quirements of the will it shall be in the south division of the city, or, as it is usually called, the South Side.

This munificent bequest calls attention to the library privileges that Chicago already enjoys, and which are probably not equaled to a corresponding degree by any other city in the country. For years the Chicago Public Library has been noted for the number and quality of its books and for the large number of volumes it circulates among readers. The annual report of this institution recently published shows that it contains 189,350 volumes. It has twenty-nine delivery stations and six branch reading rooms. During the past fiscal year it circulated 2,094,094 volumes and periodicals, and of this immense number 988,601 volumes were for home use. The daily average circulation of books for home use was 3,272. Just at present this library is in cramped quarters in the upper story of the City Hall, but contract has been let and foundation is nearly completed for a new library building, which is to be situated in the heart of the city convenient to the North, South, and the West Sides of the city.

On the North Side of Chicago is a fine library, which, in many of its departments, is without equal in the country. This is the Newberry Library, which, perhaps, by an unfortunate bequest in the will of Mr. Newberry, who founded it, is limited to being a library for reference. The last report of this institution, made six months ago, shows that there are 107,157 volumes and 39,501 pamphlets. This library is especially strong in the departments of music, bibliography, American history, biography, and genealogy, fish, angling, and fish culture. In the department of music it is believed to exceed any other library in the country in the value of its books. This library has an endowment of $3,000,000. A new building has just been erected, and will be occupied in a few months, which is one of the finest specimens of architecture in Chicago. It is an immense building, occupying half a small square, but the other half belongs to the library association, so that at any time when necessary the building can be extended. The books in this library are classified and arranged in departments, and each department will have separate rooms, where the books will be kept and where people wishing to refer to any volume may be by themselves and not in a general reading room. The capacity of this new building is 800,000 volumes.

There is another library in Chicago which is destined to play an important part in the education of the city, and that is the library connected with the Chicago University. This institution is situated at the extreme southern end of the city between Fifty-eighth and Fifty-ninth Streets, and, with its immense resources, both in money and intellect, will undoubtedly soon have one of the finest libraries of any university in the country.

An Ancient Canal in the Crimea.

The Russian engineer Melnikoff writes from Odessa to the Smithsonian Institution, says the Philadelphia *Evening Telegraph*, describing the ruins of an ancient canal discovered in the Crimea, which he regards as one of the wonders of the world.

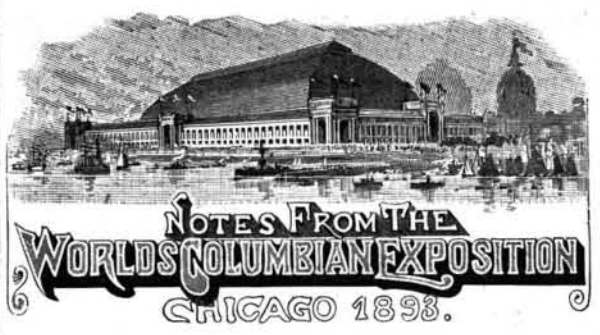
At each end of the western side there was a lofty castle, the ruins of which remain to this day, the cubical contents exceeding 750,000 meters. A part of these stones, as well as those with which the bed of the canal was paved its entire length, were removed some time ago to build a town which adjoins.

During the Crimean war some of the stones remaining were utilized in the construction of hospitals for the wounded soldiers, which structures are still standing. Along the banks of the canal there were at least six towers, but what purpose they served, unless for defense, is uncertain. There was also a high wall, which extended its entire length. At an equal distance from each end there was a gigantic fortress, built in the form of a square and covering a space of 32,400 square meters. The canal is as straight as an arrow its entire length, except at this point, where it forms three sides of a square about the fortress. Here there was a smaller canal on the outer side, which may have provided greater security.

One of the gateways of the fortress is still partially preserved, and through it passes a dilapidated road. The canal was built by Assande I, of Bosporus, in the seventh century B. C., and is nine kilometers long. Mention is made of this in the writings of Pliny and Strabo. It passes by the modern town of Perekop, and is not far from the Greek city of Neapolis. Its width on the bottom was about five meters and its depth ten meters. Whether it served formerly as a great and towering fortification or not, it certainly contained water enough to sail ships of considerable burden.

Artificial Gum Arabic.

According to *Rev. de Chim. Ind.*, a product possessing the properties of gum arabic is obtained by boiling 1 kgm. flaxseed with 8 kgm. sulphuric acid and 10 liters water, filtering after three or four hours, adding four times the volume of alcohol, washing and drying the precipitate. The product is amorphous, colorless, insipid, and dissolves in water like gum arabic.



