only, without the necessity of retouching or masking, could not be sustained.

One of the cheapest processes of chromo-photography is that of printing from half-tone relief blocks. Several examples by this method were shown in the exhibition. The blocks may be made from different negatives, representing the different colors, as in other processes; or they can all be made from a single negative, afterwards cutting away certain portions corresponding to the colors not required in that particular block.

THE EGG-PLANT.

THE egg-plant seems to have received little systematic attention, either from gardeners or students. Yet it is an important and interesting plant, and there are indications that it can be considerably modified by treatment. This is clearly shown by the results of studies and experiments made at the Cornell University Agricultural Experiment Station, by L. H. Bailey and W. H. Munson, and given in detail in Bulletin No. 26 of that station. Their studies of the egg-plant began five or six years ago, but three years were consumed in learning how to grow it. During the last two years they have grown all the varieties procurable in this country, in France, and in Japan.

The chief difficulty in growing the egg-plant in the North is the shortness of the seasons. It is only by starting plants early and maintaining a vigorous growth that the large sorts can be fruited satisfactorily. The plants should be started under glass from the middle of March to the middle of April in a warm house. The chief cause of failure during the early experiments was the lack of a good forcing house. In the cold and small house at the disposal of the experimenters the plants grew slowly, and when set out of doors they were not of sufficient size and vigor to begin bearing at once. The seed is sown in "flats" or boxes, and when the first true leaves are about half an inch in diameter — which is about a month after the seed is sown — the plants are pricked off into two-inch pots. As soon as the pots are filled with roots, the plants are shifted into four-inch pots. Indifferent success was met with in transplanting into other flats, as the plant is most severely checked when placed in the field, from the greater injury to the roots. It is imperative that the plants should not become "drawn." The plants are transferred from the four-inch pots to the garden from the first to the middle of June. The early sorts are not so seriously injured by a check in growth as the large and late sorts, and they can therefore be handled with less care. These sorts can be started two weeks later than the others and receive but one transplanting. The effects of early and late setting are shown in the following experiment.

Seeds of several varieties were sown March 27 and May 15. On the 7th of September they presented the following differences: long purple, giant round purple, and long white from early sowing were productive, but few or no fruits had formed on the plants from late sowing. Early long purple and round white from the late sowing were fully as productive as those from the early sowing. Early dwarf purple gave best results from plants started April 15. This shows that there is little or no gain in productiveness in the small early sorts from very early sowing, while the large sorts profit by it. The black Pekin, which is one of the large varieties, proved an apparent exception, however. Plants started May 1 gave better results than those started earlier, but neither lot was satisfactory. The unsatisfactory results from the early sowing may have been due to the loss of the first flowers because of the transplanting. Transplanting usually has the effect of keeping plants growing, to the detriment of the flowers; and egg-plants which are in bloom when removed to the field are apt to drop the flowers. It is important in the large sorts to induce the first flowers to set.

The best soil for egg-plants is a heavily manured rich sandy loam, — not too light, — which contains an abundance of humus and retains moisture. The large kinds were set three feet apart each way, although they can be set somewhat closer if land is very valuable. The ground should be thoroughly cultivated throughout the season. The patches were run through lightly with the cultivator at least twice a week.

The worst enemy of the egg-plant is the potato beetle, which prefers egg-plants to potatoes. The egg-plant grows slowly, and any injury to the young plant is overcome with difficulty, if at all. If the plants are seriously injured when first set out there will be little use in attempting to fruit them, especially the large kinds. Paris green, one pound to 100 gallons of water, is used for spraying.

It is rare that all the plants in a large plantation of the common or late varieties mature fruit, and such kinds as black Pekin, New York, and giant round purple rarely mature more than two large fruits to the plant in the latitude of the station, and often only one. The early dwarf purple, early long purple, and other early and medium varieties, mature from four to eight fruits without difficulty. The value of any of the late varieties depends very largely upon the uniformity with which all the plants in any lot set and mature fruit. The value of continuous and careful selection to this end was illustrated in the behavior of a large plantation of crosses last year, in which a large percentage of the plants were entirely unfruitful, showing that a promiscuous lot of seedlings is likely to be unproductive; and in this case these were crosses between productive parents. Breeding plants of uniform productiveness is the most important field in egg-plant experimentation at present.

