abroad and make popular the better ways in charity and reform is the object of the National Conference of Charities and Correction, which meets annually in one or other of our great cities, and will hold its Nineteenth Annual Session in Denver, Col., next June. It combines the best philanthropy of all creeds and all shades of political opinion upon the broad platform of humanity. Its programme for the year has just been issued, and is an interesting paper, its topics covering many of the social problems of the time. The membership of this conference is unique. It has no salaried officers and no selfish benefit to offer to anyone, so its doors are open to all the world; whosoever will may come in, on a footing of the most perfect equality. The fact that you are interested in its work, makes you a member, and entitles you to a seat and a voice in its discussions. Anyone desiring further particulars as to reduced railroad fare, hotel accommodations, etc., may address Alexander Johnson, secretary, Indianapolis, Ind., who will send circulars and answer inquiries.

—During the past two years a large number of variegated plants have been examined with reference to the presence of parasitic fungi by Byron D. Halsted, New Brunswick, N.J., who presented a paper before the Torrey Botanical Club Feb. 9. Attention was first called to the subject by a study of the foliage of a variegated ash, which had its leaves badly spotted with a species of *Coniothyrium*, while ordinary ash trees were free from the same fungus. Some of the variegated plants, both of the hardy sorts and those grown under glass, have been badly infested with leaf blights. Of the former may be named the delicate and popular bedding plant called plantain lily (*Funkia undulata*, var. *variegata*), several sorts of variegated pelargoniums and alternantheras. Among the most affected of the tender plants of the variegated class may be mentioned the *Aspidistra lurida*, var. *variegata*, *Ficus elastica*, var. *variegata*, *Abutilon Thomsoni*, *Codiaeum*, sp. (crotons), *Dieffenbachia*, sp., *Hydrangea hortensis*, var. *variegata*, *Phrynium variegatum*, *Dracaena*, sp., etc. There seems to be no question that the variegated leaves are more susceptible, and that likewise the etiolated parts are the ones first attacked. The absence of green in a leaf, from this it is to be inferred, is a source of weakness, and upon this account the etiolated tissue is less able to resist the attacks of the fungus germs. Speaking generally, a variegated plant lacks capacity for the best work, and the gardener, in propagating a variegation, no matter how it may have originated, is propagating a weakened plant in so far as it has its normal amount of chlorophyll reduced. The fact that some sorts of the self-blanching celery have been found more susceptible to blights and decay bears directly upon this point. It is a pity that so many of our choicest variegated plants blight easily; it is, however, natural that they should do so. Even a fungus parasite will take the line of least resistance.

—At the last meeting of the Numismatic and Antiquarian Society of Philadelphia a number of the amulets recently presented to the Museum of the University of Pennsylvania by Mrs. John Harrison, who collected them during her recent journey in the East, were exhibited. Among others was a small stamped metal hand with a Hebrew inscription, worn by Jewish boys in Cairo on their foreheads. The inscription reads: *Ben Porath Josef*, "a young branch is Joseph" (Gen. xxii., 49), *Shaddai*, and "Jerusalem the Holy City." A green-stone talisman purchased at Jaffa bore an inscription in Arabic of Cufic type, reading "God is High." The hand gave rise to a discussion on the wide-spread use of the extended hand as a magical symbol. In Japan such a hand is frequently placed over the doorway as a charm, and its use in America was commented upon. The folk-lore collection comprising charms, games and a variety of objects in the University, receives constant accessions and is growing in interest.

—The *Bol. dell Instituto Geogr. Argentino*, Tomo xii. Cuad. v. y vi., contains a description of Tierra del Fuego by Dr. Polidoro A. Segers, who took part in an expedition in 1886, and since then has continued his observations during three consecutive years. The northern part of the island, explored by MM. Rousson and Willems, is covered with prairies, where no trees and few shrubs are to be found (see vol. vii., p. 536). To the south, however, of the line from Useless Bay to Cape Peñas the surface is clothed with forest, which gradually becomes more dense towards the south. Here the coast is more rugged and the shore is encumbered by rocks, harboring large numbers of sea fowl and a variety of molluscs. Fish also and seals are more abundant on the southern coasts. This difference in the animal kingdom causes a corresponding difference in the mode of life of the natives. Whereas in the north the Onas, or, according to Dr. Segers, Aonas, subsist on the guanaco and the *tucu-tucu*, a small rodent, the natives of the south, where these animals are seldom met with, are almost entirely dependent on the sea for their living. They catch seals with a decoy of seal skin stuffed with grass, which they draw through the water by a thong, imitating at the same time to great perfection the bellow of the animal. Birds they catch at night by torch-light, letting themselves down the cliffs by ropes of leather, and fish they take in nets made of sinews of the guanaco. In their dress and customs the southern Onas resemble their brethren of the north, with whom they are constantly at feud.

Their number, in consequence of frequent battles with their more numerous enemies, has been much reduced, and is now, probably, very small. They are very skilful in the use of the bow, and show some dexterity in the manufacture of arrow-heads of flint and glass and needles of bone, but they never make any improvements in their utensils and are utterly ignorant of art of the rude description generally found among savages. Tierra del Fuego is inhabited by six tribes of Onas, each of which speaks a particular dialect, though men of different tribes are able to converse together. Each man has his distinctive name, wherein the Onas differ from the Yaghan, who live on the Beagle Channel, and go out in their canoes to sell otter and seal skins to passing vessels.

— Among the most singular cats which have been introduced into Europe of late years are those known as the Siamese. They are coming into favor, and half a dozen old cats and several young ones in the kitten classes were exhibited last fall at the Crystal Palace show. The ground color of one was pale cream, slightly darker on the hind-quarters, the color of the extremities, that is to say, the muzzle, ears, and tail, and the four feet, being a very dark chocolate, approaching black.

— At a meeting of the board of directors of the American Association to Promote the Teaching of Speech to the Deaf, held at Washington, D. C., Jan. 18, it was decided to hold the annual summer meeting either at Manitou, Col., Lake George, N. Y., or at Northampton, Mass., and Mr. A. L. E. Crauter was appointed a committee to ascertain the relative advantages of these points. He reported to a meeting of the executive committee at the Parker House last week. The committee decided, after due deliberation, to hold the meeting from June 22 to July 1 inclusive, at Crosby-side Hotel, Lake George, N. Y. This will in no wise conflict with the proposed conference of principals and superintendents of deaf and dumb institutions in Colorado. At the meeting last week, Dr. A. Graham Bell presided. Among those present were Miss C. A. Yale, principal of the Clark Institution for the Deaf; Miss Sarah Fuller, principal of Horace Mann school, Boston; Prof. A. L. E. Crauter, principal of the Pennsylvania Institute for the Deaf, Philadelphia; Hon. John Hitz, superintendent of the Volta bureau, Washington, D. C., and others. The meeting adjourned subject to call of the president to hear the report of the committee of arrangements in regard to a programme.

— Mr. William Sowerby, the veteran and distinguished Secretary of the Royal Botanical Gardens, writes to the *British Medical Journal* the following note on his suggestion for adding to the number of alkaloid beverages by the introduction of coffee-tea: When walking in the Gardens of the Royal Botanical Society, Regent's Park, and noting the extent of the collection of living medicinal and economic plants of all climes and countries there brought together in one spot, it must have occurred to all of us how very small a number of plants, out of the vast store which Nature has provided, man has bound to his service, and the yet fewer he has taken the trouble to cultivate. During the march of the last half-century, in science, medicine, mechanics, steam, and electricity how little has been gained from Nature's stores. The artificial culture of cinchona is, perhaps, the most noted of the few. Again, any step in eating, drinking, dress, is so governed by habit or fashion that he must be a bold man who tries to turn the current. This is illustrated in tea drinking. Perhaps there is no one habit so universal; each people has its peculiar tea or closely allied beverage, and most of these have continued the same for many ages. In one it is cocoa, in others, coffee, and in many, tea; in a few special quarters of the globe nothing but *matè* is thought fit to drink, but in only one small district is coffee-leaf tea used. Now we all know that these beverages are found by man to be pleasant and agreeable to him by reason of their containing a peculiar principle called *theine*; but yet we do not always select for our use the part of the plant containing the largest percentage of *theine*, or cultivate the special plant with a view to afford us the most valuable part. For example, in coffee the leaves are said to contain 1.26 of theine, and the berries only 1.0 per cent, and yet over 110,000,000 of men use the berries, and only 2,000,000 the leaves of coffee, although 500,000,000 use the leaves of tea. Now the cultivation of coffee berries is very try-

ing, precarious, subject to attacks of blight and unfruitfulness; in fact it follows the general line that the produce of fruit by cultivation is far more open to accident than that of the leaves, and very probably good crops of coffee leaves could be obtained at small cost in countries and localities where it would be risky or even impossible to produce berries. Here is a case open to a vast variety of people to solve, for there can be no reason why coffee leaves may not become a valuable item of culture in our warmer colonies and many parts of the world. The one most difficult item to move is to create the demand. Once start the fashion for "five o'clock coffee-leaf tea," and the thing is done, and many a fortune made. As to the peculiar flavor of coffee-leaf tea much depends on the manipulation of the leaf after it is taken from the plant. At the Botanic Gardens a variety of flavors have by treatment been produced from leaves off one plant, the general flavor being a kind of combination of coffee and tea so as to get both in one cup.

