THE CIVILIZED INDIANS OF THE PHILIPPINES.

BY PROF. J. B. STEERE.

The chief factors in the future of the Philippines are the civilized Indians. The best Spanish authorities estimate their numbers at over six millions. Europeans, other than Spanish soldiers, number less than ten thousand. Nearly two hundred thousand mestizos —people of mixed blood, Spanish and Indian, and Chinese and Indian—are affiliated closely with the Indians and are their natural leaders.

The civilized Indians are rapidly increasing in numbers. At the coming of the Spaniards in 1519, they were supposed to number about half a million. In 1735, more than two hundred years later, they were estimated at a million. In 1800 they had increased to two millions. These estimates, though doubtless far from correct, show that their ratio of increase has rapidly accelerated during the present century.

Among the various reasons for this rapid increase of population in recent years, the cessation of the bloody raids of the Moros of Mindanao and Sulu is, no doubt, one of the chief. For over two centuries and a half these people had made frequent expeditions, in their swift vessels, along the coasts of the eastern and central islands as far as Mindoro, and even in some cases to the bay of Manila, burning towns, carrying off plunder, and killing or carrying away into slavery the Christian inhabitants. When pursued by the Spanish war vessels, they would either outsail them and escape, or, if this was impracticable, they would get out their oars and pull away in the eye of the wind until they were out of reach of the guns. The introduction of steam gunboats by the Spanish has put an end to these piratical expeditions.

STREET SCENE, PANEPANGA, ISLAND OF LUZON.

We found marks of the rapid growth of population in nearly all the islands visited, in the formation of new plantations and villages. This was especially noticeable in Negros, Mindoro, and Mindanoa.

The Philippine Indians are much like the civilized people of Java and Celebes in appearance. They are brown in color, with coarse, straight, black hair, and little or no beard. Many of them show a decided Chinese obliquity of the eyes. They are larger and stronger than the people of purer Malay type to the south. Their physical appearance, as well as their language, shows their close relationship to the savage tribes still existing in the islands.

Their language shows a large admixture of Malay words. The best Spanish authorities consider them mixed races of Malay and Negrito stock, with perhaps some infusion of Chinese and Japanese blood.

Their origin and relationship to the Malay race is a part of the great race problem of the Pacific.

They are separated by their languages or idioms into several tribes. The chief of these are the Tagalos, inhabiting Manila and central Luzon, and numbering about a million and a half, and the Visayas, numbering over two millions and occupying the central and eastern islands. Some five other idioms are spoken by from two to three hundred thousand people each. These tribes are not only alike in having adopted the Christian religion, but are so similar in appearance and dress and customs that the casual visitor cannot separate them. The Tagalos are considered the superior race. The differences of language naturally give rise to more or less jealousy and mistrust, which will probably have considerable influence on the future development of the islands.

There existed at the coming of the Spaniards a written language among the Tagalos and the Visayas, with an alphabet, said by some to be of Arabic origin and by others to be unlike any other. The native languages are now written and printed in the Roman letters.

The Philippine Indian is simple in his necessities and his tastes. His clothing consists of shirt and short trousers, the shirt being invariably worn outside the trousers. He usually goes barefooted, but wears on his head when in the woods and fields the salacot, a round bowl-shaped black hat, made of narrow strips of some fine species of rattan. This is of several thicknesses and is impervious to rain, and serves passably well in case of need as a helmet or a dish to hold water or food. The women wear a short loose jacket or camisa and the saya, a piece of cloth wound round the hips and the corner tucked in at the waist to secure it. The woman's hat is made of palm leaf or rattan, but with a broad brim, so that it serves as an umbrella in case of need. I have seen two women sheltering themselves under one hat as they crossed the street in the rain. The hat also serves as a basket, and in the market the women display their fruits or flowers or fish upon it, placed on the ground before them. The Indian governors of the towns and their council of principal men, when they attend church together or on other state occasions, wear short coats of black broadcloth over their shirts, which still hang over the trousers below, and crowd their feet into shoes of European make. Many of the Indian women of Manila wear low slippers on their bare feet. These are too narrow for the whole foot, and the little toe is left to travel in the mud outside.

