

PRINTING BY X RAYS.

Dr. Frederick Strange Kolle, in the last number of *The Electrical Engineer*, publishes a description of the "new process of printing by the use of X rays," which opens up what he claims to be a feasible method of producing an immense number of impressions or records. Dr. Kolle states that printing by the use of X rays was, perhaps, first suggested by an article by Elihu Thomson in 1896, wherein he showed that multiple radiographs had been made at one exposure; these were called multiple skiagraphs. The experiment proved that more than a single sheet of sensitized paper would be affected by the rays when laid one upon the other, setting aside the theory that the chemical composition of one sensitized film would absorb most of the rays. Owing to the thin sensitized films of the printing paper, very unsatisfactory skiagraphs were obtained. Dr. Kolle now declares that he has overcome these difficulties and that the process of typo-radiography is not a theoretical dream, but is a self-evident and systematic method of procedure. In regard to the practicability of this process, it may be said to overcome first the cost of labor of composition, secondly, the limited time of striking off copies, and thirdly, the advantage of keeping the entire work a total secret from the printer, a very valuable fact not to be overlooked in diplomatic documents, letters, communications, etc. Dr. Kolle finds a suitable writing ink for this purpose to be composed of red lead, powdered gum arabic, glycerine, and water. For type work a semifluid mixture of red lead, potassium bromide, and glycerine sufficient to make a paste would be necessary.

These inks will, however, only permit of white text on a black background unless certain photographic methods are followed, as in the employment of "upset developers," therefore, a second or "unfatty" ink, which will permit of black characters on a white background, must be used. These are made preferably of bichromated mucilage. Bichromated mucilage which has not been exposed to light previous to its use in order that its non-adherent property may be retained, is suggested for the writing. The fatty ink then applied with a roller will adhere to the unwritten portions of the paper, leaving the letters uncovered or free for the penetration of the X rays. The third method of preparing the phototype is to print or write a text with an adhesive or mucilaginous ink composed of a tacky varnish or gum and then dusting it over with some opaque metallic powder such as mercury binoxide, zinc oxide or lead oxide. The copy would then have to be blown off to render the characters clear cut and the unused space free from mottling opacities resulting from retained dust.

After the copy is prepared, the sensitive paper on which it is to be printed is made into what Dr. Kolle calls a "senso-block" which contains fifty to one hundred sheets. It is then mounted or clamped into a form, the sensitized side upon which the copy or phototype is laid facing up, and it is thus subjected to the action of the X rays. The current is then turned on for an exposure of ten or twelve seconds, and the block taken to a dark room to be developed. Twenty blocks each containing fifty sheets of paper might be arranged around one X ray tube to give one thousand impressions every ten seconds of exposure. This would give about six thousand copies a minute. Prof. Kolle suggests that special gelatino-bromitized films be used and after being photographed to form a block should be made so that it will still retain the features of a single sheet.

The process is extremely interesting, and though it is not regarded as a menace to printing, at the same time there is, unquestionably, a field for the X ray printing establishment which may only require intelligent development to bring it within the domain of the working arts.

CIVIL ENGINEERS IN SESSION.

The forty-sixth annual meeting of the American Society of Civil Engineers was begun on January 18, at the Society's building, West Fifty-seventh Street, New York. President Alphonse Fteley occupied the chair. The meeting was for three days, and during it excursions were made to a number of interesting engineering works and establishments in the vicinity of New York. Mr. Willard Smith, of Chicago, who has been appointed to supervise the engineering exhibit from the United States at the Paris Exposition, spoke on that subject. He stated that 13,000 feet of the building already constructed had been given to the American exhibit in this department and that additional space would be found in the United States Weather Bureau Building. Mr. Smith recommended that there should be a plentiful exhibit of models, and he named, as among those which he thought would be of unusual interest and value, models of American cities. These show the real situation in reference to harbors, railways, plans of streets, intramural communication and in general the larger features of the city. Mr. Smith said one of the disadvantages in which the engineering products and achievements of the United States suffered is being comparatively remote from

European countries. Hence the special value of the opportunity offered to Americans by an exhibition such as that at Paris. The course of action by the Society was referred to the Board of Directors.