— The *St. Petersburger Medicinische Wochenschrift* gives a *résumé* of a paper by A. S. Ignatovski on the cause of death by hanging. He refers the rapid loss of consciousness after suspension to the retarded or arrested circulation in the brain brought about by the increased intra-cranial blood pressure. The effect of this impediment to the circulation is the same as in cerebral anæmia, for in both the nutrition of the brain suffers. It is therefore not, as Leofman teaches, an insufficient supply of blood to the brain, due to compression of the carotids, which interferes with the functional activity of the brain, but compression of the capillaries by increase of the intra-cranial pressure, which has this effect, and which occurs whilst the supply of blood remains the same, or even increases.

— We learn from *Nature* that a prize is offered by Schnyder von Wartensee's Foundation, Zürich, for the solution of the following problems in the domain of physics. "As the numbers which represent the atomic heats of the elements still show very considerable divergences, the researches conducted by Professor H. F. Weber on boron, silicic acid, and carbon, regarding the dependence of the specific heats upon the temperature, are to be extended to several other elements, prepared as pure as possible, and also to combinations or alloys of them. Further, the densities and the thermic coefficients of expansion of the substances investigated are to be ascertained as carefully as possible." The following are the conditions: the treatises handed in by competitors may be in German, French, or English, and must be sent in by Sept. 30, 1894. The examination of the treatises will be intrusted to a committee consisting of the following gentlemen: Professor Pernet, Zürich; Professor A. Hantzsch, Zürich; Professor E. Dorn, Halle-on-the-Saale; Professor J. Wislicenus, Leipzig; Professor E. Schär, Zürich, as member of the committee offering the prizes. The Prize Committee is empowered to award a first prize of two thousand francs, and minor prizes at its discretion to the amount of one thousand francs. The work to which the first prize is awarded is to be the property of Schnyder von Wartensee's Foundation, and arrangements will be made with the author regarding its publication. Every treatise sent in must have a motto on the title-page, and be accompanied with a sealed envelope bearing the same motto outside and containing the author's name. The treatises are to be sent to the following address: "An das Praesidium des Conventes der Stadtbibliothek, Zürich (betreffend Preisaufgabe der Stiftung von Schnyder von Wartensee für das Jahr, 1894)."

— John Wilson & Son, Cambridge, announce "Selections Illustrating Economic History Since the Seven Years' War," compiled by Benjamin Rand, Ph.D., assistant in philosophy, Harvard University. This is a second edition, revised and enlarged. The first edition of these selections was published as a text-book of required reading to accompany a course of lectures on economic history given at Harvard College. It was also adopted for a similar purpose by other American universities. A continued demand for the work has led to the preparation of the present edition. The design of the book has been to exhibit in a series of articles of permanent value different phases of economic thought, and to present in chronological order a narrative of some of the more important events and influences of modern economic history.



## SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES.

874 BROADWAY, NEW YORK.

SUBSCRIPTIONS.—United States and Canada.....\$3.50 a year.  
Great Britain and Europe..... 4.50 a year.

Communications will be welcomed from any quarter. Abstracts of scientific papers are solicited, and one hundred copies of the issue containing such will be mailed the author on request in advance. Rejected manuscripts will be returned to the authors only when the requisite amount of postage accompanies the manuscript. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guaranty of good faith. We do not hold ourselves responsible for any view or opinions expressed in the communications of our correspondents.

Attention is called to the "Wants" column. It is invaluable to those who use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

For Advertising Rates apply to HENRY F. TAYLOR, 47 Lafayette Place, New York.

## CURRENT NOTES ON ANTHROPOLOGY.—II.

[Edited by D. G. Brinton, M.D., LL.D.]

## Prehistoric European Migrations.

LITTLE by little the seemingly impenetrable veil which shrouded the wars and wanderings of European nations before history began is lifting. Scientific methods undreamed of half a century ago now reveal the secrets of ages too remote to date. We can trace man in western Europe steadily advancing through the development of a continuous culture from the rudest period of chipped implements of stone to an epoch when he learned to polish and bore that material, and finally threw it aside to arm his hand with a blade of glittering bronze.

The continuity of this development is one of the master generalizations from the long labors of Worsaae, Mortillet, and others. It has recently received further solid support in an excellent critical study by Dr. Sophus Müller, entitled "Instruments Tranchants de l'Ancien Age de Pierre," published in the *Mémoires de la Société Royale des Antiquaires du Nord*. It is especially devoted to the use of the triangular stone celts found abundantly in Denmark. They are shown to be tools, and to belong to the earliest stone age of that portion of the continent.

Neither they nor any of the relics from northern Europe carry us so far back in the past as some from France and the Iberian Peninsula. This fact leaves little room for doubt but that these latter regions were inhabited first. Even there the advent of man must be placed as a post-tertiary event. This is the mature opinion of such authorities as Topinard, Cartailhac, and especially of M. Alexandre Bertrand, whose excellent book, "Nos Origines," has recently appeared in a new edition. M. Bertrand is director of the National Archæological Museum at St. Germain-en-Laye, and a most conscientious student. From his and others' observations it appears that matters went smoothly enough in Europe down to Neolithic times; but then widespread migra-

tions began. More than 1200 years B.C., thinks M. Bertrand, the Ligurians came down from somewhere up north, and conquered portions of the littoral of Spain, Gaul, Italy, and Sicily. The interior of France and the Iberian Peninsula was then peopled by "Iberians." Not far from the date mentioned these were driven westward by inroads of the Celts. He acknowledges, however, that there are no relics positively attributable to either Ligurians or French Iberians; and his theory therefore must be accepted as only one degree less unlikely than the purely gratuitous one of Virchow, who makes out the Ligurians to have been "Turranians."

In recent numbers of the *Globus* and *Ausland*, Karl Penka urges with renewed vigor his theory that Scandinavia was the original home of the Aryan stock; and that not very long before the beginning of our era the whole of central Europe was peopled by Celts. He has an earnest disciple in E. Krause, who lately issued a volume of nigh 700 pages on "Tuisko-Land," his name for Scandinavia, to which, with great wealth of learning, he traces both the myths of Hellas and the simple cults of pristine Rome.

Another ethnologist with his own notions is Dr. Theodore Köppen, librarian of the Imperial Library at St. Petersburg. In a pamphlet reviewed at length in the *Archiv für Anthropologie* (Band xx.) he insists that the Finnic and Aryan linguistic stocks are one in origin; that their ancestral home was somewhere about the region of the middle Volga; that the separation took place into eastern and western branches on the river Don; and that at that time arose the Aryan and Ugro-Finnic divisions. His arguments are principally linguistic, and he lays especial stress on the words for "honey" and "linden bast," which he finds the same in the two stocks. His work is principally interesting as showing the growing tendency among scholars to discard the old theory that the Indo-Europeans began in Asia, in favor of an origin in Europe; but Köppen repeats the familiar error of attributing the theory of the origin of the white race in Europe to Dr. Latham; whereas, long before he mentioned it, it had been urged with clearness by Omalius D'Halloy, the distinguished Belgian anthropologist.

## Retrogressive Culture in Prehistoric Times.

The general law of the continuity of development holds good throughout historic and prehistoric time; but the careful archæologist will always bear in mind that, in both, periods of retrogression have occurred in many localities; and he will not, therefore, assign to relics of man's industry a later date solely on the ground of higher technical perfection. Often a tribe or nation has been conquered or destroyed by one ruder though stronger, and for generations a lower has followed a higher degree of art-produce.

Two or three examples of this in prehistoric times have recently been adduced. Mr. H. Stopes reports in the Proceedings of the British Association for the Advancement of Science, 1890, a curious station in the Thames Valley, where some tribe in the Palæolithic condition had overwhelmed one with Neolithic culture; and not understanding the use of the polished stone implements of the latter had chipped them into rough stone shapes! Not less remarkable was the discovery of the brothers Siret, in the caves and rock-shelters near Almeria, Spain, that the most ancient Neolithic potteries there are distinctly superior in make and ornament to those of later date. Something similar seems to be the case with the interesting series of potteries lately exhumed in the Neolithic station of Latinne, Belgium, by M. de Puydt. They

show a finish that we do not find in what appear to be later deposits.

#### Prehistoric Commerce Between Africa and Asia.

The ancient relations which existed between Egypt and the east coast of Africa on the one side, and Mesopotamia and India on the other, are placed in strong light by two articles which have lately appeared in the *Verhandlungen der Berliner Anthropologische Gesellschaft*.