Compressed air is used more or less throughout the grounds and buildings at the World's Columbian Exposition, and there is a complete system of pipes for its distribution. Four Norwalk compressors are used, alsoan Ingersoll-Sargent and a Rand compressor. The latter two have a capacity of 200 and 500 horse power respectively. Compressed air operates the elevators in the Transportation building and many freight elevators throughout the grounds. Several locomotives are represented in operation, the energy for this being supplied by compressed air. The air brake exhibit and other exhibits in the Transportation building use compressed air. In the Mining building are several rock drill exhibits, also in the Palace of Mechanic Arts machines are operated by compressed air.

The drainage is divided into three departments. One devoted to the disposal and carrying off of water from the roofs of buildings during storms; another to the surface drainage and disposal of all accumulations of rain water; the third is that of the sewage proper. The rain water from the roofs is emptied direct into the lagoon. The surface drainage from the high grounds flows by gravity into the lake.

The surface drainage from the low parts of the grounds is collected in underground pipes constructed of wood with a bottom of concrete. Three centifugal pumps lift the water, giving it sufficient headway, so that it flows by gravity into the lake. These pumps are operated by electricity. This sewer also carries off the condensing water waste from the Palace of Mechanic Arts.

The remaining general sewerage system of the grounds is operated by compressed air. The main sewer consists of cast iron pipes 30 inches in diameter, and the pressure of air throughout the system varies from 35 to 47 pounds per square inch according to the distance from the sewage pumping plant. Nearly every one of the large buildings on the grounds forms a district in itself. By this division into districts the work of maintaining and operating the system can be more readily carried on and the drainage is more efficient. All sewage is forced through the pipes by the compressed air at a rate of about three feet per second, and is carried immediately to the sewage purifying works, which are at the extreme southeastern corner of the grounds. Here the sewage is made to rise to a tank in the top of the building, where it flows over a sieve and falls into this tank. The sieve separates all the large articles that may be floating in the water, and at frequent intervals they are raked off and taken to the crematory, where they are burned. From this tank the water is distributed by means of pipes into the four precipitating tanks.

Two methods are followed for precipitating the solids in the sewage. In two of the tanks copperas and lime are used and in the other two sulphate of alumina and lime. Large pipes run from the receiving tank direct to each of the four precipitating tanks. The copperas or the sulphate of alumina, whichever is used, is combined with the water as it enters the pipes. As soon as the chemical enters the pipe the water passes through a mixing device, which is simply a sort of paddle wheel, and which thoroughly mixes the chemical with the water. The water then passes on through the pipe, and just before it reaches the tank milk of lime is added. Again the water comes in contact with a device for mixing, so that the chemical shall be thoroughly combined with the sewage. This second mixing device consists simply of a shallow cone. The water pours into this cone, and as it is forced up over the edges, flowing into the precipitating tank, the proper mixing takes place. When the sewage enters the precipitating tank, it does not at once combine with the sewage already in the tank, but passes nearly to the bottom through an inner tank or main designed for this special purpose, then rises to the top outside of this inner tank and passes over an overflow. During the passage of the water down this inner tank and up around the outside of it all solids held in suspension are precipitated, so that the water which flows through the wasteway is nearly clear and is discharged into the lake.

The solid matter, or sludge as it is called, is drawn from the precipitating tanks and passed through a filter press by compressed air at about 104 pounds pressure. The pressed sludge is removed to the garbage crematory, where it is burned. The garbage is collected each night and is carried by the cart load to the crematory, where it is burned. Oil is used for fuel in these furnaces. Refuse is never allowed to accumulate and the garbage is burned every night.

The sanitary arrangements at the Exposition are most excellent, and the system has shown that it is equal to any demands that are liable to be made upon it.

The exhibit made by the Oil Well Supply Company, of Pittsburg, Pa., illustrates in a most perfect manner the skill and science reached in the matter of driving wells for this and other purposes. The exhibit is located in a special building. Working models illustrate the drilling of a well, showing the machinery at work. A second illustrates the manner in which oil is pumped from wells. The structures are inclosed in glass. The Liliputian workmen are armed, as they frequently are in real life, with a bottle of whisky in one pocket and a plug of tobacco in another. The third model is that of a flowing well. All the pipes and tanks for controlling the oil are shown, and the peculiar intermittent flow of the crude petroleum is perfectly reproduced. Derricks used for sinking the wells are also exhibited. There are two large outfits of full size, and such as are built for sinking the deepest wells. The greatest depth yet reached is 4,600 feet. These two large outfits are of different types, one being the most modern, with steel construction and improved power-applying device, while the other is constructed mostly of wood and is of the type that has been so extensively used in the oil regions of Pennsylvania and elsewhere. The company making this exhibit has planned to sink a well 3,000 feet under the steel outfit, and one length of casing, 12 inches in diameter and 30 feet long, has already been driven. Smaller portable outfits are also shown, designed more especially for drilling wells from 800 to 1,000 feet deep. One of these outfits comprises a steam vehicle and adjustable derrick, all in the one machine, which can be hauled by horses or run by its own steam power.