The results of the experiments may be summed up as follows: (1) Egg-plants are adapted to cultivation in the North. The requisites of success in growing them are these: early starting; warm quarters; vigorous plants; rather late transplanting to the field; warm, rich, and rather moist soil; constant attention to potato beetles; frequent cultivation. (2) The best varieties for private use are early dwarf purple, early long purple, white Chinese, with perhaps black Pekin for late. (3) The best market varieties are New York improved and black Pekin, with perhaps early long purple for the first demands. (4) In crossing different races of egg-plants, the purple-fruited types appear to be stronger in their power to transmit color to offspring than do the white-fruited types; and this appears to hold whether the purple type is used as the staminate or the pistillate parent. (5) The white-fruited types appear stronger in the power to transmit form and productiveness. (6) Fewer seeds are produced by flowers artificially pollinated than by those left to mature, even though an excess of pollen is used. (7) It is probable that the egg-plant may be included among those plants which are capable of producing fruit without the aid of pollen.

As some of the neglect of the egg-plant is doubtless due to the fact that cooks are not familiar with it, the following recipes for cooking the fruits are recommended by the experimenters at Cornell as reliable. (1) Cut in slices crosswise, not over a half inch thick, and parboil in salt water about fifteen minutes; then remove, and fry in a hot spider in butter and lard. (2) Cut into slices a quarter or a half inch thick and lay in strong brine for two hours; then wash very thoroughly; sprinkle with brown sugar, pepper, and salt, and fry slowly to a dark brown. (3) Cut in two lengthwise, remove the seeds and pulp, and fill with dressing made of half a teacupful of bread crumbs, one teaspoonful of butter, and salt and pepper to taste; lay the halves side to side in a dripping pan, add a little water, and bake nearly an hour. (4) Pare, cut in thin slices crosswise, and soak in salt water for eight or ten hours; dry on a towel, dip in beaten egg, and roll in bread crumbs, then fry slowly in hot butter until the pieces become a rich brown; serve hot.

THE LOCUST PLAGUE IN ALGERIA.[1]

ON the 13th of May last I was travelling with my husband through eastern Algeria. At six o'clock on a lovely summer's morning we had taken the train from Algiers, making our way along the shores of one of the most beautiful bays in the world, its blue waters shining in the early sunlight beneath the wooded heights of Mustapha, studded with its white Arab villas. We had left behind us the Maison Carrée, where Cardinal Lavigérie's Pères Blancs make the best of both worlds in manufacturing excellent wines, and in preparing for their life of self-denial in the Sa-

[1] Evelyn Frances Bodley in the Contemporary Review for June, 1891.

hara. By nine o'clock we had reached Ménerville, where the fertile plain of Métidja ends, and the mountain country of the Kabyles begins. We were toiling up a steep ascent, when the order was given for all the passengers to alight. There had been a landslip, making the passage of a viaduct dangerous, so we had to get out and walk across it while the train cautiously followed us. Suddenly a cry was raised: "*Voilà, les sauterelles,*" and there before us, in the transparent air, looking like a summer snowstorm, we saw approaching a dancing cloud of winged particles. It was the advance guard of the dreaded locust army marching on Algiers.

For weeks nothing had been talked about in the neighborhood of my old home but "*les sauterelles.*" Everybody, French, English, or Arab, who owned a vineyard, or even a garden, was calculating the chances of the approach of the invading scourge, sometimes in a manner not intelligible to strangers. There was a lady not long arrived from England, whose knowledge of French was limited, and who asked me: "Who are these people, the Sauterelles, of whom every one is talking, but whom I have not yet met?" The day before starting on our journey I had been present at a wedding at one of the loveliest villas in Mustapha, to which the governor-general, Monsieur Jules Cambon, had come, on the very morrow of his arrival, to show his regard for his English friend, the bridegroom. When it was rumored that his excellency had accepted the invitation, all the well-informed declared that the new governor could not possibly be fulfilling social duties, when the locusts had appeared at St. Pierre-St. Paul, thirty-five kilometres distant from the capital. As a matter of fact, Monsieur Cambon, with the energy which characterizes that most amiable and distinguished Frenchman, after assisting at the wedding, set out, twenty-four hours later, on a tour of inspection of the ravaged districts, and I only mention this incident to show how the advance of the locusts was the sole absorbing topic of the hour in Algeria.