The one, by G. Schweinfurth, undertakes to show the external relations of ancient Egypt by means of the origins of the earliest cultivated plants found in the tombs or mentioned in the inscriptions. Their three earliest and most valuable cereals, wheat, barley, and spelt, he believes were introduced from Babylonia. The fig was imported from southern Arabia, its native home. From Persia were brought the pomegranate and the henna used as a cosmetic by the beauties of the earliest dynasties. From the remoter region of India came rice, sorghum, sesame, and the sugar-cane. As all these exotic plants were familiar to the Egyptians at the beginning of their history, they testify to an active and far-reaching commerce before the date of Menes.

The second paper, by Mr. Merensky, is especially concerned with the culture influences of ancient India on eastern and central Africa. He adduces much historical evidence to illustrate this intercourse, and finds as the result of it the presence of Indian coral and pearls in central Africa, the shape of the hand axe, the musical instrument called the marimba, the use of the betel nut, the worship of fire, traces of a caste system, etc.

Both articles confirm the growing belief in the wide extension of prehistoric commerce.

#### LETTERS TO THE EDITOR.

**\*\*.** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

#### The Question of the Celts.

IN "Current Notes on Anthropology" (*Science*, Mar. 11) Dr. Brinton reviews a late essay by Schaaffhausen upon the ethnographic position of the Celts. He states: "The difficult problem of the conflicting physical types among the Celtic nations — the one short in stature, brachycephalic, and brown, the other tall, dolichocephalic, and blond — he [Schaaffhausen] summarily solves by supposing either an intermixture with other types or a change in mode of life and climatic environment."

The first mentioned type is apparently that now represented by the Auvergnats and Savoyards, whose ancestors were the Celts of Cæsar. Now Schrader has pretty well established the fact that this race has no claim to the name Celtic other than the fact that at one time they spoke a Celtic dialect. Rather they were Ligurians related socially to the Lapps and Finns; and their original language was that now represented by Basque, their Celtic dialect having been acquired from the tall, fair, brachycephalic race which conquered them, and drove them to the south of France. There should be no need to say that community of language does not necessarily imply identity of race; for one only has to look upon the Mexicans, who speak a Neo-Latin dialect, but whose race-type has almost wholly reverted to that of the Aztecs. The French inhabitants of Louisiana cannot now be distinguished by their language, and the speech of Jamaica is an English jargon, though the population is now almost wholly negro. The fact that French is a Neo-Latin language by no means proves any racial connection between the Latins and the French, who are descended from several distinct races.

Now there is very good evidence that the tall, fair, brachycephalic people, whose remains are found in the round barrows of Britain and in the graves of Belgium, France, and Denmark, spoke the original Celtic tongue. They were the Belgic Gauls, and they overran France, conquering the short, dark, brachycephalic Ligurians and imposing their language upon them. The Ligurian tongue, ancestral to Basque, was a Euskarian dialect related to the Ural-Altaic group, which was ill-fitted to survive in contact with the Aryan speech of the northern race. The best modern representatives of the type of the conquering race are the Danes and Slavs, especially the Lithuanians.

The tall, dolichocephalic and blond type is certainly represented now by the Swedes, and fair north Germans, and has been well called the Scandinavian type. The Anglo-Saxons and Teutonic tribes belonged to this race, and their speech was ancestral to the German and English. If this be true, and the facts seem well attested, it is hard to see how this tall, fair, dolichocephalic type can be logically drawn into the Celtic controversy.

In conclusion, it would seem that the conflicting types among the Celtic nations are due solely to the application of the name Celtic to several distinct races, and if that name is restricted, as there is excellent ground for doing, to the tall, fair, brachycephalic race, the difficulty of conflicting types vanishes.

P. MAX FOSHAY.

Rochester, March 15.

#### The Color Question Again.

I NOTICE in your issue of Feb. 26 an article by Professor Pillsbury of Smith College, in which my name is mentioned in connection with a system of color instruction.

Perhaps an explanation of the exact scope and intention of this scheme may avoid any misapprehension of the claims that are made for it.

The sole object has been to apply, as far as possible, scientific facts of color to elementary instruction in color and the artistic use of color. While it is easy to find various indications that the old theory of Brewster has been abandoned by the scientists and the Young-Helmholtz theory of the three primaries, red, green, and violet, accepted in its place, no practical advance in the application of the latter theory to art instruction has been secured. The following quotation from the publishers' notice of a valuable book, "Theory of Color," by Dr. Wilhelm von Bezold, shows the advanced ground regarding color taken by this scientist: —

"The theory of three primary colors, red, yellow, and blue, has therefore been abandoned, and with them the whole system of so-called secondary and tertiary colors has fallen to the ground. It might be feared that anarchy would take the place of order in the realm of color after the overthrow of the old system of classification. This is not the case, however, for the system of colors adopted by Professor von Bezold not only affords a ready means of classifying every sensation of color which may possibly affect the eye, but is exceedingly simple."

But experience has shown that this book, although the ablest attempt to unite the scientific theory of color with the practical use of colors ever offered at the time it was published, has, in the sixteen years since the English translation was printed, had no practical effect on the terms employed by the artists or on the methods employed in color instruction.

Owing to the fact that the illumination and purity of all pigmentary colors fall so far below the spectrum colors as found in sunlight, it is impossible with them to produce by the union of the three primaries, red, green, and violet, any reasonable approximation to the colors seen in nature. Therefore it has been practically impossible for artists and art educators to avail themselves of the scientific theories of color in their work.

Right here is where we find the real value of the system to which Professor Pillsbury has alluded. It practically bridges the chasm between the science of color and the practice of color in the use of pigments. Instead of beginning with three primary colors seen in the spectrum we are content to select six. By choosing six colors, red, orange, yellow, green, blue, and violet, as they appear in the spectrum, making the best imitations of

them possible with pigments, and applying these to the Maxwell rotating disks, with the addition of black and white, we can make and accurately name a very large proportion of all the colors found in nature which also agree somewhat nearly with similar pigmentary compositions.

As above stated, this system of color instruction includes a practical nomenclature of color never before advanced, which has already been explained by Professor Pillsbury. Professor A. H. Church of the Royal Academy of Arts, in a series of lectures before the Society of Arts, London, an account of which has been published in this country, urges a scientific consideration of color in its application to art, and near the close of one of his lectures he says:—

"We want an international color conference, in which artists, manufacturers, and scientists shall be represented. We want an agreement upon the name to be assigned to a number of different hues. We want representations of these hues reproduced in enamel, preserved like our standards of weights and measures, and distributed to every educational institution in the United Kingdom. . . . The importance of having a definite nomenclature of quite intelligible character at our disposal when we are talking or writing about the decorative employment of color is so important that I venture to make a few suggestions which may tend toward the attainment of this object."

After making a suggestion for a method of notation, Professor Church adds:—

"The corresponding modifications in the five other principal series of colors would be expressed in a similar manner, the symbols, etc., being used exactly in the same way as in chemical notation. In order to obtain a scale in a concrete form I would recommend the use of Maxwell's rotation method by which each step in the gradation could be matched."

This author next proceeds to give a nomenclature of colors, but as it is based on the three primary colors of the scientist, namely, red, green, and violet, and the introduction with them of such additional terms as sea-green for a symbol, it is neither as simple nor as definite as the one which has been described in your article to which I have referred. This nomenclature is based solely on nature's standards as found in the solar spectrum. Should we be favored with the international conference suggested by Professor Church, and should such a conference adopt the six standards and definitely locate them in the spectrum by their wave lengths, the world would then have standards which are the same in one country as in another, and would remain the same in the twentieth century as in the nineteenth.

As a manufacturer of an extended line of colored papers I am constantly putting this proposed nomenclature to a severe test by ordering new colors by telephone. That is to say, we make the desired combinations on the wheel in our office and then telephone them to the factory, ten miles distant, where they are again made on the wheel and the papers are then manufactured to correspond with the results of these combinations. Under this plan we are liable to have occasion to "telephone a color" frequently. In the same way we could call colors to Europe should it be necessary. MILTON BRADLEY.

Springfield, Mass., March 17.

#### Professor Alexander Agassiz on the Origin of the Fauna and Flora of the Galapagos Islands.

In the "General Sketch of the Expedition of the 'Albatross' from February to May, 1891" (Bull. Mus. Comp., Zool., Harvard College, Vol. xxiii., No. 1, Cambridge, Feb., 1892) Professor Alexander Agassiz refers to my paper "On the Origin of the Galapagos Islands" (*Am. Nat.*, March-April, 1891). There are some fundamental misunderstandings of my statements in Professor Agassiz's remarks, which need correction.

Page 71, he says: "He [Baur] speaks of the Galapagos as being connected with the mainland by the 4,000-meter line." Then he adds "This [the connection of the Galapagos with South America] is an important fact; all the older maps showed the Galapagos separated from Central America" (!). To this I have to reply, that I never expressed the opinion that the Galapagos were former-

ly connected with South America. The same is repeated by Professor Agassiz in two other passages (p. 71).