A full line of all the drills, tools for recovering broken drills, torpedoing apparatus, including the go-devil which fires the torpedo, etc., is shown.

The driving of wells in this country is done on what is called the cable system; that is, steam or other power is used for operating the drill, which is suspended on a cable. But in order to add completeness to the exhibit and to compare latest improved methods as utilized in this country with cruder methods as used in other countries, there is shown a complete pole outfit, which consists of splices of poles which are fitted together.

The rest of the exhibit in this building consists of a full line of engines from 12 to 60 horse power, valves and fittings of all kinds, some of the valves being as large as 30 inches in diameter; pipe-threading machines, and a fine line of photographs illustrating the oil well business in all its phases, from the preliminary work of preparing the well to complete buildings, flowing wells, tanks and wells on fire, etc. A large framed picture shows the first oil well that was drilled by Colonel Drake, near Titusville, Pa., in 1859.

In the Horticultural building the wine exhibit is very extensive. The most noticeable pavilion in this department is the one erected by the four California wine producers, C. Carpy & Co., Arpad Haraszthy & Co., Napa Valley Wine Company, and J. Gundlach. This pavilion is constructed of the bark of a giant redwood tree, from Mendocino County. The tree from which this bark was taken was 30 feet in diameter at the base and 290 feet high. The section which this pavilion represents is 47 feet high, and 9,760 pounds of bark was brought from California to use in this structure. Two passageways afford entrance into the lower part of the pavilion, and a narrow winding stairway leads up through it, giving egress to the gallery floor. Over the entranceway, at the right, is a statue of a Franciscan father, representing him in the act of tilling the soil. These representatives of the church first established grape culture in California in the old mission days. Over the left entranceway is a figure of an Indian woman, such as were connected with the mission stations in the early days. Between these two statues is a third one, representing one of the figures by Schmidts, typical of California. Growing up from the base of the tree are grapevines, with an abundance of ripe fruit hanging from the vines. The interior of the tree affords a spacious room, in which there is considerable display of the products of the vineyards.

Adjoining this pavilion is the pavilion and exhibit of Leland Stanford's Vina vineyard.

Two rooms, each of much length, are utilized for the fruit exhibits, those of oranges and lemons being very attractive. The largest exhibit of these fruits comes from the counties of San Bernardino and Los Angeles, California. At one end is a large pyramid of lemons and oranges; at the center is a model of the Liberty bell, entirely covered with oranges, except for the black zigzag space left to represent the crack in the bell. Tropical plants, glasses of preserved fruits, photographs, and other things add to the attractiveness of this exhibit. Smaller exhibits of oranges and lemons and grape fruit are made from other counties in California, as well as from other parts of the world, the exhibit from the most distant points being made by New

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WORLD'S FAIR NOTES.

(*Continued from page 67.*)

South Wales, Australia. The most conspicuous exhibit is a tower of oranges reaching to the ceiling of the room. A placard says that this tower contains 13,873 oranges. Florida's leading exhibit consists of an arch of Florida golden russets, "the most delicious oranges on earth," according to a placard. Florida makes several other exhibits of oranges and lemons and grape fruit, and also jars of sliced and preserved fruit. The inner court, near the north end of the building, is an open space of considerable area, and here California makes an exhibit of a grove of many trees of oranges and lemons with the fruit on the trees.

Probably the largest piece of rolled metal ever exhibited is shown in the Mining building. This is a steel plate seven-sixteenths of an inch in thickness, twenty inches wide, and one hundred and twenty feet long.

The exhibit made by Pennsylvania in this building gives a very instructive idea of the mineral resources of this State. Petroleum, fire clay, building stone, terra cotta, glass-making materials, slate, and many other minerals are also shown. The exhibit of most historical importance is a model of an iron furnace such as was used about four hundred years before Christ. The Philadelphia and Reading Coal and Iron Company's exhibit consists of a model of a coal mine and a coal breaker, showing the method of mining, breaking, and shipping anthracite coal. The model is complete in every respect, with seams of coal, engines, pumps, breakers, etc., showing the entire operation from cutting the coal from the seam to loading it into the cars. This company also exhibits many specimens of coal representing seams in section. The exhibit of iron ores is also very satisfactory, and includes nearly every kind of iron mined in the State.

