Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

C. D. MUNN. S. H. WALES. A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York.
☞ "The New York News Company," 8 Spruce street, New York.
☞ Messrs. Sampson, Low, Son & Marston, Crown Building, 188 Fleet st. Trubner & Co., 60 Paternoster Row, and Gordon & Gotch, 121 Holborn Hill, London, are the Agents to receive European subscriptions. Orders sent to them will be promptly attended to.

VOL. XXIII., No. 16 . . [NEW SERIES.] . . *Twenty-fifth Year.*

NEW YORK, SATURDAY, OCTOBER 15, 1870.

Contents:

(Illustrated articles are marked with an asterisk.)

CENTRAL PARK, NEW YORK---REPORT OF THE COMMISSIONERS.

The report of the Central Park Commissioners for 1869 has but just made its appearance. We are, however, compensated for the delay by the fullness of the report. The book, which is in pamphlet form, comprises some two hundred pages of valuable statistics, and other matter, and is illustrated with a number of photographs and lithographs. The lithographs illustrate the work of Professor Hawkins, who has been, as our readers are already informed, engaged in modeling a group of fossil animals for the Museum, and the meterological instruments, improved and invented by Mr. Daniel Draper, and used in his observations, are given at length for the year in the report. The photographs are chiefly scenes and statuary in and about the Park.

From the body of the report we are enabled to extract some items of general interest.

THE MUSEUM.

As a beginning of this collection, intended to ultimately be made equal to any in the world, the Commissioners have purchased

1st. The entire collection of the late Prince Maximilian, known as the Weid Collection, comprising 4,000 mounted birds, 600 mounted mammals, 2,000 fishes and reptiles.

2d. Selections from the Verreau collection at Paris, 2,800 mounted birds, 230 mounted mammals, 400 skeletons.

3d. The entire collection of American and foreign birds, about 2,500 in number, lately belonging to D. F. Elliott, Esq.

4th. A series of 250 birds of Siberia, purchased from Monseiur Vedray, in Paris.

This purchase, comprehending in all 12,770 specimens, as follows: Mounted birds, 9,550; mounted mammals, 820; fishes and reptiles, 2,000; skeletons, 400.

The details of the conditions upon which these collections are to be deposited with the Park Commissioners have not yet been entirely settled, but it is believed they will be such as to be satisfactory to all the parties concerned, and greatly to the public advantage. It is important that the conditions be carefully devised, to provide for all probable contingencies, to protect the property, to keep alive and extend the interest of the donors, and to serve as a precedent for those interested in other branches of art and science who may be disposed to make like arrangements.

Prof. B. Waterhouse Hawkins has been engaged in advancing the group of fossil animals, more fully alluded to in the last Annual Report. A very wide interest, both in this country and in Europe, has been excited among scientific men by this interesting and novel undertaking. The proceedings of the Commissioners of the Park in this matter have been alluded to, commented upon, and commended by scientific journals, both at home and abroad.

It would be difficult to insure too great care in the preservation of the wonderful remains of animal organizations of past times that are from time to time discovered in different parts of the country. There are examples of fossil remains lying in public and private collections of the country, that in the interest of science, should be utilized and placed where they can readily be got at by those especially interested in this department of inquiry. It is very difficult, except through the offer of a reward in money, to impress upon those who, in excavation, casually come upon fossil remains, the importance of handling them with care; they are often, to them, nothing but old bones, and a stroke of the pick, or a scoop of the shovel may, in an instant, irrevocably destroy or cast away a fragment that might serve to establish or refute received ideas of the past eras of our globe.

The great group of ancient animals formerly living during the secondary geological epoch on the continent of America, now being modeled and restored to the natural size and appearance of the animal as in life, by Mr. Hawkins, for the Central Park, consists of the gigantic Hadrosaurus of the exact dimensions (one twenty-six feet, and the other thirty-nine feet long), as proved by the fossils described by Dr. Joseph Leidy, in the "Smithsonian Contributions to Knowledge, No. 192"; also models of "Laelap's Aquilunguis" fossils, described by Cope, together with the aquatic "*Elasmosaurus* and *Mosasaurus*." The second division of the group will illustrate the post-tertiary period, and represents the mastodon, the mammoth, megatherium, megalouyx, glyptodon, etc., etc., thus uniting the early periods of animal life with the earliest evidence of man's existence, and so constituting a complete visual history of the American continent from the dawn of creation to the present time.