In all my statements in regard to the land connections I was very cautious, as will be seen from p. 310: "*In their general characters the fauna and flora of the Galapagos show resemblances to the great Mexican and Sonoran province, and also to the West Indies, and it may be that the connection was with these regions (and it seems more probable than any other), but of course it is quite impossible to bring to-day any positive proof for this idea.*" (The italics are mine.)

According to Professor Agassiz the proof of my subsidence theory "is based on no better evidence than the so-called alpine character of parts of the flora and upon the presumed former connection of the Galapagos Islands with the Central American continent." Professor Agassiz has completely overlooked the main point of my argument. This I considered the harmony in the distribution of fauna and flora, as will be seen by referring to my paper. I tried to show that this harmony was absolutely unexplainable by the theory of elevation. After this was done, I examined whether our present knowledge of the soundings showed any serious obstacle to the theory of subsidence, and I found that it did not. *Professor Agassiz did not refer with one word to this harmony of distribution, which formed the basis of my whole ideas!*

When Professor Agassiz or any one else is able to explain this by the elevation theory, I shall be the first one to adopt it. But until this has been done, I believe in subsidence.

The paper to which Professor Agassiz refers was written before my visit to the islands. My investigations have only more convinced me of the insufficiency of the elevation theory. In my final work I shall speak fully about this question and about other points in Professor Agassiz's article.

G. BAUR.

Clark University, Worcester, Mass., March 15.

#### The Scientific Alliance.

I HEARTILY agree with your leading article of March 11, and trust that you will continue to press this subject. The further co-operation of the scientific societies in this city will result, I feel confident, in increased activity and effectiveness in each.

The special needs of many branches of work now being carried on here are more funds for publication and for first-class illustration. There is no national publication open to all papers of merit, like the Royal Society Transactions. The only journal I know of which provides liberally for illustration is Whitman and Allis's *Journal of Morphology*, and this is now, I have learned, overstocked for two years to come with biological papers of a high class.

HENRY F. OSBORN.

Biol. Dept., Columbia College, March 18.

#### BOOK-REVIEWS.

*Travels amongst the Great Andes of the Equator.* By EDWARD WHYMPER. New York, Scribner's. 8°. \$6.

AMONG the fascinating books of Professor Tyndall's is one on "Hours of Exercise in the Alps," in which, among other matter, he records the several unsuccessful attempts he made to ascend the Matterhorn, and how the rope left, by his party, hanging over a ridge of rocks enabled the next following party of climbers headed by Edward Whymper to gain such advantage as to be able to reach the top. This first success was marred by a terrible tragedy, only three or four of the party of seven getting back to the foot of the mountain alive.

But Edward Whymper added another triumph to his record as a mountain climber in his being the first to reach the summit of Chimborazo in 1879. It is the account of his journey at that time that is now published.

A hundred years ago the natives of the valley of Chamonix who took travellers up the mountain suffered as much as their employers from physical sensations ascribed, no doubt rightly, to the rarity of the air. They were unable to walk more than a few paces without halting. Last autumn travellers who walked in early morning from the hut under the Bosses (14,000 feet) to the top (15,780 feet) had the company of five Chamoniards. They



went up at a fair pace without resting. Arrived on the top, without a moment's pause, the men took their spades and shovels and began digging. They asserted that they did only about a third less work in the day than in the valley; and that they suffered no inconvenience from a prolonged stay in the Bosses hut; slept well, and ate largely. Their work was to excavate a tunnel in the summit ridge about thirty feet below the top. The object of this tunnel was to reach rock, in which a shelter-cave might be excavated.

Mountain-sickness is a term which has been used during the nineteenth century to designate the ailments which come to men and beasts on reaching high elevations on mountains. Some supposed that the uncomfortable symptoms were the result of local causes, and did not depend solely on reduced atmospheric pressures, as is the opinion of Mr. Whymper.

It was largely with a view to settle various questions in regard to mountain-sickness that the journey to the Andes was undertaken. Mr. Whymper wished to learn: (1) at what pressure the symptoms would first appear; (2) what form the sickness would take; (3) whether one could become habituated to low pressures.

To the first question the answer came at a pressure of 16.5 inches. Most of the party were simultaneously incapacitated for work and found themselves preoccupied by the paramount necessity of obtaining air. Precautions had been taken not to introduce complications in the way of physical exhaustion, Mr. Whymper maintaining "that our 'incapacity' was due neither to exhaustion nor to deficiency of bodily strength, nor to weakness from want of food, but was caused by the whole of our attention being taken up in efforts to get air." This gasping for air was accompanied with intense headache and an indescribable feeling of illness, pervading the whole body. The attack was sudden, but the recovery gradual; and even at the best it was only while at rest that sufficient air could be secured through the nostrils; on exerting themselves it was necessary to breathe through the mouth as well, and the capacity for work was low.

In reviewing the whole of their experiences, two different sets of effects could be distinguished: those which were transitory, and those which remained so long as the party was exposed to low pressures. The transitory effects were acceleration of the circulation, and increase in temperature. The permanent ones were more rapid respiration, indisposition to take food, and lessening of muscular power.

In the opinion of Mr. Whymper, the mountain-sickness is due to diminished atmospheric pressure, which operates in two ways: by lessening the value of the air inhaled, and by allowing the gases within the body to expand and seek partial escape.

But aside from the value of the book as a record of investigation on mountain-sickness, which is, by the way, made by no means prominent, we have in "Travels amongst the Great Andes of the Equator" a most valuable record of travel, well written.

A "Supplementary Appendix," to which some fifteen prominent naturalists contribute, is devoted to the collections made in the Andes, a very considerable part being on the coleoptera. The ample number of plates and illustrations make the whole work one of special value as a scientific record, and the account of the journey is most entertaining.

*Order in the Physical World and its First Cause According to Modern Science.* From the French. New York, James Pott & Co. 12°. \$1.

*Natural Law in the Spiritual World.* By HENRY DRUMMOND. New York, James Pott & Co. 12°. 75 cts.

THESE two works are eminently characteristic of the present time. The relations between science and religion have been the constant theme of comment and controversy for the past thirty years, and still excite extraordinary interest in certain classes of minds. Persons of an atheistical turn point to certain discoveries and theories of science as negating the very idea of religion; defenders of Christianity repel the charge; while a third class of writers endeavor to reconcile the two conflicting systems of thought by finding some rational ground of agreement. The two works now before us belong to this last category. The first, which is translated from an anonymous French writer, is an adaptation of

the design argument to the present state of scientific knowledge; the discoveries of science themselves furnishing the basis on which the argument rests. It is not a profound work nor in any way original; and it will not satisfy minds thoroughly imbued with the skepticism so characteristic of the present time. But for those who think the design argument a convincing one the book will have an interest. Unfortunately the English of the translation is imperfect and sometimes ungrammatical, especially in the earlier pages, and typographical blunders, such as "sideral" for sidereal, "Emmerson" for Emerson, etc., are altogether too frequent.

The second volume before us is of a different character, and somewhat curious. The author, Mr. Drummond, as he tells us in his preface, had been employed for some years in teaching the natural sciences on week days and lecturing upon religious themes on Sundays. Naturally, and almost necessarily, he was led to a study of the relations between the two subjects and to seek some basis of agreement between them. The result appears in this book, in which he endeavors to show that the laws of biology, which are manifest in organic life, are no less manifest in religious, or, as he calls it, spiritual life. Analogies between organic life and the mental and moral life of man have often been pointed out before; but Mr. Drummond maintains there is something more than analogy in the case, that the very same laws operate in these widely different spheres. We cannot think, however, that he proves his thesis, the resemblances that he points out between the natural and the spiritual world being, in spite of his disclaimer, nothing but mere analogies, and often remote and fanciful analogies. For instance, he speaks of the law of biogenesis, that life can only come from antecedent life, and argues that this is the same as the Christian doctrine that a man must "be born of water and of the spirit" in order to enter the Kingdom of God. He even speaks of "spiritual protoplasm," and declares that the difference between a Christian and a good man who is not a Christian is the difference between the living and the dead. As poetic analogies between natural and spiritual things, some of the resemblances that Mr. Drummond dilates upon have a certain interest, and serve well to illustrate moral and religious truth; but as the basis of scientific doctrine and as proving the reign of law in the spiritual world, they are of little value.

#### AMONG THE PUBLISHERS.

THE exclusive authorization to issue an English translation of the "Memoirs of the Baron de Marbot," which have created unusual interest in Paris, has been acquired from the Baron's representatives by Longmans, Green, & Co. They will publish the work immediately, both in New York and London.

— P. Blakiston, Son, & Co. have brought out a second edition of Blair's "The Organic Analysis of Potable Waters." Considering that the first edition was published but little over a year ago, this shows that the book has proved a good one.

— Messrs. Eason & Son, Dublin, will issue in April the first number of the *Irish Naturalist*, a monthly journal of general Irish natural history, and the official organ of all the natural history Societies in Ireland. The editors will be Mr. George H. Carpenter and Mr. R. Lloyd Praeger.