Here at last we were face to face with, or rather surrounded on all sides by, the devastating hordes. The railway crawls up the Kabyle hill country, through a succession of gorges, interrupted here and there by a tunnel, and sometimes the line skirts the cliff-side, hanging on a terraced ledge over a rushing river of the color of *café au lait.* The mountain defiles are thick with the flight of rushing insect life, but here in these barren passes there is nothing for them to prey upon, only a tuft of cactus here and there perched on the side of a torrent, or a solitary cluster of acanthus. But now the hills recede, and we are once more in the fruitful plains. How can I describe the glories of early summer in Algeria? English tourists come in the winter, and leave in the spring, taking away an impression of rare hours of sunshine, scattered among days of storm, and of scirocco, and sometimes, as this year, of snow; but it is in May that the full beauty of northern Africa comes forth in its wealth of flowers. We were now passing through a valley bounded by majestic snow-crowned heights, which appeared literally to be carpeted with a luxuriant growth of gorgeously tinted flowers — yellow marguerites, white and pink cistus, scarlet poppies, purple orchids, crimson gladiolus, and blue convolvulus — and sailing above this gay ribbon border of the fresh green of the vineyards, sped along the fluttering host of locusts, farther in all directions than the eye could reach. It seemed like a never-ending swarm of bees, bees as large indeed almost as skylarks, or at all events as humming-birds, but instead of bringing with it the proverbial luck of "a swarm of bees in May," it was carrying in its wake ruin and despair to the Mussulmans of the soil and their Christian conquerors.

It is popularly supposed that the locusts eat their way from place to place, and that the whole region through which a flight of them has passed is left devastated and bare. We saw no trace of the passage of the plague on our way, and, as a matter of fact, the locusts in their progress do comparatively little harm. The mischief is done when they settle and lay their eggs, which, when hatched, bring forth myriads of young — "*les criquets,*" and it is they which eat up the land. . . . It is difficult without seeming to exaggerate, to attempt any estimate of the countless myriads of *criquets* which are produced by the *sauterelles.* I will only mention one example, which may afford some idea of their numbers. In one commune alone during the last two months the weekly destruction of eggs has amounted to from eighteen to twenty millions.

Some years ago, when I was very little, I remember seeing a flight of locusts on the Mediterranean as we neared the coast of Algeria on the voyage from Marseilles. My childish recollection of it was that in the distance we saw a dense cloud approaching, and that when the ship passed through it, we seemed to be enveloped in a London fog for the space of several minutes. I have often thought that my young fancy had exaggerated the phenomenon, but though the swarms we passed through to-day were not densely packed, the numbers we encountered must have immeasurably exceeded the mass which I then saw flying across the sea from headland to headland. From Ménerville to Bouira is a distance of seventy kilomotres — between forty and fifty miles — yet never once was there a break in the procession. I had a reason for gazing attentively through the carriage windows. When I was seven years old I had driven by my father's side, in the days before railways were thought of in the Kabyle country, and as we approached the village at sunset, we saw a lion drinking at a stream. That is fourteen years ago, and it makes me feel a very ancient inhabitant of Algeria to think that I have seen, as a not extraordinary incident of a peaceful drive, a lion, which the most intrepid hunters have now to penetrate far into the heart of Africa to get a shot at.

After Bouira, as we approached the Department of Constantine, the locusts disappeared, and the next morning, in the picturesque capital of the eastern province, we could not find a line about the *sauterelles* in the curious little sheets, half a dozen of which do duty as journals in every town of Algeria. Nothing of greater interest was paragraphed than the visit of Admiral Duperré and the officers of the fleet from Philippeville to the old Roman fortress, and the complimentary remarks of Lieutenant Viaud (better known to the world as Pierre Loti) about the incomparable site of the rocky ramparts towering above the abysses of the Roumel.

A day later we went on to Hamman Meskroutine, where are the famous hot sulphur springs which rush steaming from the earth, forming cascades over petrified terraces of the dazzling whiteness of alabaster. Just as we were driving along the flower-bordered road which leads to this most beautiful sight, against a thunder-cloud which hung threateningly over the mountains, we espied between us and the dark background thousands of yellow flecks — they were our friends, the locusts, again. This lovely spot is in the midst of a vine country. Though the land was in full beauty, it was too late for tourists, and every one we saw there was connected more or less with the locality, from the Jewesses, in their grave mediæval costumes, come from Constantine or Tunis for the baths, to the small French proprietors, who sat round us at the *table-d'hôte;* and every tongue sounded the voice of lamentation at the appearance of the pest.

