

the expenditure was \$3,905,667, very little going for public improvements. The principal exports in 1896 were coffee, valued at \$2,500,000; sugar, \$3,500,000; tobacco, \$425,000, etc. The total exports in 1895 amounted to \$15,799,000, and the imports to \$17,446,000. In 1895 1,077 vessels of 1,079,036 tons entered Porto Rico. From a commercial point of view the acquisition of Porto Rico would be important to the United States.

#### Recent Archaeological News.

The finds of old gold and silver coins at Santiponce, near Seville, have brought many antiquarians to the spot. The excavations have been continued with great zeal, and among the latest finds are a Roman marble statue in complete preservation, an amphora and some fine mosaics. But more interesting still is the location of the walls of ancient Italica, a portion of which has been laid bare. They were made of roughly formed stone and mortar without battlements, but a truncated square tower in a perfect state of preservation is the latest discovery. Santiponce is among the hills that bound the valley of the Guadalquivir on the west and is about three miles from Seville, which is across the river on the other side of the valley. The town of Italica was founded by Scipio Africanus in the Second Punic War. It was the birthplace of the Roman Emperor Trajan.

The Forum of Augustus is the cats' home of Rome. There the superfluous felines are dropped over the wall to join their numerous fellows in the Forum below. Every day charitable people throw scraps of food into this open prison, and, as seen from above, its inhabitants seem to be plump and happy—so happy, indeed, that they make no attempt to escape. A few years ago the Forum of Trajan was also used as a depositing place for cats that were not wanted, but as it does not present the same facilities of retreat and hiding as the Forum of Augustus, street boys and others took every opportunity of stoning the unfortunate animals. Finally, the authorities, after many complaints, refused to allow any more cats to be thrown there, and, in order to get rid of those already living in the Forum, presented one to each sentry box on the walls of the city. They all, however, speedily disappeared from their new homes, some returning to the foot of Trajan's Column, where they were either killed by the street boys or transferred to the Forum of Augustus.

The Institute of France has formally entered into possession of the Château of Chantilly, says The Builder, and the collections included in what is now to be called the Condé Museum, the contents of which have been inventoried in five volumes, with indications of the arrangement of the various classes of objects according to the intention of the Duc d'Aumale. The museum contains 557 pictures, without counting the pictures, engravings and drawings which adorn the Château d'Enghien; 30 enamels; 282 miniatures; more than 200 gems and precious stones displayed in glass cases; and in addition to the equestrian statue of Condé, by Paul Dubois, about 50 statues and busts in marble, among which are three by Chapu ("Jeanne d'Arc," "Pluto" and "Proserpine"), a "Hebe" by Dezeine, the statue of Bossuet by Guillaume, two bas-reliefs by Jean Goujon, and animal sculptures by Gardet and Auguste Cain. Among the 12,600 drawings are 111 original drawings by Nicholas Poussin and more than 500 by Raffet. Besides these are 5,000 engravings, a collection of 3,685 medals and a library containing 24,000 printed volumes, 1,493 MSS. and 272 parchments. The château includes besides more than 500 pieces of furniture and other objects of great value—armor, tapestries, etc. There is also a collection of autographs and historical documents of great interest.

Herr Ernst Berger, in his "Contributions to the History of the Development of Painting," describes the way the colors of the ancients are examined by chemists as follows: The color layer is first carefully scratched off with the knife in order to separate the colors from the lower ground. A portion of the color powder thus obtained is dissolved in water and heated in a retort; then the binding materials, dissolved in water, are separated from the color pigments by filtration. The filtrate is evaporated, and from the residuum the binding agent present is determined, according to whether it contains organic substance or not; ashes which turn brown with a burning smell point to organic binders, likewise the presence of ammonia (ammonia is recognized by the odor or by means of turmeric paper, which is dyed brown by ammonia vapors). A second portion of the scraped-off powder is treated with boiling alcohol, which dissolves the fatty resinous substances; the mass is filtered as above, and the filtrate is evaporated in like manner; from the residuum, which takes on a dark color, an oily or resinous binder results, which can be determined more closely by the odor. In order to recognize the presence of lime, a drop of hydrochloric acid suffices, which causes effervescence. The color substances remaining in the filter are then tested by means of different reagents for the presence of metals, earths, etc., and conclusions are drawn accordingly. In exactly the same manner the foundations on which the painting was are tested.