— A new *Physical Review* has been started by the publisher, J. Engelhorn, of Stuttgart. The editor is L. Graetz. The object of this periodical will be to make German readers acquainted with the work being done by physicists in other countries. It is intended that it shall serve as a sort of supplement to the well-known *Annalen der Physik und Chemie*.

— W. B. Saunders, 913 Walnut Street, Philadelphia, has published, as No. 22 of Saunders's Question Compends, "Essentials of Physics," by Fred. J. Brockway, M.D. The book is arranged in the form of questions and answers prepared especially for students of medicine. The author is assistant demonstrator of anatomy at the College of Physicians and Surgeons, New York. The reasons assigned for the existence of the book are that Ganot is too large for the purposes of medical students and that some of the other text-books do not contain enough.

— *Natural Science* is a new monthly review of natural history progress. The object of the editors will be "to expound and deal in a critical manner with the principal results of current research in geology and biology that appear to be of more than limited application." Articles are contributed to the first number by Mr. F. E. Beddard, Mr. J. J. H. Teall, F.R.S., Mr. A. S. Woodward, Mr. R. Lydekker, Mr. J. W. Davis, Mr. G. A. Boulenger, Mr. J. W. Gregory, Mr. G. H. Carpenter, and Mr. Thomas Hick. The publishers are Messrs. Macmillan & Co.

— Every teacher of physics will be glad to know that a tenth edition of Maxwell's "Theory of Heat" has just been issued by Longmans, Green, & Co. Lord Rayleigh is the editor, which is sufficient to make all physicists confident that the necessary revision has been well done. It is probable that no more suggestive work was ever produced in the whole science of physics. It is more than its name signifies, for a number of physical problems are discussed, which are not usually treated under the head of "heat." But no one should take up the book unless he is prepared for some pretty intense study. It is not a popular work, but for those competent to understand even portions of it it stands without any equal as a guide to the study of physical science.

— "A Guide to the Scientific Examination of Soils: Comprising Select Methods of Mechanical and Chemical Analysis and Physical Investigation" is the title of a book recently published by Henry Carey Baird & Co., Philadelphia, at \$1.50. It is a translation from the German of Dr. Felix Wahnschaffe, with additions, by William T. Brannt. Mr. Brannt is editor of "The Techno-chemical Receipt Book." The "Guide to the Scientific Examination of Soils" is a book for the agricultural chemist. There are introductory chapters on "Derivation and Formation of the Soil," and "Classification of Soils"; but these are brief, and the main purpose of the work is shown in the chapters bearing more directly on methods, mechanical and chemical, to be used in determining the soil-constituents and their plant-nourishing value. This last depends, as is well known on more than mere chemical constitution, and due attention is given to the determination of the properties of the soil depending on physical as well as chemical causes.

— The name of nearly every appliance on the English railway is different from the corresponding term applied on the American railroad, yet many of the problems involved in the working of rail transportation are the same. Only three or four years ago a lecture on "The Working of an English Railway" was delivered before the School for Military Engineering at Brompton Barracks, England, by George Findlay, who, in addition to holding certain rank in the volunteer service of England, is general manager of the London and Northwestern railway. This lecture was naturally devoted, to some extent at least, to the use of railways in military operations. It proved attractive, however, to a wider circle of readers than the army officers to whom it was first delivered, and the result was the first edition of "The Working and Management of an English Railway." Additions to the scope of the original lecture were made to adapt it to its new public, with the result that we now have before us the fourth edition, published in this country by Macmillan & Co. The subjects treated range all the way from such as are purely mechanical—the permanent way, rolling stock, signals, telegraphs, etc.—to questions concerning the relation of the state to railways and the state purchase of railways, which are to some extent social. There are some imperfections in the mechanical execution of the book, perhaps due to the large number of copies printed, but it is sure to interest all who want a popular *exposé* of the ways in which the modern railway has been brought into existence and the problems occupying the minds of those now managing them.

— Fleming H. Revell Company, New York, are the American publishers of "Heroes of the Telegraph" (\$1.40), by J. Munro, which is brought out in England by The Religious Tract Society. Mr. Munro has written a number of popular books on electricity and the lives of workers in this comparatively new science. As an Englishman, he gives first place to Sir Charles Wheatstone among the heroes of the telegraph, and no one will wish to with-

hold any of the honors due that great pioneer in electrical science, especially as the author, in his second chapter devoted to S. B. F. Morse, does full justice to him whom we Americans are proud to consider as the inventor *par excellence* of the telegraph. But it is not with him that work on the telegraph ceased. Much work remained to be done before sub-marine cables and long and complicated land-lines were a possibility, and so there are chapters containing interesting accounts of the contributions to the telegraph made by Sir Wm. Thomson, Sir Wm. Siemens, Fleeming Jenkin, Reis, Bell, Edison, Hughes, Gauss, Weber, Sir W. F. Cooke, Bain, Dr. Werner Siemens, Latimer Clark, Count du Moncel, and Elisha Gray.

— So many ask for a really good elementary book in electricity and magnetism that we are inclined to hope much usefulness for "A First-book of Electricity and Magnetism" (60 cents), by W. Perren Maycock, recently brought out by Macmillan & Co., on this side of the water. The book is an English one, the author being a member of the English Institute of Electrical Engineers. The author does not touch upon the modern electrical theories, which are attracting so much attention, but which would be extremely unpromising subjects for popular exposition as they now stand; but he certainly seems to give a clear statement of the facts of electrical science in a way likely to be helpful to many who have not the training to use such excellent books as those by Silvanus Thompson or Fleeming Jenkin.

— Another book intended to serve the same purpose as that mentioned above has been published by Norman W. Henley & Co., New York, entitled "Electricity Simplified," by T. O'Sloane. The author of this book has met with success as a writer of primers on scientific subjects, his "Home Experiments in Science" and "The Arithmetic of Electricity" being doubtless known to many of our readers. There is certainly a demand for an elementary book that will tell the uninitiated something of the wonders of electricity, and all seeking such information should examine Sloane's "Electricity Simplified." (\$1.).

— A notable literary article will appear in the April *Forum* by Mr. Philip G. Hamerton, who discusses the important subject of the Learning of Languages. Mr. Hamerton is one of the few men who are absolutely as much at home in French as in English, and his experience and observation make his article full of suggestiveness. The historian, Professor Edward A. Freeman, writes an autobiographical essay showing the growth of his opinions and method of work. Mr. R. L. Garner, the student of the speech of monkeys, contributes the most interesting paper that he has yet published on the results of his investigations. Other articles in this number will be on the German Emperor's policy of removing restrictions upon trade, by Mr. Poultney Bigelow, his personal friend; on German Colonization and Emigration, by Dr. Geffcken; an explanation of the method of burial by the great funeral monopoly in Paris, by Mr. Edmund R. Spearman, who has made a special study of it for the *Forum*.

— "Age of the Domestic Animals" is a treatise on the dentition of the horse, ox, sheep, hog, and dog, and on the various other means of determining the age of these animals, by Rush Shippen Huidekoper, M.D., veterinarian (Alfort, France); professor of sanitary medicine and veterinary jurisprudence, American Veterinary College, New York. This work presents a study of all that has been written on the subject from the earliest Italian writers. The author has drawn much material from the ablest English, French, and German writers, and has given his own deductions and opinions, whether they agree or disagree with such investigators as Bracy Clark, Simonds (in English), Girard, Chauveau, Leyh, Le Coque, Goubaux, and Barrier (in German and French). The illustrations have been mainly taken from these authors, and it would be extremely difficult to improve upon them. There are, however, a large number of original illustrations on the horse, cattle, sheep, and pig. To quote from the preface, "The author has attempted to prepare such a book as he feels would have been of interest and service to himself in his association with animals as a layman, and would have aided his studies and appreciation of the anatomy of the teeth, dentition, and means of determining

the age. He hopes, also, that this work will furnish, to students and veterinarians, knowledge which will aid in surgical operations on the mouth." The publishers are, F. A. Davis & Co., 1231 Filbert Street, Philadelphia.

— Macmillan & Co. will issue early in April an important work by Professor J. Henry Middleton on the "Remains of Ancient Rome," comprising two fully illustrated volumes.

— Messrs. Gauthier-Villars have published a work entitled "Leçons de Chimie," by Henri Gautier and Georges Charpy. It is intended mainly for the use of students of special mathematics.

— Professor Geo. J. Romanes has arranged with the Open Court Publishing Co. to bring out the American edition of his latest work, "Darwin and after Darwin." It will be published simultaneously with the English edition.

— Mashonaland, in south Africa (called "the future gold-fields of the world"), will be described in the April *Scribner* by Frank Mandy, a member of the Pioneer Corps which opened up the country for settlers. He has spent many years in that region, and is an acknowledged authority upon it.

— An excellent series of "Museum Hand-Books" is being issued by the Manchester Museum, Owens College. A "General Guide to the Contents of the Museum" has been prepared by Mr. W. E. Hoyle, keeper of the Museum, and Professor Milnes Marshall has drawn up an "Outline Classification of the Animal Kingdom," and a "Descriptive Catalogue of the Embryological Models."