THE PIRATES AND BRIGANDS OF THE PHILIPPINES.

BY SPECIAL CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

The brigands and pirates which infest the islands of the Philippines and the adjacent waters have, from time immemorial, been regarded as among the most desperate freebooters to be found in any part of the world. The inhabitants of these islands are composed of many different tribes and mixed races. The races or tribes are somewhat different on all the larger islands, and on every one of these there are tribes that never knew the rule of Spain. On these islands there are no less than seventeen pagan and half a dozen Mohammedan tribes. Luzon, Mindanao, Cebu, Negros, Mindoro, and a dozen other islands all have their lawless freebooters, the remnant of some native tribe.

To get a correct idea of the great bands of lawless natives who infest these islands, it will be necessary to go back to a date much earlier than the beginning of Spanish rule in these islands. Prior to the coming of Magellan, these islands had already suffered several foreign invasions. But these were peaceful ones. Away back in early ages, the Chinese or Inglothes sought these islands in great numbers, and their coming proved of much good to the islands. They had industrious ways and soon imprinted these upon these islands, Luzon in particular. Later, the Indian or Tagal invasion occurred, and these, like the Chinese, were soon absorbed in the population of these islands. Thus were made up the three early races in these islands, to which all tribes can be traced. These are the Negrote, Ingrote, and Tagal. The Negrote was the aboriginal race, and in many of the races the Negrote can yet be found. In nearly all cases the pirates and brigands are made up of these fierce tribes. The Tagal is, to-day, regarded as the real native of the Philippines. This tribe is the only one of the early races which, at this day, can be considered a factor in the islands.

Until a comparatively late day these islands have been the center of piracy. For more than three centuries Spain has been fighting to get rid of the pirates and subdue the native brigands, but without success; for many whole islands have practically always been independent of Spanish rule, while many tribes on the larger islands were also independent. On Luzon, Mindanao, Negros, Panay, Zebu, Leyte, Bohol, Samar, and Mindoro there are as many different tribes as there are islands.

In the earlier years of Spanish rule, the Tagals and Visayas gave the conquerors no end of trouble, and no sooner had these tribes been subdued than the Mores, in the south, began lawless operations. From that time to this, they have carried on their lawlessness, and have never been subdued. The Chinese pirates, in earlier days, also gave the Spanish much trouble. They captured a number of smaller towns along the coast, and even made attempts to capture Manila during the sixteenth and seventeenth centuries.

In the island of Sulu, Mohammedanism is particularly strong, and the sultans of the islands have, from time to time, given the Spanish rulers much trouble; but some years ago their power was broken. During the sixteenth century, the Mohammedan tribes were particularly strong on the islands of Mindanao, Palawan, Tawi Tawi, and Basilan. But the pirates of Mindanao have always been the most troublesome. The Mores still inhabit the islands, and live entirely independent of any outside rule.

The Mores are a peculiar tribe, which originally came from the surrounding islands and mixed with the native tribes of Mindanao. The Mores are the most warlike people of the islands and are a powerful race. They regard all foreigners as their enemies. This is probably due to the bad treatment they have received at the hands of the Spaniards. Most of the Mores are well organized and well equipped. The barong is a terrible weapon, and with it an expert tribesman can cut a man in half at a single blow.

The peculiar native crafts, so common on the rivers and harbors of these islands, are particularly adapted to the use of the pirates. They are long, narrow, and sharp at both ends and the natives are very skillful in handling them. They carry large sails and have outriggers to prevent the boat from capsizing. Before the days of steam navigation these crafts were easily able to avoid pursuing parties.

The brigands of these islands are no less notorious than the pirates, and while the latter are pursuing their lawless calling along the coast, the former are carrying on their system of plunder in the interior. Every island has its lawless tribes which never knew Spanish rule. These native brigands were in many cases led by the charm men, who, even to this day, are found among the native tribes.