It was no passing cloud, as we realized the following morning, when we went on by train towards the frontier of Tunisia. The railway carriages of the Chemin de Fer de l'Est-Algérien are fitted with a little gallery which runs the length of the compartments, and very amusing it is to sit and watch the passengers lolling or promenading, especially as a large proportion of them are grave Arab chiefs, of charming manners and of splendid presence, in their graceful burnous. To-day the sons of the desert laid aside some of their dignified impassiveness, for no sooner had we started than we found ourselves among a host of locusts. It will hardly be credited when I say that far above the clatter of the train was heard the whirr of the countless wings. We passed through a mountain valley about a kilometre in width, and the whole expanse seemed blocked with the clamoring mob of insect life, and when the valley widened out into the fertile vine-clad plains that stretch around Guelma — where a generation ago Gérard, the renowned *tireur de lions* commenced his fame — as far as our sight could travel danced in the sunlight the yellow phalanx.

Algeria is so familiar to me, who have spent in that country nineteen out of my twenty-one winters, that I do not know if it be necessary to describe the geographical situation of the places I have mentioned, and of other localities ravaged by the locust plague. The three departments of Oran, Algiers, and Constantine, which compose the colony, stretch from Morocco on the west to Tunisia on the east, the city of Algiers standing about half-way

between the two boundaries, and the whole coast-line being about a thousand kilometres in length. The whole of this wide expanse is threatened by ruin, ruin compared to which the ravages of the phylloxera are mild. The last news which we had from the western province was that around Tlemçen, on the frontier, flights of locusts were alighting unintermittently, and that a caravan just arrived there from Morocco had travelled for thirty-two days in the midst of locusts, the country being entirely devastated. I have said enough to show how the central department of Algiers is threatened, and now on the borders of Tunisia, advancing from the east, we had met once more with the dread hordes. The night before our arrival at Bône, the frontier port, a train coming thither from Tunis had been actually blocked for half an hour by a swarm at a little place called Oued-Zerga, and in the capital of the Beys the natives were trying to make the best of the plague by cooking and selling the *sauterelles* for food.

I have not the space, even if I had the technical knowledge, to describe the means by which Algerian cultivators are trying to stay the pest; how they set about the unpleasant work of destroying the eggs, and how, after incubation, they devise methods for stopping the march of the *criquets*, which, if unchecked, literally eat their way along, leaving the most verdant and fertile tracts a brown wilderness. Suffice it to say, that not only are the local authorities, the maires, and sous-préfets, organizing resistance and raising subsidies for the struggle, but, what is more significant in a territory which is above all things a military training-ground for France, the general commanding the forces in Algeria has granted a remission of thirteen days to all cultivators called to serve with the colors, whose properties are menaced by the locusts.

My last glimpse of the country, which I have the greatest reason for loving that a woman can have, was across the vineyards whose leafy lines stretch in never-ending vistas over the rich plains by the Tunisian frontier, and I thought of the sinister Arab prophecies which foretold that, after the conquest by the Franks of this fair land, an army of invaders, worse even than they, should come up from the desert, and extend the boundaries of the Sahara to the shores of the Mediterranean.

VARIETY AND PLANTING OF CORN.

BULLETIN No. 15 of the Pennsylvania Agricultural Experiment Station is a report of experiments on the influence of variety and the rate of seeding on the yield of ensilage corn. Two varieties of corn were planted, one the field corn ordinarily grown in that locality, the other Breck's Boston market ensilage, a large-growing variety which barely reaches the glazing stage before frost in that locality. Both varieties were sown in duplicate plots, of two rates of seeding each, the plots being alternated. The rows were three and a half feet apart, with guard rows between the plots, so that the ground was all equally occupied. Manure was applied liberally, but by a mistake the thick-seeded plots received larger quantities of manure as well as of seed. The thin-seeded plots were planted so that the stalks stood fourteen inches apart in the rows, while on the thick-seeded plots the stalks were three and a half inches apart.