— We learn from *Nature* that the first part will shortly be issued by Messrs. Dulau & Co. of a new botanical publication, to be called British Museum Phycological Memoirs, edited by Mr. George Murray. It will be devoted exclusively to original algological papers, the records of research carried on in the Cryptogamic laboratory of the British Museum in Cromwell Road, and is intended to be issued at about half-yearly intervals. The first part will be illustrated by eight plates, and will contain, among other articles, the description of a new order of Marine Algæ.

— There is evidently, in the opinion of one man at least, a perfect climate in one portion of the United States. The man is P. C. Remondino, M.D., and the place is Southern California. The beauties of Southern California Dr. Remondino sets forth in "The Mediterranean Shores of America," just published by F. A. Davis & Co., Philadelphia. After speaking of the beautiful adjustment of humidity to temperature, so that hot, muggy days are unknown, our author goes on to tell of the calm character of the weather, which is such that thunder-storms are almost unknown, and the signal office at San Diego, after eight years' waiting, found the storm flags of no use and returned them to Washington. Southern California, our author maintains, has as varied a climate as that of the north of Italy, or even more extremes of condition, but, with these extremes, enjoys the anomalous condition of having these extremes alike favorable to health and long life — just the reverse of northern Italy. The book is, of course, intended to convey such information as those seeking a health resort desire.

— The American Academy of Political and Social Science, with headquarters at Philadelphia, announce for early publication the following monographs on political and economic subjects: "Ethical Training in the Public Schools," by Charles DeGarmo, president of Swarthmore College, an essay which is intended to prove the necessity of moral instruction in our public schools, but to show that it need not necessarily be religious; "The Theory of Value," by the Austrian economist, F. von Wieser, a scientific explanation of the views of the Austrian school on this subject; "Basis of Interest," by Dwight M. Lowrey, a reply to Henry George's doctrines on this question. They will also publish at an early date a monograph on "Party Government," by Charles Richardson, which is a severe attack on the theory that devotion to party is a political virtue; and a pamphlet by J. R. Commons of Oberlin College on "Proportional Representation," in which a plan is disclosed which will prevent gerrymandering and secure minority representation.

— "The Will Power: its Range in Action," by J. Milner Fothergill, is a small book published by James Pott & Co. It is not a metaphysical essay, but a practical work on the importance in

human life of strength of will, which the author regards as the principal thing in man's character and the main source of one man's influence over others. The different aspects of the subject, such as the will in relation to heredity, the will and circumstances, etc., are treated of, and some interesting anecdotes related to illustrate the author's doctrine. From the doctrine itself, however, we are obliged to dissent, because it puts strength of will above rightness of will, force above virtue. The highest principle in man is not will but conscience; conscience is the lawgiver, while the will's business is to obey, but Mr. Fothergill shows no sufficient appreciation of this fact. He admits, indeed, that strength of will may be used for evil as well as for good, and in many of the examples he adduces what he calls strength of will is merely selfishness or a domineering temper. Yet he expressly says: "Mighty as the will is, the first numeral in character, the next is principle in this world; in the next world, we are told, principle will come first" (p. 181). Such a doctrine, if carried into practice, would lead directly to immoral conduct; and we cannot, therefore, recommend this book as a means of moral instruction.

— The American Academy of Political and Social Science has just published a monograph by Leo S. Rowe on "Instruction in French Universities." This is the fifth of the monographs which they have issued treating of instruction in political science, etc., in various countries. Of the other four, two treated of German universities, one of the University of Oxford, and one of Italian universities. They also published a pamphlet on Jurisprudence in American Universities. The present essay gives a careful exposition of the system of faculties in vogue in France, together with a brief history of the higher educational system from the time of Napoleon to the present. It also explains the new system of universities which is now being advocated. Mr. Rowe then discusses the courses in political science, etc., which are offered by the law faculties and the other institutions, such as the *École Libre* and the *Collège de France*. The monograph concludes with some very valuable university statistics and a complete list of the instructors in political science and public law in the various institutions of higher education in France.

— The latest issue in the "Contemporary Science Series," published in England by Walter Scott and imported here by Charles Scribner's Sons, is a work by Karl Pearson entitled "The Grammar of Science." It is a discussion of the scope and method of science and of some of its fundamental principles. The author sneers at metaphysics, declaring both metaphysics and natural theology to be pseudo-sciences; and yet his own book is metaphysical from beginning to end, only it is bad metaphysics. Mr. Pearson adopts the subjectivist, or "idealist" theory of knowledge, which denies the existence of a real material world and regards external objects as nothing but groups of sensations. He adopts Kant's theory of space and time, though he derides Kant for being a metaphysician. His view of causation is borrowed of Hume; and he maintains that the business of science is merely to describe facts, not to explain them. "Science," he says, "deals with the mental, the inside world," and a law of nature is not an order of external facts but merely a "routine of perceptions." He alludes to Newton's formula of gravitation, and then goes on to say: "The statement of this formula was not so much the discovery as the *creation* of the law of gravitation. A natural law is thus seen to be a *résumé* in mental shorthand, which replaces for us a lengthy description of the sequences among our sense-impressions. Law in the scientific sense is thus essentially a product of the human mind and has no meaning apart from man. It owes its existence to the creative power of his intellect. There is more meaning in the statement that man gives laws to Nature than in its converse that Nature gives laws to man" (p. 104). Such is the burden of the whole book, and it is thrust forward on every possible occasion; and it shows, we think, with sufficient clearness the mental calibre of the author and the quality of his book.

— The first number of the new *Zeitschrift für Anorganische Chemie*, edited by Professor Krüss, of Munich, was issued on Feb. 27. As its title implies, the new journal is devoted exclusively to

the inorganic branch of chemistry, and the names of the distinguished chemists throughout Europe and America whose co-operation the editor has been fortunate in securing would appear to promise well for its value and success. The first number, says *Nature*, contains the following six original memoirs: "Phosphorus Sulphoxide," by T. E. Thorpe and A. E. Tutton; "The Double Acids of Heptatomic Iodine," by C. W. Blomstrand; "The Action of Hydrogen Peroxide upon certain Fluorides," by A. Piccini; "Ammoniacal Platinum Compounds," by O. Carlgren and P. T. Cleve; "Preparation of Tungstates free from Molybdenum," by C. Friedheim and R. Meyer; "A Lecture Experiment," by C. Winkler.

— "Humanity in its Origin and Early Growth," by E. Colbert, is a work recently issued by the Open Court Publishing Company of Chicago. It is, of course, mainly historic in character, and much that it contains is familiar. The history of religion is the leading topic in it, but considerable space is also devoted to the origin and growth of language and the rise of the industrial arts. The book, however, is full of crude and often fantastic theories, the author being one of those men, by no means rare in these days, who have thrown off all traditional religious belief and taken an attitude of religious skepticism, but are, nevertheless, extremely credulous of new-fangled theories and alleged scientific discoveries. Thus Mr. Colbert tells us with an air of assured conviction that man originated at the North Pole, and also that some thousands

of years hence most of the land in the northern hemisphere will be submerged by the ocean, while a vast southern continent will arise from the waters. Religion, he thinks, originated in the worship of the heavenly bodies; and expressly says that the Greek and Roman Jupiter is nothing else than the planet of that name (p. 230). He thinks that religion was mainly the work of the priests, who used the popular belief in astrology and magic as a means of domineering over men; and he nowhere shows any conception of the grandeur of the religious sentiment nor any respect for the religious beliefs of mankind. Yet he is half inclined to believe in astrology himself, holding that "a great deal may be said in justification of the old fashioned idea of stellar and planetary rule over the affairs of men" (p. 390). Altogether the book is a curious one, especially as revealing the character of the author's own mind.

— Houghton, Mifflin & Co., have recently issued a large-paper edition (of 250 copies) of "The Discovery of America," by John Fiske, a work in four volumes, forming the beginning of Mr. Fiske's history of America, and the most important single portion yet completed, written upon original sources of information regarding ancient America, the Spanish conquest, mediæval trade, questions about Columbus, the causes of the transfer of supremacy from the Spanish race to the English, etc. The work contains abundant foot-notes, which are the results of vast research. We understand that the whole of this large-paper edition has al-

#### CALENDAR OF SOCIETIES.

##### Chemical Society, Washington.

Mar. 10. — H. W. Wiley and Wm. H. Krug, The Solubility of some Inorganic Salts in Acetone and of Acetone in Dextrose Solutions; H. W. Wiley and K. P. McElroy, The Specific Gravity of Acetone and Mixtures of Acetone and Water.