The Viking ship, which was illustrated in the SCIENTIFIC AMERICAN of May 20, reached the World's Columbian Exposition on Wednesday, July 12. A splendid reception was given to this famous craft and crew by a large number of officials and foreign representatives, including nearly a score of Norwegian societies. Several large excursion steamers and the two government vessels met the ship off Evanston and escorted it to the Exposition grounds. As the ship approached its anchorage adjoining the wharf and just astern of the model war vessel, it furled its sail, and the members of the crew took to their oars and rowed into port in true Viking style. It was a memorable coincidence that these men who came from Norway to Chicago in this vessel modeled after a type of craft used one thousand years ago should be met at the Exposition grounds and transferred by the type of vessel of the future—one in which the motive force was electricity. An address was delivered by President Palmer, of the National Commission, and Captain Andersen, master of the Viking ship, responded. At the close of his address he signaled to the men of his crew, who mounted the platform and gave the Viking cheer.

In the Agricultural building the most instructive brewing exhibit is that of the Bartholomay Brewing Company, which consists of a miniature brewery in operation. It contains all the necessary machinery of a complete brewery.

The dairy exhibit is very fine. Here are exhibited in much variety every conceivable device used in a dairy for cooling and caring for the milk, churning and working the butter, etc. The east gallery only lacks a few swarms of bees to make it a complete apiary. The exhibit of hives and honey is very large and is made by many States.

Among the features of the Michigan Logging Camp is an enormous load of logs chained to a log sled labeled "The World's Fair load of logs, 36,055 feet. Hauled by estate of Thomas Nester to the Ontonagon River, 1893. The largest load of logs 18 feet long ever hauled in the world and hauled by one team. Height 33 feet 3 inches, weight of logs 144 tons; hauled on bunks 16 feet long. Nine flat cars were required to convey the logs to Chicago."

The Blake, a schooner-rigged steamer which has been used for a number of years in taking ocean observations, has been added to the government exhibit. The Blake is tied up to the long pier. The object of bringing this vessel here is to show people interested in marine and commercial matters the system now in use for obtaining a knowledge of the sea coast, the character of the bottom, the location of reefs, etc. The apparatus is very interesting. The deep sea sounding machine allows soundings of a depth of 27,000 feet to be made. The Blake has a peculiar arrangement which allows her to anchor in water 12,000 feet deep. The exhibit is one of the most interesting which the federal government has provided.

The Javanese village in the Plaisance is composed of curious little bamboo houses covered with matting and straw thatch. All around the village, which looks like a dream of the Orient, with the growing palms, may be seen the tiny brown creatures who have already won all hearts as they did in Paris. The music of the native orchestra is not very bad, and the dancing is excellent. The little people have a very curious mode of greeting. They place their hand in yours, and then turn their fingers back until they almost touch the back of the hand.

The exhibit of the terra-cotta reproductions of the Tanagra figures is very fine. Two houses exhibit, one in the Austrian section and one in the English section, though the goods are made in Denmark. The figures, which average only eight or ten inches high, are modeled in the purest classic forms, and are colored in light tints, the color being fired in. The originals are very expensive, costing from five hundred to one thousand dollars. The little figures are very beautiful, and the reproductions may be purchased for as many dollars as the originals cost hundreds.

The Transportation building is a wonderfully successful example of polychrome decoration, the huge arches of the golden doorway in broad, receding planes are very effective. Everything in the building relates directly or indirectly to transportation, and the exhibit includes cash carriers, bicycles, tricycles, baby carriages, wagons, carts, trucks, hearses, elevators, street cars, everything relating to railroads, boats, steamboats, tourist companies, etc. The models of steamships exhibited by their owners or builders attract great attention, while the large section of an ocean steamer exhibited by the American Line is a never-ending source of wonder to visitors. The two special transportation buildings devoted to the exhibit of the Pennsylvania and Vanderbilt systems are interesting, some of the old tickets and time-bills being very curious, a poster issued by the Jefferson, Madison and Indianapolis Railroad being peculiarly so. It seems that the railroad was troubled by frequent requests for passes, so they printed the following poster. The heading reads: "In those days there were no passes. Search the Scriptures." Then follow several passages bearing upon the subject:

"Thou shalt not pass."—Numbers xx. 18 v.

"Suffer not a man to pass."—Judah.

"The wicked shall no more pass."—Nahum l. 15 v.

"None shall ever pass."—Mark xiii. 30 v.

"Though they roar, yet they shall not pass."—Jeremiah.

"So he paid the fare and went."—Jonah i. 3 v.

The exhibit of the dead letter office in the Government building contains many curiosities, including a letter written on a shingle. Another letter says: "If not delivered in thirty years return to—" Wedding cake, candy, fruit, snakes, tarantulas, and nearly every conceivable thing finds its way into Uncle Sam's mail bag. A curious article in the collection is a neatly bound book, labeled "Ireland's True Spirit in Spiritual Sermons," while out from the nicely marbled edge protrudes the neck of a bottle, which formerly contained a sample of Ireland's spirit.