MALAY CHIEFS, MINDANAO.

The house of the Philippine native is as simple as his clothing. Tall posts of some durable timber are planted firmly in the ground, and to these, six or eight feet above the earth, are lashed or framed the floor sills of the house. The walls are of palm leaf tied to upright timbers with rattan. The roof is also of palm leaves, thick enough to be stormproof. The floor is usually of split bamboo, with open cracks which allow the dirt to fall through. Openings are left in the walls for windows and a door, and these are closed against storm by shutters of the same materials as the walls. The fire place is ordinarily a box filled with earth upon which the fire is built, the smoke making its way out through the thatch. The furniture consists of a few earthen pots for cooking, joints of bamboo for holding water, and raised platforms of bamboo, which serve for tables and chairs and beds. It seems strange that large towns of houses of such inflammable material, placed thickly along narrow streets and with open fireplaces in each, should exist any length of time without burning up. I once asked an Indian of Zanebranga what prevented the city from burning up, and he answered that it must be the mercy of God.

This method of building houses perched above ground is more or less common among all the races with Malay relationship, and may have grown out of the habit of the Malays of building over the water. It seems to have no significance in the Philippines, but simply to be the universal fashion.

The food of the Philippines is chiefly rice and fish, eaten without knives and forks, or chopsticks, with the fingers. The national dish is tuba, palm beer, made by cutting off the points of the great flower stems of the cocoanut palms, and collecting the sweet juice which flows from the wounds. Bamboo cups are hung in the trees to collect the juice, and long bamboo poles are laid from the crown of one palm to another, so that the tuba gathered may pass from one tree to another, without descending to the ground. These roadways, frequently sixty or seventy feet above ground, look like great spiders' webs, and need the skill of a rope walker to use them. The juice rapidly ferments, and is colored and made bitter with the bark of mangrove roots.

In common with the Malays and Javanese, the Philippine islanders make much use of buyo, betel nut. The pieces of nut are wrapped in pepper leaf, and smeared with lime before chewing. They are not such excessive tobacco users as the Malays and Chinese, and what they use is smoked in long home-made cigars or in cigarettes.

The men are addicted to cock fighting. The government prohibits this except on feast days and Sundays, and in the regularly licensed cock pits, of which each town has one. The pairing of the cocks forms quite a share of the labors of the Indian, and a most common sight in a Philippine town is two neighbors squatted on their heels in some quiet corner of the street, each holding a cock by the tail, and allowing them to spring and strike at each other, and then drawing them back. They bet heavily on their favorite fowls. I have seen an Indian take up his dying bird which had lived just long enough to win the match, and with tears in his eyes and voice carry it tenderly away, while another, whose bird had turned tail, picked it up and carried it off while cursing it, and tearing great handfuls of feathers from its cowardly skin.

They have learned games of cards of the Spanish, but do not seem addicted to gambling as their masters. In Manila they invest much of their earnings in the lotteries.

They are all good Catholics, and make much of the feasts and services of the church, and there can be no doubt that the church has been the chief civilizing

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agency among them, and, on the whole, has been an immense power of good. The territory occupied by them is divided into nearly a thousand parishes, the priests of which are in most cases monks of the various orders of Augustines, Dominicans, Franciscans, and Jesuits, the Augustine monks and Dominicans being the most numerous.

In many towns the priest is the only white man, and though he may be a poor unlearned Spanish peasant, he becomes the chief man of the community, and the progress of the town and surrounding country depends upon him. He is the sole architect of the church and convents, and shows the natives how to build streets and bridges, and, for lack of any other, he may take the place of the schoolmaster.