## Correspondence.

### The Naval Supplement.

To the Editor of the SCIENTIFIC AMERICAN:

I desire to express to you my appreciation of the excellence of the NAVAL SUPPLEMENT your paper has recently issued, and especially so because, instead of representing, as is so often done, our vessels as superior to anything else afloat, it frankly calls attention to certain of their limitations, e. g., the low freeboard of the "Indiana" and "Kearsarge" classes, and also to the doubts regarding the desirability of the superposed turrets of the "Kearsarge" class.

It is only by teaching our people regarding the shortcomings of their present vessels that a demand for better ones can be created, and nothing short of the best at the time of construction should satisfy us.

Furthermore, exaggerated ideas as to the excellence of our vessels, as compared with those of other nations, may lead to unpleasant consequences.

Permit me also to express the hope that you will follow the publication of this NAVAL SUPPLEMENT with one on United States ordnance, both that of the navy and of the army, including in the latter the armament for coast defense.

May I suggest that in such a supplement especial attention should be given to the subjects of rapid-fire guns, projectiles and smokeless powder, and that should you, on investigation, conclude that we are behind any other nation in adopting useful inventions, or have failed to keep our ordnance up to the highest standard, either in the matter of guns or that of ammunition, you should frankly say so?

Comparisons such as have appeared in various publications, e. g., between the efficiency of the armament of our "New York" and that of the Chilean "Esmeralda," or that of our "Kearsarge" and the Japanese "Fuji," of the muzzle energy of our guns as compared with those of the same class in the English, French and German services, etc., would, I think, be of interest if published in such a supplement.

EDMUND M. PARKER.

Boston, May 11, 1898.

### An Electric Railroad for Freiburg.

To the Editor of the SCIENTIFIC AMERICAN:

The city of Freiburg, a town of 55,000 inhabitants, with most beautiful surroundings, many large villages near by and romantic valleys into the heart of the Black Forest, is contemplating the building of an electric railroad system and a central power station for electric light and locomotive power.

Competition for these new enterprises is open to the world, and as United States consul I consider it my duty to call the attention of American manufacturers to the same, and feel that your valuable publications are the best medium for that purpose; hence send this note to you.

Freiburg is a busy little city, very conservative and slow but sure in whatever it undertakes, and whatever is constructed here is built, not for a day or lifetime, but for an age.

"Rapid" transit they have here, but it is the old-fashioned omnibus. Electric light is seen nowhere but in several factories with private motors and dynamos. Hence the need of these new enterprises and the call for bids for the same, such bids to be in the hands of the Committee on Underground Structures (Tiefbauamt) before July 1, 1898.

I mail you under separate cover the circular letter, plan of the city, plans and profiles of the projected enterprises, etc., such as the above-mentioned committee sends to parties interested, and shall be glad to procure any further information for you or other Americans who may take an interest in this matter.

E. THEOPHILUS LIEFELD,

United States Consul.

Freiburg, Baden, Germany, April 29, 1898.

### The Current Supplement.

The current SUPPLEMENT, No. 1168, contains articles of general interest to our readers. "The Use of Aluminum in Bicycles and Light Machinery" describes some of the latest advances in the use of this metal as a substitute for brass, steel and iron. "The Report of the Building Committee of the Scientific Alliance of New York" outlines an interesting plan for the co-operation of scientific societies. "The Great Shore Battery of Krupp Guns at Cuxhaven" is a subject of a splendid full page engraving. "Recent Work in the Princeton Psychological Laboratory" is the subject of an interesting article by Prof. J. Mark Baldwin. Papers of this nature in which psychology is treated in a popular yet clearly scientific manner are rare. "Malay Life in the Philippines," by W. G. Palgrave, is continued from the last number. It is one of the most important contributions ever made to the literature of travel in the Philippines.

THE French mint, besides coining money for the home country and her colonies, has also last year received and filled orders for Abyssinia, Bolivia, Chile, Morocco, and Russia.—La Science en famille.