#### Publications received at Editor's Office.

DRUMMOND, HENRY. *Natural Law in the Spiritual World*. New York, James Pott & Co. 12°. 438 p. 75 cts.  
FOTHERGILL, J. MILNER. *The Will Power; its Range in Action*. 3d. ed. New York, James Pott & Co. 12°. 184 p. 60 cts.  
MAXWELL, J. CLERK. *Theory of Heat*. 10th ed. New York, Longmans, Green & Co. 16°. 357 p. \$1.50.  
MEYER, LOTHAR. *Outlines of Theoretical Chemistry*. Trans. by D. Phillips Bedson and W. Carleton Williams. New York, Longmans, Green & Co. 8°. 232 p. \$2.50.  
ORDER in the Physical World, and its First Cause according to Modern Science. From the French. New York, James Pott & Co. 12°. 247 p. \$1.  
PEARSON, KARL. *The Grammar of Science*. London, Walter Scott. New York, imported by Charles Scribner's Sons. 12°. 510 p. \$1.25.  
TILLMAN, S. E. *Elementary Lessons in Heat*. 2d ed., revised and enlarged. New York, John Wiley & Sons. 8°. 172 p.  
WHITELEY, J. LLOYD. *Chemical Calculations*. New York, Longmans, Green & Co. 12°. 114 p. 60 cts.  
WORTHINGTON, A. M. *Dynamics of Rotation*. New York, Longmans, Green & Co. 12°. 167 p. \$1.

#### FOR SALE.

#### SCIENTIFIC INSTRUMENTS AND GEOLOGICAL SPECIMENS.

The instruments are second-hand, in good condition; prices fixed are about one-half cost; they were owned by the late Dr. Wm. M. Herron, of Allegheny City, Pa. They will be sold separately or at a reduced price in a lot. Offers respectfully requested. Information and detailed list furnished on application to

JNO. H. HERRON,

1003 Penn Avenue, Pittsburgh, Pa.  
1 Large 4-prism Spectroscope, John Browning, maker.....\$175  
1 Spectograph, for recording Spectra, same maker.....20  
1 Six-inch spark, Ruhmkorff coil, same maker.....50  
1 Two-mirror Helio-stat.....150  
1 Large Electric Lantern, automatic slip, for spectrum work.....35  
1 60° flint prism, \$10; 1 concave grating, \$20.....30  
10 Geissler tubes, with rotating apparatus.....35  
11 Plucker tubes.....10  
18 Incandescent Electric lamps, 6 & 8 C. P.....10  
1 Galvanic lamp, for use with platinum coil.....2  
1 Case Mineral and Geological Specimens (perhaps 700 pieces).....100

#### Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 874 Broadway, New York.]

For sale or exchange, Das Ausland, 10 vols., 1882 to 1897, including 6 vols. bound, 4 in numbers. Wheeler Survey, vol. 1, Geog. Report; also vol. 6, Botany; Production of gold and silver in the United States, 1880, '1, '2, '3, '5; Selfridge Isthmus of Darien. Will sell at very low prices. J. F. James, 1443 Corcoran St., Washington, D. C.

For exchange.—A fine thirteen-keyed flute in leather covered case, for a photograph camera suitable for making lantern slides. Flute cost \$27, and is nearly new. U. O. COX, Mankato, Minn.

#### AMUSEMENTS.

EVERY  
MONDAY  
AND  
WEDNESDAY  
AT  
8.15 P.M.

SATURDAY,  
Matinee  
at 2.

#### URANIA

##### TRIP TO THE MOON.

Entirely Remodelled. New Views

Magnificent representation of

solar and lunar eclipses, etc.

CARNEGIE MUSIC HALL

57th Street and 7th Avenue.

Mr. GARRETT P. SERVISS,

the well-known and popular writer

and lecturer on astronomy, has

been engaged to explain the scenes

and views as they pass before the

audience. Seats 50 cents, \$1.00.

#### PROCTOR'S THEATRE. 23D

PROCTOR & TURNER, Proprietors and Managers.

EVERY EVENING AT 8.15.

#### THE ENGLISH ROSE.

By SIMS & BUCHANAN.

Produced under the direction of Aubrey Boucicault.

BRILLIANT CAST. COMPLETE ACCESSORIES.

Special Prices and Children Half Price.

#### EDEN MUSEE,

23d Street, near Broadway.

#### DE KOLTA'S ASTONISHING PROBLEMS.

DEFREGGER'S | The | MUNCZI LAJOS'S

Celebrated | Tyroleans. | Cocoon. | Hungarian Band.

#### THE GREAT TOWER OF THE

#### MADISON SQUARE GARDEN

##### NOW OPEN

Daily from 9 A.M. until 10 P.M.

Admission, 25c.

The most Perfect and Delightful View of New

York ever witnessed.

#### Wants.

*Any person seeking a position for which he is qualified by his scientific attainments, or any person seeking some one to fill a position of this character, be it that of a teacher of science, chemist, draughtsman, or what not, can have the 'Want' inserted under this head at 10 cents a count line. Nothing inserted at less than 50 cents a time prepaid by stamps, if most convenient.*

TRANSLATOR wanted to read German architectural works at sight (no writing). One familiar with technical terms desired. Address "A." Box 149, New York Post Office.

WANTED.—A position in a manufacturing establishment by a manufacturing Chemist of inventive ability. Address M. W. B., care of *Science*, 874 Broadway, N. Y.

WANTED.—Books on Anatomy and Hypnotism. Will pay cash or give similar books in exchange. Also want medical battery and photo outfit. DR. ANDERSON, 182 State street, Chicago, Ill.

WANTED.—A college graduate with some normal training, to teach the sciences, at \$1,800 per year, in a Southern college. A Baptist or a Methodist preferred. Must also be a first-class Latin scholar. A. H. Beals, Box K, Milledgeville, Ga.

A PROFESSORSHIP in Chemistry is wanted by one who has had five years' experience in that capacity. Would prefer to give instruction by lectures and experiments rather than by text-book methods. Would like a position in a college or university where there is a good student's laboratory. Special points of strength claimed are: (1) Thorough control of a class and good order during lectures and recitations. (2) Accuracy in experimenting with chemicals and skill in the manipulation of chemical apparatus. The permission of several distinguished educators has been given to refer to them if required. Would not care to accept a position paying less than \$1,500. Address B. E., care of *Science*, Advertising Dept., 47 Lafayette Place, New York.

ADDRESS WANTED.—Will some one please send the address of the Secretary of the American Philological Society. Also that of Herbert Spencer. "ADDISON," Room 84, 164 Madison St., Chicago, Ill.

ADDRESSES of Old Book Dealers wanted.—Wishing to obtain a number of old books out of print, I very much desire the addresses or catalogues of rare second-hand book dealers. If there is a directory or list of such dealers I should like to obtain possession of one. W. A. BLAKELY, Chicago, Ill.

WANTED.—(1) A white man versed in wood and iron working, able to work from specifications and plans, suited for an instructor of boys; his business to have charge of shops of school, outline and direct the work for foremen and students; salary to be \$1,000 per annum (nine months). (2) A man (black preferred) to teach the colored, iron working and forging, subordinate to the preceding; salary, \$720. (3) A man (white) competent to take classes in engineering (assistant's position), but with the ability to perform any of the work required in any of the ordinary engineering courses of our universities; salary from \$1,000 to \$1,500. A. H. BEALS, Milledgeville, Ga.

ready been sold. The regular edition, in two volumes, will be ready on the 26th.

—J. B. Lippincott Co., Philadelphia, recently issued "The Tannins," by Henry Trimble. The author is professor of analytical chemistry in the Philadelphia College of Pharmacy. It is now about one hundred years since tannin first became recognized as a distinct substance. About twelve years ago the author commenced to collect the literature of the subject, especially that referring to the astringent value of certain tannin-bearing materials, with the methods involved in their estimation. As is always the case with one thoroughly interested in his subject, the work grew on Professor Trimble's hands till he thought best to give to the public a work on the general subject, with gallotannic acid, and an index to the literature, leaving for a subsequent volume the remaining individual tannins. It has been the author's constant endeavor to make the book more than a mere compilation, and

the results of much of his own experience have, therefore, been incorporated. It is the author's hope that the present publication may lead others to aid in bringing together information on his subject.

—The American Book Company, New York, Cincinnati, and Chicago, has recently issued a "Laboratory Manual of Chemistry," by James E. Armstrong and James H. Norton. Mr. Armstrong is principal of Lake High School, Chicago; and Mr. Norton is principal of Lake View High School of the same city. The purpose of the manual is to aid the student in his laboratory work in such experiments as he can conduct himself, the experimental work to be supplemented by a course in some good text-book. We do not recall any other manual for use in chemical work in school laboratories which at all compares with the one now before us, and it seems to show that the interest in the best methods of scientific training in schools is making great progress.

#### PROPRIETARY.

## Exhaustion

### Horsford's Acid Phosphate.

A wonderful remedy, of the highest value in mental and nervous exhaustion.

Overworked men and women, the nervous, weak and debilitated, will find in the Acid Phosphate a most agreeable, grateful and harmless stimulant, giving renewed strength and vigor to the entire system.