The detective service is excellent, and the staff includes detectives from the principal countries of Europe. If a robbery occurs, the description of the man is telephoned to every exit, and there is little chance of escape. Indeed, the service is so good that professional criminals are leaving Jackson Park severely alone.

The ambulance service is in fine running order, and may be summoned by the guards from any of the numerous police boxes. Over 5,000 workmen were injured during the period of construction of the Fair. The hospital is thoroughly well equipped, and competent physicians and nurses are in attendance.

The East Indian prince, the Nawab of Rampur, is at the Lexington Hotel, and is busily engaged in studying the Fair. He has his own cook, as some of the members of his party are Brahmans of high caste, and can only eat certain kinds of food prepared by the hands of an anointed cook.

The diamond cutting exhibit of Messrs. Tiffany & Co., in the Mines building, attracts much attention. The machinery and men are surrounded by a glass partition, which, while it does not obstruct the view, protects the diamonds. The progress of the cutting is shown by the men, who obligingly hold up the stick in which the diamond is cemented. The exhibit of alloys in the gallery is very remarkable, many of the imitations of gold and silver having been made up specially by this progressive firm.

The "Mocking Bird" is a large steam whistle, which has been placed on the roof of Machinery Hall for use as a fire alarm. The note of the whistle can be altered by insensible degrees over two octaves, so as to give out a sound that is weird and alarming. The whistle will be blown from the pumping station, and at the first blast all firemen and guards who are off duty will proceed to the fire at once. It is also intended to notify guards on duty at the buildings to shut all doors and to keep the visitors in until the fire is extinguished. There is always a chance of injury by being run over in the crowded roads by the engines and ambulances, which accounts for a rule that might otherwise be called harsh and arbitrary.

A pompier corps is to be added to the Fire Department, as a result of the Cold Storage fire. A pompier corps is a band of firemen skilled in scaling buildings by short ladders, which they pull up after them. The equipment includes ladders, netting, ropes, and other appliances. It is said that many of the men could have been saved at the Cold Storage fire if such a corps had existed.

The auditor of the World's Fair has presented a very interesting statement of the financial condition of the Exposition. The cost, up to June 30, $20,620,160. The balance in favor of the Fair, for the months of May and June, is $1,127,417. Important reductions in expenses have been and will be made. The railway tracks in and about the grounds cost $402,237; the symphony orchestra has cost $55,820 so far; the Columbian Guards have entailed an expense of $555,233; the postage bill amounts to $59,696; the architects have taken $169,558; the statues on the grounds have cost $198,830; the photographic concession has cost $45,140, the receipts for the same have been $46,535, so that this important concession has paid a profit of $1,395. It is interesting to note that the total receipts through the concessionaires have been $580,006.

A very natural question for any one who is about to visit the Fair is, "How long a time will I require to see the Fair properly?" This is, of course, largely a matter of personal opinion, but it can be safely said that the Fair can be seen in a satisfactory manner in seven days and two evenings, if the grounds are reached at nine o'clock in the morning and left at six o'clock in the evening, except the two nights, when a stop is made for the illumination. To see the Fair more leisurely ten to twelve days will be required. If each of the eight thousand works of art in the Art Gallery are examined individually, the time would have to be increased.

Potash, Soda and Magnesia from Kainit.

In *Le Genie Civil*, M. D. Lidersky describes the new process adopted by the Buckau Chemical Company, of Magdeburg, for producing pure potash, soda and magnesia from the kainit deposits of Stassfurth, Germany. Most of this kainit is sold as manure, and only a very little has been employed in the manufacture of potash, partly because so many useless by-products were found, and partly because it was difficult to obtain a pure potash with the Leblanc process, which was the only one employed. The new process uses up all the by-products, and besides potash it produces soda, calcined magnesia, crystallized sulphate of lime, hydrochloric acid and sulphuric acid. The average composition of the kainit used is $MgSO_4$ 16–18 per cent; K_2SO_4 22–24 per cent; NaCl 30–34 per cent. These salts are first converted uniformly into sulphate, by treatment with sulphuric acid. The hydrochloric acid produced is condensed. Concentrated milk of lime is then added to the boiling solution of sulphates to decompose the magnesium sulphate. The lime dissolves, but when left at rest for some days after slow cooling, the sulphate of lime separates out as a heavy crystalline powder covered with a lighter deposit of magnesia. The solution is then removed and the magnesia and sulphate of lime washed, separated, and collected in a filter press. The solution is then treated for the separation of the potassium and sodium salts. Barium sulphide is added with the resulting production of insoluble barium sulphate and solutions of the alkaline sulphides. The solution is boiled down to a strength of 20° B. and subjected to the action of pure carbonic acid gas obtained from the decomposition of alkaline bicarbonates. The sulphides are decomposed; sulphureted hydrogen is evolved, and bicarbonate of soda and potash formed. The sulphureted hydrogen is burned and converted into sulphuric acid. The bicarbonate of soda is almost insoluble in the cold solution, and is separated by filtration. The potassium bicarbonate is obtained by boiling down the filtered liquid. The bicarbonates are calcined into neutral carbonates, and the carbonic acid gas driven off is employed in the decomposition of the alkaline sulphides.