### Science Notes.

M. Phisalix announced to the Académie des Sciences, Paris, some time ago, that cholesterine injected into the blood of animals made them resist the venom of vipers. Doubts were thrown on his results, because he had used cholesterine of animal origin. Since then he has repeated his experiments with crystallized cholesterine extracted from carrots, and found it as effective as that from animals. Moreover, he has obtained similar results with crystallized tyrosine extracted from the dahlia and even with the sap of the dahlia.

Mr. W. H. Wheeler draws attention in Nature to the effect of gales on tideless lakes and seas, which he says is at times so marked as to cause considerable inconvenience and anxiety to mariners. Thus in the Caspian Sea a gale will raise the water on one side six feet and depress it on the other as much, making a total difference of level of twelve feet. In the Baltic easterly gales will alter the level upward of eight feet. In Lake Erie depressions and elevations of from two to four feet are common, while occasionally heavy gales have produced a difference of level of upward of fifteen feet.

When drawing attention, about a year ago, to the bipedal movements of certain Australian lizards, notably the comical little chlamydosaurus, or "frilled lizard," whose photograph is now familiar, Mr. Saville-Kent referred to an unconfirmed rumor that the Mexican iguanoid lizard also possesses the power of running on its hind legs, being led to this by the correspondence in general structure of the creatures, especially the abnormal length of the hind limbs. In Nature he publishes a letter from a gentleman living in the West Indies, which shows that there also all the lizards, from the large tree iguana, five feet long, down to the tiniest mites which scamper about among the stones, are accustomed to run erect on their hind legs when hurried. The correspondent adds the interesting information that on the rocks about the watershed of the Guiana are old drawings of lizards running erect. Mr. Saville-Kent points out that this peculiarity, which a year ago was doubted by many naturalists, but which has now been shown to be common to so many different species of lizards, deserves attention as pointing to bipedal locomotion in some remote ancestor.

Mr. F. G. Jackson's account of his three years' exploration in Franz-Josef Land is the prominent feature of The Geographical Journal for February. The main result of his adventurous journeys seems to have been the mapping of the southern part of the archipelago, and, it may be added, the conviction that it is "one of the worst" routes to the pole. A study of the geological collections brought back by the expedition appears to show that the islands are fragments of a vast basalt plateau, probably the "grandest example of volcanism in the world." On account of the absence of warm southwesterly winds, the flora is "more scanty and stunted on the whole than that of almost all the other Arctic regions." There are certain plants, however, as poppies and four species of mosses—brilliant green, red and golden yellow—which give color to the landscape. The only land mammalia are the bear and the fox, but three new species of birds were discovered. The northern lights were disappointing, though occasionally they were brilliant enough "to cast a shadow and to eclipse stars below the third magnitude." The highest registered temperature was 43° Fah.; the lowest, -54°. The Journal also contains Dr. Mills' elaborate classification of geography with arbitrary symbols, presented at the Toronto meeting of the British Association.

The chemical and toxic properties of the poison of the honey bee have been a subject for long study by a German scientist, Dr. Joseph Zanger. During his investigations Dr. Zanger employed 25,000 bees. He found that the fresh poison is clear, like water, of an acid reaction, bitter taste and of a fine aromatic odor. On evaporating and drying at a temperature of 100° Centigrade (212° Fahrenheit) a gummy residue is left. It is soluble in water; with alcohol it forms an emulsion-like mixture. The aromatic odor is due to a volatile substance, which disappears on evaporation, and is not poisonous. The poisonous constituent is not destroyed by short boiling, nor by drying and heating the residue to 212° Fahrenheit, nor by the diluted acids or alkalies. Dr. Zanger has proved the existence of formic acid, but he has also proved that that is not the poisonous principle. The latter is an organic base, soluble with difficulty in water, but kept in solution by an acid. On the healthy skin neither the bee poison nor a two per cent solution of the poisonous principle has any effect, but they act as powerful irritants on the mucous membranes. His tests made on rabbits and other animals show that when the poison is brought in contact with the eye there follow lachrymation, hyperemia, chemosis and croupous membrane on conjunctiva. The general condition is also affected; the animals become melancholy, take no food, but are very thirsty, and the urine shows small amounts of albumen.