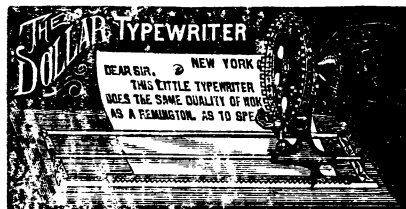
Dr. Edwin F. Vose, Portland, Me., says: "I have used it in my own case when suffering from nervous exhaustion, with gratifying results. I have prescribed it for many of the various forms of nervous debility, and it has never failed to do good."

Descriptive pamphlet free.

Rumford Chemical Works, Providence, R. I.

Beware of Substitutes and Imitations.

**CAUTION.**—Be sure the word "Horsford's" is on the label. All others are spurious. Never sold in bulk.



A perfect and practical Type Writing machine for only ONE DOLLAR. Exactly like cut; regular Remington type, does the same quality of work; takes a fool's cap sheet. Complete with paper holder, automatic feed, perfect type wheel & linking roll; uses copying ink. Size 3x4x9 inches; weight, 12 oz. Satisfaction guaranteed. Circulars free; AGENTS WANTED. Sent by express for \$1.00; by mail, 15c. extra for postage. R. H. INGERSOLL & Bro. 65 Cortlandt St. N. Y. City.

## PATENTS

For INVENTORS. 40-page BOOK FREE. Address W. T. Fitzgerald, Attorney at Law, Washington, D. C.

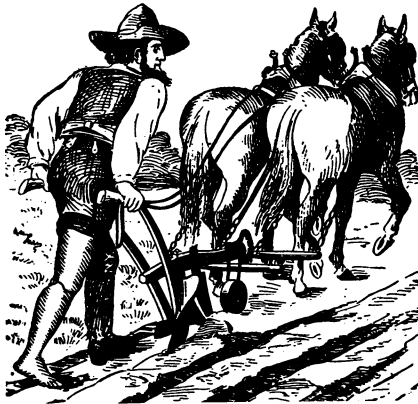
#### PATENT LIMBS AND SHOES.

### ARTIFICIAL LIMBS

#### WITH RUBBER FEET AND HANDS.

Durable in Construction, Natural in Action, Noiseless in Movement.

And the MOST COMFORTABLE for the wearer. It is not unusual to see a farmer working in the fields with an artificial leg, or a brakeman applying his brake on a fast running train, or an engineer with hand on the throttle, or a fireman, carpenter, mason, miner, in fact, men of every vocation at labor in the full capacity of their employment, wearing one or two artificial legs with rubber feet, performing as much as men in possession of all their natural members, earning the same wages, in fact, experiencing little or no inconvenience.



Over 12,000 artificial limbs of the Marks' patent in daily use. Established over 39 years. Indorsed and purchased by the United States and many foreign governments. By our formula applicants can supply us with all the data necessary to secure a fit while they remain at home. One half of the legs and arms furnished by us are made from measurements and profiles without our seeing the wearers. Fit always guaranteed. A treatise of 430 pages with 256 illustrations and a formula for measuring, sent free. Address

A. A. MARKS, 701 Broadway, N. Y.

### BANDY LEGS PREVENTED.

Send for Catalogue of PATENT CORSET SHOES, recommended by Physicians and Surgeons for Children learning to walk, and those troubled with weak or sprained ankles. B. NATHAN, 221 6th Ave., New York.

## ESTERBROOK'S STEEL PENS.

OF SUPERIOR AND STANDARD QUALITY.

Leading Nos.: 048, 14, 130, 135, 239, 333

For Sale by all Stationers.

THE ESTERBROOK STEEL PEN CO.,

Works: Camden, N. J. 26 John St., New York.



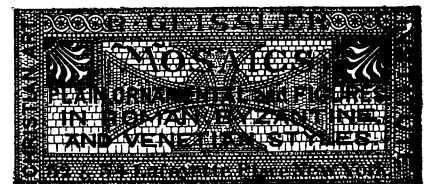
#### METAL, MARBLE, AND MOSAIC WORK.

### MEMORIAL AND HISTORICAL TABLETS

TABLETS EXECUTED IN METAL, OR MARBLE AND MOSAIC. PHOTOGRAPHS ON REQUEST. ILLUSTRATED HANDBOOK FREE.

J. & R. Lamb

59 Carmine St., New York.



ESTABLISHED 1858.

H. H. UPHAM & CO.,

## MEMORIAL TABLETS

In Brass and Bronze,

54 So. Fifth Ave., near Bleecker St., N. Y.

#### MINERALOGY.

### Course of Mineralogy for Young People.

Conducted by correspondence; minerals and books furnished.

Collection and book, "First Grade," one dollar; postage, 25 cents. Send for circulars to

GUSTAVE GUTTENBERG, Central High School, Pittsburgh, Pa.

**GEM OPALS.** Cut ready for setting. Having purchased a large lot at the Mexican locality, we are offering them at about one-fifth jewelers' prices; 50c., \$1, \$1.50, \$2, \$3. This is a rare opportunity to secure a fine gem very cheap. 100 pp. Mineral Catalogue 15c., in cloth 25c., Supplement 2c. GEO. L. ENGLISH & Co., Mineralogists, 733 and 735 Broadway, New York City.

**20 GEMSTONES FREE as a premium with THE GREAT DIVIDE.**

These Gemstones are cut and polished ready for jewelry mounting, and are given free to each new subscriber sending \$1, price of yearly subscription.

Address **THE GREAT DIVIDE,** 1516 Arapahoe St., Denver, Colo.



DRY GOODS, ETC.

## Arnold, Constable & Co.

### Men's Spring Woollens,

English, Scotch, and Irish  
Homespun and Cheviot Suitings.

Fancy Cassimeres,  
Dress Cloths, Overcoatings.  
**LADIES' CLOTHS,**  
New and Desirable Shades Adapted for  
STREET AND EVENING WEAR.  
Tweed, Homespun, and Mixed Suitings,  
Scotch and English Stripes and Checks,  
DIAGONALS, SERGES.

Broadway & 19th St.  
NEW YORK.

## SAVE MONEY

BY PURCHASING

Dry and Fancy Goods  
THROUGH

## KOCH & CO.'S

### Illustrated Fashion Catalogue.

"Koch & Co.'s Catalogue is a household necessity. It illustrates and describes everything useful as well as ornamental for the wear of either young or old and for the furnishing and beautifying of a home, and their goods are the cheapest without ever sacrificing quality to price."—*HERALD*.

Spring and Summer Edition ready March 10, 1892, and will be mailed free upon application to anyone residing out of town.

**H. C. F. KOCH & CO.,**  
West 125th St., Bet. Lenox & 7th Aves.,  
(Formerly 6th Avenue and 20th Street.)  
NEW YORK.

In writing please mention SCIENCE.

## R. H. MACY & CO.

6TH AVE., 13TH TO 14TH ST., N. Y.  
SINCE MOVING INTO NEW BUILDING

we have added 75,000 square feet to our floor area, thereby

GREATLY ENLARGING ALL DEPARTMENTS.

### OUR SPRING AND SUMMER CATALOGUE,

the most complete of its kind ever issued, of 315 illustrated pages,

WILL BE ISSUED ABOUT APRIL 1ST  
and mailed free to any address outside the city.

CARPETS, ETC.

## Body Brussels, Tapestry Brussels, AND Ingrains.

We offer a very large stock of these moderate-priced

## CARPETS.

It includes all the newest designs and choice colorings in such variety that satisfactory furnishings can be secured most economically.

Mail orders receive our prompt attention.

**W. & J. SLOANE,**  
BROADWAY,  
18th and 19th Sts. 33-35 E. 18th St.

## NEW YORK SHOPPING.

By a lady of experience. Best of references. Send for circular.

**MRS. M. W. KETCHUM,**  
106 W. 42d Street.

### HEALTH BETTER THAN WEALTH.

Valuable information sent to all wearers of Artificial Teeth upon the receipt of postage. Dr. W. E. DUNN, 331 Lexington Ave., cor. 39th St., New York.

CARPETS, ETC.

## Carpets.

Spring Season 1892.

New styles and colorings and at lower prices than ever before; a large assortment of the best quality at following prices.

Axminsters - \$1.20	Wilton - \$1.50
Moquette - \$1.10	Velvet - \$1.15
Tapestry - 60c.	Body Brussels 95c.

### India Rugs & Carpets.

In addition to our own large importation of these goods, we have added, (by recent purchase) the entire stock of two native importing houses, containing the finest specimens of antique and modern Oriental Art.

We can sell some of these Rugs at even a lower price than we have heretofore been able to sell the same quality of goods.

## Lord & Taylor.

Broadway & 20th St. N. Y.

# SCIENCE

## The Illustrated Popular Science Weekly. TENTH YEAR.

More than Two hundred of the leading scientific men and women of America have agreed to contribute to the paper during the coming year; and, as others are constantly joining in this move, to make the paper more valuable than ever, it cannot be long before there will be a body of five hundred competent users of this weekly medium of scientific discussion.

Send 50 cents, in postage stamps if most convenient, for 2 months' trial subscription.

**N. D. C. HODGES,**  
874 Broadway, - - - NEW YORK.