Housekeepers Should Remember.

Katherine B. Johnson gives in the *Albany Cultivator* some household hints that are very seasonable.

That there are few servants so thorough that they should not inspect the refrigerator daily to see that no liquids are spilled or food allowed to spoil and contaminate the rest.

That dish water, which is always impregnated with more or less vegetable matter, should never be thrown on the surface of the ground at the back door.

That all tubs and basins in bath rooms and kitchen sinks and drains should be flushed with hot water on every weekly washing day.

That sulphate of iron (copperas) and chloride of lime, two of the best disinfectants, are but ten cents a pound, and a plentiful use of either in sinks and open drains during the summer and autumn may prevent that dreaded disease, typhoid fever.

That no hamper or other receptacle of soiled clothing, no matter how handsomely decorated, should be kept in a sleeping apartment.

That powdered borax, plentifully used, will exterminate cockroaches and water bugs.

Natural History Notes.

The Production of Sound in Ants.—If we consider that ants have the faculty of producing a sound perceptible to our ear by rubbing a part of the body, the hypothesis that these insects possess also the faculty of hearing acquires a certain likelihood. Landois and Lubbock mention as probable that the organ that produces this sound is in the posterior part of the insect's body. Yet they furnish no proof of it. It, therefore, appears to us of interest to quote the following short passage from a work by Robert Wroughton upon the noise produced by ants in the Indies:

"I am almost certain of having heard these sounds. When one of the gray paper nests of *Cremastogaster regenhoferi* is suddenly and violently shaken, the ants escape by thousands, moving their abdomen in the manner so characteristic of the species of the genus when they are excited. From time to time there is distinctly heard a slight hissing, as if a red hot coal were being plunged in water. I had always supposed that this noise was caused by the friction of the legs of the ants against the sides of their nest. An analogous, though feebler, sound may be perceived when a large nest of *Camponotus* or *Polyrhachis spinigera* is disturbed. It is produced then by the friction of the bodies of the ants, which suddenly enter into active motion. However, the passage from Lubbock that I have just cited leads me to think that there is nothing in this but that the noise heard is produced by the mass of innumerable ants. The motion of the tail of the *Cremogaster* would explain why the noise that they make is louder, although they are much smaller than the *Componoti* or the *Polyrhachides*. I asked Mr. Aitken to make some experiments in order to confirm the results that I thought I had obtained. He will, doubtless, be recognized in the following note, confirming my assertions:

"I have no need of making an experiment. The noise produced by a host of *Lopobiltæ*, when they are stirred up with a straw, is heard without the necessity of placing the ear close by. I should like, however, to know something as to the nature of those organs. What is their role? Are they military drums?"

Twenty years ago, Mr. Auguste Forel described in our European *Camponoti* a signal of alarm, consisting of a peculiar noise: "Not only do the *Camponoti* strike themselves forcibly, and with repeated blows against each other, but, at the same time, strike the ground two or three times with their abdomen, and repeat this act at short intervals, thus producing a very marked noise that is heard especially well when the nest is in the trunk of a tree."

Forel's theory is confirmed by several of my observations upon the *Camponotus ligniperdus*, and I have nothing to add thereto. There is no doubt that this signal of alarm is understood by the ants. Without that it would not be an alarm signal. But the question is to know whether the noise perceived by the ants is perceived as a sound through a sort of hearing, or as a simple shock by the touch by means of a slight friction of the lower limbs upon the bottom of the nest. Ants, in fact, are provided with hairs under the legs for the purpose of feeling. In order to elucidate the question, the examination would be more favorable if it extended to different species of our myrmides, which show their anger by a violent motion of their posterior legs. They seem to make use of their first sting for rubbing their *metanotum*.

Unfortunately, the species of which we have just spoken are almost too small, except the *Myrmica rubida*, which is too quiet to permit of proving distinctly the production of sound in these animals. Two years ago I published a work upon the touch of insects. This observation is, perhaps, still unknown to specialists, and it is for that reason that I communicate it here once again.

One very hot day I had put a portion of a large colony of *Myrmica ruginodis* into an empty glass globe. The ants were much agitated and rubbed their posterior legs violently. On seeing this motion executed by a large number of individuals at the same time, I heard a slight droning that recalled to me the sounds made by a coleopter, the *Mononychus pseudacori*, which lives in the fruit of gladioli. Unfortunately, I did not succeed in renewing this observation in the experiments that I made later on.