THE ZOOLOGICAL GARDENS.

The progress reported in the zoological gardens has not been great, owing to want of proper drainage, insufficient housing for animals, and delay in regulation of streets and avenues about the grounds. It will probably be a year before this feature of the Park reaches completion. The commissioners having no control over the difficulties specified are obliged to wait the movements of others. They report, however, that

Nearly two thirds of the foundation wall is, on the west line of the square, complete. The preparatory excavations of the habitations of the large group of northern carnivora represented by the genus *Ursus*, or the bears, with their allied genera, has been made at the southwest angle of the Zoological grounds. At this point are also commenced the accommodations for the polar bears, the walrus, seals, sea lions, etc., specimens of cetacious, and also for the aquatic rodents, such as capybare, beaver, etc. In these, as in all other habitations for the animals of the gardens, every arrangement that will conduce to their healthfulness, and to the facility and convenience of observing them, will be provided, and it is hoped that in the outset the knowledge of the needs of various classes of auimals may be so thorough, and the skill in utilizing this knowledge for the purposes required may be so marked and successful, as to avoid much of the expensive alterations and changes in plan that have characterized, during the last half century, the experiences of most of the European gardens, and that by the time these habitations are ready for occupancy, some of the ways of approach to the gardens may be passable. Some progress has also been made in the preparation of designs and models for the houses of tropical carnivora, and each class of animals, in the order of its relative importance, will be located and properly housed and provided for.

METEOROLOGICAL OBSERVATORY.

This employs the self-registering apparatus above referred to, a portion of which was invented by Mr. Daniel Draper, and the rest improved from European instruments by the same gentleman, and by which, to use the language of the report, "the weather each day leaves, by its own action, an enduring picture of itself, complete and accurate, presenting a marked contrast to the ordinary methods of weather observation. The records of the observatory frequently sought for to determine legal controversies, are given weekly to the newspapers for publication, and are forwarded to kindred institutions."

The report is a well-written and comprehensive document, and the favored few who are able to obtain copies of it, will doubtless read it with interest throughout. The Commissioners are entitled to great praise for the vigorous and judicious manner in which they have discharged and are discharging their duties, and the additions they are constantly making to the chief attraction of our great metropolis.

WOODBURY'S PHOTO-RELIEF PROCESS.

A few years since Mr. Woodbury explained to us in Paris his famous process for obtaining pictures by copying negatives with gelatin and transferring the print to soft metal. Since that time he has made some improvements, and we give below the whole method as witnessed by ourselves, and as described in some of the photographic journals.

A film of gelatin rendered sensitive by bichromate of potash is exposed in a common printing frame to the action of the sun or electric light. Where the light acts, the gelatin is rendered insoluble, where it does not penetrate, the gelatin remains soluble. If, therefore, the film of the exposure be put into warm water, the parts acted upon by light will be dissolved out, and the other portions will remain to form a picture in relief.

This gelatin picture is laid upon a steel plate, then covered with a plate of type metal, and subjected to pressure under a small hydraulic press. The raised parts of the gelatin film are forced into the soft metal, thus giving a picture with the lights and shadows reversed.

Upon this metallic *cliché* is poured a hot mixture of gelatin with some coloring substance, a sheet of well-sized paper is then laid on, and the whole is well pressed together. As soon as the gelatin is cool, the impression is done.

In order to render the impression permanent it is immersed in a solution of alum or of tannin—it would otherwise be soluble in water.

This is the outline of the process, and we come now to speak of the details.

A glass plate is greased and covered with a hot solution of gelatin containing some pigment and bichromate of potash. After drying, the film is covered with a thick layer of paper collodion. It is then removed from the glass, and kept on a portfolio until wanted. The greasing of the glass facilitates the removal of the gelatin. The film is quite black, and as thick as pasteboard. The coloring matter is added to aid in following the development of the picture, and the collodion serves as a support to the film.

The gelatin sheet thus prepared is laid in a printing frame, with the collodion side in contact with the negative. It is then exposed either to the sun or a powerful electric light. The length of exposure is half an hour in the sunlight, and two to four hours in electric light. The sunlight is preferable because the rays are parallel and more powerful. The electro-magnetic apparatus consists of fifty horseshoe magnets, and the helices are propelled by a steam engine of six-horse power.