Probably the most noted brigands of the islands are the Maccabebes, who are found on a number of the larger islands. The Maccabebes know no law save their own. They have no connection, whatever, with the

insurgents, and natives and Spanish alike fall before this murderous gang. The Chinese are the particular mark of the Maccabebes, and scarcely a night passes but what some Chinaman is killed. Already our authorities have begun the work of breaking up the Maccabebes, and quite a number of the gang here in Manila have been executed. But this is only the beginning of the trouble with the wild tribes and the lawless bands of the Philippines.

THE GREAT STRENGTH OF BEARS.

The strength of grizzly bears is almost beyond belief, says a hunter, in *Public Opinion*. I have read about the powerful muscles in the arms of African gorillas, but none compared with those in the arms and shoulders of big grizzly bears. I have seen a grizzly bear with one forepaw shot into uselessness pull its own 1,100 pounds of meat and bone up precipices, and perform feats of muscle that trained athletes could not do. I have seen grizzly bears carrying the carcasses of pigs that must have weighed seventy pounds several miles across a mountain side to their lairs, and I have heard hunters tell of having seen cows knocked down as if by a thunderbolt with one blow from the forepaw of a bear. Three summers ago I spent the season in the coast mountains, near Hudson's Bay, and one moonlight night I saw a big grizzly bear in the act of carrying a dead cow home to her cub. I had a position on the mountain side where I could see every movement of the bear in the sparsely timbered valley below me. The creature carried the dead cow in her forepaws for at least three miles, across jagged, sharp rocks ten feet high, over fallen logs, around the rocky mountain sides, where even a jackass could not get a foothold, to a narrow trail up the steep mountain. She never stopped to rest a moment, but went right along. I followed, and just about half a mile from the beast's lair I laid her low. The heifer weighed at least 200 pounds and the bear about 450.

THE PROGRESS OF THE ZOOLOGICAL GARDEN.

The Board of Managers of the New York Zoological Society held their annual meeting on January 17. The chairman of the executive committee reported that \$16,977 had been expended on the works for the installation of the animals at Bronx Park, work on thirteen structures being under way. These will cost, when completed, about \$83,000.

One of the most important buildings which is now going up is the reptile house, which is, perhaps, the most perfect building for the purpose ever built. It is 145 x 100 feet, and will cost about \$40,000. It presents an arched central hall, without columns, and it will include a crocodile pool, sand pile, and a conservatory of thick vegetation, and will provide room for the various serpents, saurians, frogs, turtles, lizards, etc.

The elk house is nearly finished, and excavations for some of the bear dens have been completed. Various other works have been carried on, such as the construction of duck ponds, with three islands, and a stone wall about the home of the prairie dogs. Excavations for the stone walls of the wolf and fox dens have also been made, as well as for the beaver pond and buffalo house.

DEATH OF THE LIBRARIAN OF CONGRESS.

Mr. John Russell Young, Librarian of Congress, died at his home in Washington, January 17, 1899. Mr. Young was born fifty-eight years ago, at Downingtown, Pa. When a young man he was employed on *The Philadelphia Press*, and served during the civil war as a correspondent in Virginia and afterward on the Red River expedition with General Banks. After the war he was connected with various newspapers in Philadelphia and New York, including the *Tribune* and *Herald*. In 1877 he accompanied Ex-President Grant on his trip around the world. He was Minister to China during 1882-1885. President McKinley appointed him to the office of the Librarian of Congress in the summer of 1897, to succeed Mr. A. R. Spofford, who became his assistant. Under Mr. Young's excellent executive management the library has proved much more valuable to readers than ever before.

BOSTON ELEVATED ROAD.

Ground has been finally broken on Boston's new elevated road, which will connect two widely separated districts, and, most important of all, unite the two new Union stations. The road will begin at Sullivan Square, in the Bunker Hill district, and will then proceed down Main Street, across the Charles River, until the North Union Station is reached. Then, after making a turn, will run along Atlantic Avenue and finally reach the new South Union Station, after which it will continue up Washington Street until Dudley Street is reached. The entire distance from Sullivan Square to Dudley Street, which is in the Roxbury district, will be about 10 miles. Of course the subway will really form a portion of the line. Electricity will be used as a motor power; a third rail will be used. Branch lines to other suburbs will be built later on. It is expected the work will be completed in about two years.