We find in a monthly entomological review a note by A. H. Swinton on the sound of the *Myrmica rugidinodis* and other Hymenoptera. He observed a small female worker (not a male, as he thought) that was violently agitating its posterior l gs. He made an examination and afterward found organs that probably produced a sound at the base of the posterior legs and of the second sting.—*E. Wessmann, in Biol gische Centralblatt.*

Localization of the Senses of Sea Anemones.—Herr Nagel has recently been conducting some experiments at Naples, having for their object the localization of the various senses of sea anemones. The results of his researches have shown that the sense of taste resides in the tentacles; and that though the tentacles were apparently unsusceptible to pain when cut, yet when touched, or when heated substances were placed near them, they gave evidences of being most sensitive. They are, therefore, the seat of three senses, viz., of touch, taste, and smell.

Habits of Brazilian Roaches.—Cockroaches are so common in Brazilian country houses, says Mr. Herbert Smith, in *Insect Life*, that nobody pays much attention to them. They have an unpleasant way of getting into provision boxes, and they deface books, shoes, and sometimes clothing. Where wall paper is used they soon eat it off in unsightly patches, no doubt seeking the paste beneath. But at Corumba, on the upper Paraguay, I came across the cockroach in a new role. In the house where we were staying, there were nearly a dozen children, and every one of them had their eyelashes more or less eaten off by cockroaches—a large brown species, one of the commonest kind throughout Brazil. The eyelashes were bitten off irregularly, in some places quite close to the lid. Like most Brazilians, these children had very long, black eyelashes, and their appearance thus defaced was odd enough. The trouble was confined to children, I suppose, because they are heavy sleepers and do not disturb the insects at work. My wife and I sometimes brushed cockroaches from our faces at night, but thought nothing more of the matter. The roaches also bite off bits of the toe-nails. Brazilians very properly encourage the large house spiders because they tend to rid the house of other insect pests.

Tannin Receptacles of the Leguminosæ.—Dr. P. Baccarini has made an exhaustive examination of the structure and distribution of the tannin receptacles in a large number of *Leguminosæ*, belonging to all the three tribes, *Papilionaceæ*, *Cæsalpinieæ*, and *Mimoseæ*. These special receptacles are especially well developed in the *Loteæ*, *Galegeæ*, *Phaseoleæ*, and in some *Hedysareæ*; though the tannin is by no means confined to these receptacles, but may be distributed in other portions of the tissue. In the *Podalirieæ*, *Genisteæ*, *Trifolieæ*, and in some *Galegeæ* they are altogether wanting. When present, they may be either associated with the vascular bundles (para-fascicular) or independent of them (extra-fascicular), and one only or both of the systems may occur in the same species. The archaic form is probably that found in *Ceratonia siliqua* and *Cercis siliquastrum*, where the extra-fascicular system is localized in the epiderm; in other species it occurs in the hypoderm or in the cortex. The tannin or tannins are accompanied by an abundance of an albuminoid substance. The tanniferous cells are further characterized by the presence of threads of protoplasm connecting them with one another and with the elements of other systems of a different histological character. The author does not assign to these protoplasmic threads any function in connection with the distribution of nutritive substances.

Simian or Ape-like Man.—Prof. E. D. Cope, in the April number of the *Naturalist*, has an article on this subject. He says archæology, apart from anatomy, is a poor guide in the field of human ancestry. The closer association of man with the apes is based on various considerations. It is highly probable that the homo is descended from some form of anthropomorpha, either the Eocene lemuridæ or the simiadæ. He refers to the man of Spy to prove that there dwelt in Europe, during paleolithic times, a race of men which possessed a greater number of simioid characteristics than any which had been discovered elsewhere. The important discovery in the grotto of Spy of two skeletons, almost complete, served to unify knowledge of this race, which had previously rested on isolated fragments only. These skeletons proved what had been only surmised before, that the skeleton of Neanderthal, the lower jaw of Naulette, and the crania of Cronstadt belong to one and the same race. The simian characters of these parts of the skeleton are well known.

Cause of the Digestion of Albumen by the Leaves of Certain Plants.—N. Tischutkin published an article in 1889, in the *Berichte der Deutschen Botanischen Gesellschaft*, on the cause of the digestion of albumen by the leaves of *Pinguicula vulgaris* L., in which he endeavors to show that the process of digestion is the result of the action of bacteria. This is in opposition to the theory of Darwin and other authors that the digestion is analogous to the digestion by means of pepsin in the animal kingdom.