The average yield of each pair of plots, calculated to one acre, was: small, thin-seeded, 11,962 pounds; small, thick-seeded, 19,013 pounds; large, thin-seeded, 20,955 pounds; large, thick-seeded, 26,840 pounds. It appears, therefore, that the larger variety gave a decidedly larger yield than the smaller one, and that thick seeding was decidedly more profitable than thin seeding.

Chemical analyses were made of samples from the various plots, from which it appeared that the produce of the larger variety and of the thicker seeding showed even greater superiority than that indicated by the gross yield.

Experiments similar to the foregoing have been conducted at the Ohio Experiment Station over several seasons, and these have uniformly showed a larger yield, both of grain and fodder, and therefore of food for animals, when the corn was so planted that the stalks stood about six inches apart in rows about three and a half feet apart, than when the distance between the stalks was greater. As between planting six inches apart and three inches apart, the Ohio experiments show better results from the six-inch planting.

Such close planting as this causes the ears to be chiefly nubbins, and therefore it is not to be recommended when merchantable grain is the product desired; but for silage purposes it is not necessary that the grain should be merchantable.

THE TRANSANDINE RAILWAY.

THE Transandine Railway now in process of construction across the Andes Mountains, for the purpose of connecting the railway systems of Chili and the Argentine Republic, is an enterprise involving many engineering difficulties. London *Engineering* has devoted considerable space to a series of illustrated articles on the railway and its construction, from which we gather the following facts.

The length of the new railway is 149 miles, of which 109 miles are on Argentine territory, starting from the city of Mendoza, which is 2,376 feet above the sea. In Chili there are forty miles, connecting with the Chilian system at Santa Rosa, 2,704 feet above sea-level. The greatest height attained by the railway is 10,460 feet above sea-level, the tunnel at that point being some two thousand feet below the summit of the mountains. There are eight tunnels grouped near the summit, aggregating 9.32 miles in length, the longest, the summit tunnel, having a length of 5,540 yards. To overcome a part of the difference in level within a short distance, and at suitable working gradients, it has been found necessary to construct a spiral tunnel 2,061 yards long, with a radius of 200 metres and a grade of eight feet in a hundred. It may be added that this grade is maintained through the whole nine miles of tunnelling, except, of course, in the summit tunnel.

It is in the boring of these tunnels that the greatest engineering difficulties are encountered. The absence of fuel, and the enormous expense of obtaining it, put steam out of the question as a motive power for driving the air compressors,—air-actuated drills being the means employed for boring the tunnels. Water power, the only other means available, was to be had, but at a considerable distance from the work. It was therefore decided to use the water-power for driving electro-dynamos, transmit the electric current by copper conductors to the sites selected for the compressors, convert it into power by means of electro-motors, thereby actuating the compressors and furnishing compressed air for the drills. The installations for this purpose are unique, as it is probably the first time that the power for compressing air for drills has been conveyed such a distance by electric cables. There are three installations, one upon the Argentine and two on the Chilian side of the Andes, each being distinct in all points, except that the primary stations on the Chilian side are both located at one place. Each installation has a primary station, where the turbines and dynamos are situated, and a secondary station, with electro-motors and air compressors.

The Chilian installation consists of two primary stations under one roof at Juncal, with secondary stations at Juncalillo and Calavera, and separate cables for transmitting the current. The power for driving the turbines is obtained from the Quebrada Juncalillo, the water being conveyed to the turbines, a distance of 1,420 yards, by a double line of steel pipes. The primary station at Juncal for the Juncalillo station consists of six Girard turbines, each giving 80 horse-power, a total of 480 horse-power. Each 80 horse-power turbine is coupled directly to the shaft of an 80 horse-power dynamo, consequently there will be no loss of power in transmission from the turbines to the dynamos. The latter are grouped in two groups of three dynamos each, each group having a main and return transmission cable. A great advantage is gained in having two groups, as should accidents or other cause prevent one from being worked, the whole of the tunnelling would not be stopped. At the secondary station at Juncalillo, about 3,281 yards from Juncal, the power available is 401.8 horse-power, cables being attached to six electric motors, similar to the 80 horse-power dynamos, which drive six air compressors.

The Juncal-Calavera installation is very similar to the one described above. The turbines are in the same shed, and take their water from the same source. These and the dynamos are also of