Usually six printing frames are simultaneously exposed at a distance of a few feet. A large sheet of white paper serves as a reflector. The light is evolved between two carbon pencils which are connected with the magnetic-electro machine, and is so uniform, that, with a little experience, the duration of the exposure can be estimated by the appearance of the negatives. A glass plate is covered with a solution of india-rubber in benzine. The exposed sheet with the collodion side down is pressed upon it (to prevent the curling up of the film in water), and the plate is laid in warm water, and the water is renewed from time to time. The development requires considerable time, often twenty-four hours. The coloring matter dissolves in the places where the gelatin has remained soluble, and finally leaves a clear picture. The print is then taken from the water, removed from the glass plate, and dried. It forms a beautiful transparency, and is a true picture in relief, in which the deepest shades possess the original thickness of the gelatin film.

This gelatin relief is pressed into a metal plate in a similar manner to nature printing. It is laid upon a hard steel plate and covered with a sheet composed of antimony and lead ¼ of an inch thick. It is then exposed for five minutes to a pressure of half an tun to a cubic centimeter in an hydraulic press, by which a sharp impression is obtained on the soft metal without the least spreading or injury of the gelatin film.

The *cliché* is cut with a saw, and made ready for the printing press. It is carried to a room where there are a number of large revolving tables, on each one of which there are six presses. There is one workman for every table, who is provided with a pot of dark-colored gelatin kept hot in a little stove.

The *cliché* is put entirely horizontal into the press, which is simply an iron box with a metallic cover. Some of the colored gelatin is poured upon the middle of the *cliché*, the cover put on, and the table revolved until the second press is before the printer. By the time the sixth press has been reached, the picture in the first press is ready for removal. A skilled printer can take forty impressions in an hour.

The paper is rendered water-tight by lac, and is then well glazed. After each print the *cliché* is wiped off with an oily rag to remove any adhering color. The gelatin must harden in the press; the print is laid upon a table until it is entirely dry and hard. The margin of gelatin squeezed out by the press is cut off and thrown into the glue pot to be used again. The color improves by use. Finally, the prints are immersed in a solution of alum, then washed, dried, and cut ready for mounting.

Mr. Woodbury has made some further improvements by which he can use fatty inks the same as with copperplate engraving.

Electrotypes can also be taken of the *clichés*, and this is one of the most important applications of the process, as it admits of taking photographs of all manner of natural objects, of copying them in gelatin and of obtaining electrotypes for printing in the usual way. Prints in gelatin and color have the great advantage over ordinary photographs of being much more permanent—they are as unfading as any steel engraving, and are very rapid of execution.

We are glad to know that the inventor, who has been indefatigable in his efforts to perfect his process, is now beginning to reap the rewards of his labor.

THE GATLING BATTERY GUN IN ENGLAND.

The trial of the "Gatling Battery Gun" at Shoeburyuess, has given the British authorities a very favorable impression of its formidable character. The small Gatling gun of forty-two one hundredths of an inch caliber was tried first. This gun has ten steel rifled barrels, and is made of any proper caliber to suit the musket cartridges used by different governments. It was fired at the high rate of about 350 shots a minute. The one-inch gun was tested next. This is the third or largest gun of the system, and is made with six, sometimes with ten, barrels, and discharges solid lead balls half a pound in weight. It also uses a canister cartridge which contains sixteen balls. It also discharges explosive balls with great effect. At this test it discharged 255 half-pound balls in one minute and eighteen seconds, and riddled the target at 1,400 yards. On the same day the small gun (No. 1) was again discharged at 1,400 yards, and made an excellent target, firing about 375 shots a minute. It was also fired at dummies representing a company front, on uneven ground, the men being disposed in irregular order. There were 136 dummies, representing men, 99 of whom would have been killed. The average hits were four in each man.

Subsequently, the small gun was again fired at various ranges from 1,200 down to 400 yards at targets and at dummies. The firing was at about the same rate and speed as before, making the same targets and producing the like destructive effect among the dummies. All on the ground seemed to agree that they had seen the operation of a weapon of unprecedented power.

Our readers will be interested in the history of this remarkable gun, from the pen of Mr. Gatling himself.

A man is entitled to the fruits of his labor, and to assert a just claim is a duty as well as a right. In the year 1861, I