In an article in volume XII. of *Acta Horti Petropolitani* he further discusses the subject and draws the following conclusions:

1. The disintegration of albuminous compounds by the secretions of carnivorous plants is due to the growth of micro-organisms, principally bacteria.

2. Micro-organisms possessing the power of dissolving albuminous compounds always vegetate in the secretions of completely developed carnivorous plants.

3. The disintegration of the albumen does not commence at the moment of the secretion of the fluid, but only after micro-organisms have developed in sufficient numbers in the secretion.

4. The micro-organisms found on the leaves of carnivorous plants come principally from the air, though they may be derived from other sources.

5. The name "carnivorous" plants is to be understood in the sense that the plants only assimilate the products which the lower organisms have set free.

6. The role of the plant itself is only to furnish a medium in which certain micro-organisms may live and develop.

Production of the Perfume of Flowers.—The following conclusions are the result of the researches of Mr. E. Mesnard upon the method of production of the perfume of flowers:

1. The essential oil is generally found localized in the epidermic cells of the upper surface of the petals or sepals. It may exist on the two surfaces, especially if the floral parts are completely concealed in the bud. The lower surface generally contains tannin or pigments derived therefrom.

2. The chlorophyl seems in all cases to give rise to the essential oil.

3. The disengagement of the perfume of the flower is perceived only when the essential oil is sufficiently disengaged from the intermediate products that have given rise to it, and is found, in a manner, in a ratio inverse to the production of tannin and pigments in the flower.

This, says the author, would explain: (*a*) Why flowers with green petals have no odor; (*b*) why white or rose-colored flowers are, in most cases, odoriferous; (*c*) why the Compositæ, which are rich in tannin, have the disagreeable odor that they are so well known to possess; and (*d*) finally, why the cultivated white lilac and forced roses take on a finer perfume.

A New Preservative Fluid for Slugs.—After repeated trials to obtain a good preservative fluid for slugs, I have found the following to act so admirably in preserving the color, etc., that I think it would be well to place it on record, so that others may benefit by its use. Dissolve 10 grains of alum, 2½ grains of common salt, 1½ grains of potassium nitrate, 2 grains of arsenious acid and 2 grains of mercuric chloride in 5 ounces of distilled water, and filter. After well cleansing the slugs from mucus, I place them in tubes containing the above solution, and well seal with a mixture of five parts of *old* gutta-percha and four of asphalt applied hot, and obtain the best results.—*J. W. Williams, in Science Gossip.*

Preservation of Specimens of Fishes.—Up to recent years, the method of preservation most usually recommended to travelers for ichthyological collections, and, consequently, that most usually employed, has been the use of alcohol. But the numerous inconveniences that it presents, especially the generally high price of it at the proper degree of concentration, and the maneuvers that the use of it requires, are tending more and more to cause it to be renounced. Such renunciation is so much the more to be desired in that there can be recommended with confidence the use of a substance experimented with in his laboratory as long ago as 1884, by Mr. Leon Vaillant, professor of ichthyology at the museum, and also involuntarily by Mr. Chaffanjon, who, a few years ago, brought from the Orinoco a magnificent series of fishes. It is a solution of acetate of soda, which is used in the same way as fishermen use salt in the preservation of the codfish. In any sort of a vessel is spread a layer of the acetate, upon which are placed the fishes to be preserved. These are covered with another layer, upon which is placed a second layer of fish, and so on. This is all there is of the preparation. Prince Henri d'Orleans recently brought home a small collection of fish from Indo-China that had been prepared in this way. They arrived in a perfect state of preservation.

Flower Seeds for July.

In an article in the *American Agriculturist*, entitled "Flower Seeds to be Sown in July," Mr. C. L. Allen writes that if seeds of the perennial Delphiniums are now sown and protected from drying winds by lattice frames or light boughs, they will germinate quickly and make plants strong enough to withstand the winter. Pansy seed for autumn flowering might now be sown, although this will also need protection against the sun. If carried over in a frame during winter, the plants will be in the best possible condition for early spring flowering. The seed of the Oriental poppy should be sown as soon as they ripen, for they lose their vitality very quickly. The seedlings are difficult to transplant, and it is a good plan, therefore, to sow the seed where the plants are to remain, preferably among annuals, where the ground is not densely covered, as they root deeply, and the shade of the annuals will be rather a help than a hindrance to their growth. If hollyhock seeds are sown as soon as they are ripe in deep rich soil, the plants will bloom next year. All the Dianthus family, including hardy carnations and picotees, can be had in perfection next season if the seed is sown this month and the seedlings transferred when two inches high to the places where they are to bloom. Mignonette from seed now sown will make an admirable growth in the cool moist weather of September, and will give strong spikes of flowers in autumn. The seed of the white rocket candytuft sown this month will also make flowering plants in September, which will continue to bloom until frost.