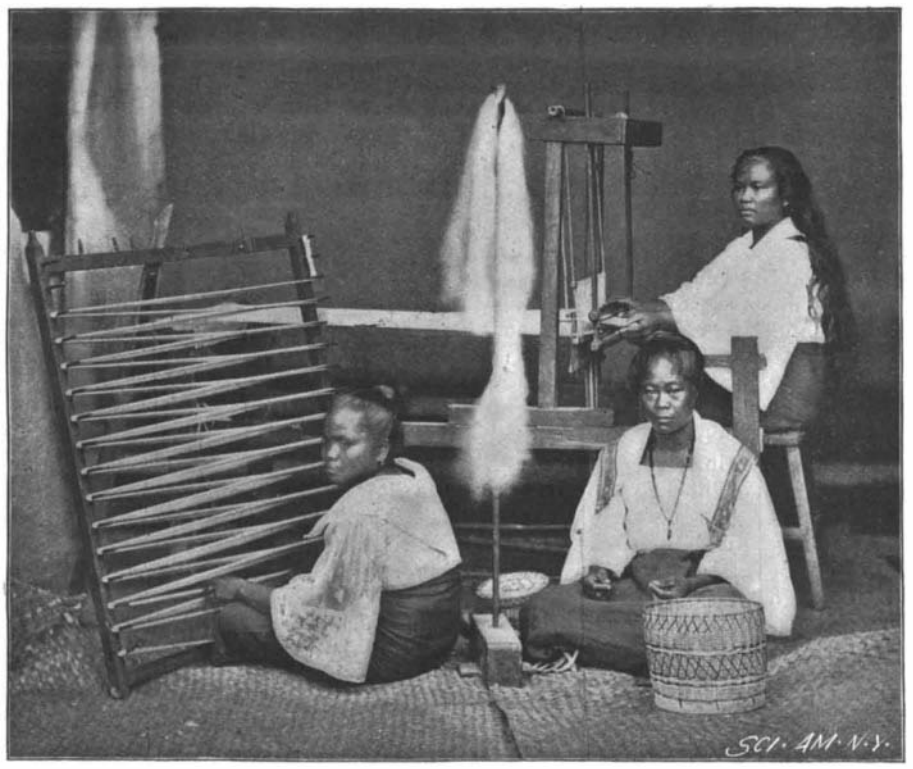
The Indians seem to have little desire for learning, a large proportion of those who strive after more than the merest rudiments of an education being mestizos, many of whom make their way to Manila and enter the schools and colleges there. About twelve per cent of the population are able to read, nine per cent can read and write, two and one-half per cent speak Spanish, while about eight per cent, according to the expressive Spanish statistics, "no saben nada," don't know anything.

They love music and learn it readily. Their musical instruments are borrowed from the Spanish. This is also true of many of their dances, one of the most common of which is the fandango. This frequently takes the form of a contest between the dancers, not only of skill and endurance in the dance, but of wit and repartee in the singing which always accompanies it. While present at a feast and the accompanying dance at the little village of Madsin, in the interior of Panay, a young Augustine priest was kind enough to translate for me the singing, which was in Visayas. The young Indian, barefooted and dressed in white pants and embroidered shirt, began by exclaiming, "My eyes are astonished! From whence has come down to earth such beauty?" The girl who had been quietly dancing opposite, and listening, now answered, "The youth is bold and his mouth is full of flattery, and of such as the maidens may well beware." Putting on a look to represent the passion he was supposed to feel, the young fellow sang, "If I could win this beauty, I should be happy, but if she refuses me, I shall die." The girl, apparently relenting, responded, while she covered her face with her hands and blushed through her dark skin, "The words of the youth are full of passion, but I do not wish his death. Let him ask my father. If he is willing, I will not refuse him." The Indian, who had been listening with rapt attention, now started back and exclaimed, "My love has vanished. I have discovered that the beauty has a turned-up nose." This was too much for the girl to stand, especially in the presence of us Costillas, white men, and she ran away and hid herself among her mates, who filled one corner of the room.

The methods and implements of the agriculture of the Philippines seem to be borrowed from the Chinese. The lower lands along the streams are carefully leveled and fitted with dikes and ditches for irrigation, so that they may be planted with rice. A one-handled wooden plow is used in turning the soil. The plow beasts are carabaos, buffaloes, a single one of which is hitched to the plow by a rude collar and traces. The rice is planted in hills by hand. It is thrashed by being tramped out with the bare feet. It is stored in the hull, and usually pounded out in rude mortars by the women and boys as it is needed for use, the pounded rice and hulls being separated by being thrown into the air upon broad trays of woven rattan.

Rude mills turned by buffaloes are used in some places for hulling rice for market. In addition to this lowland rice, much timber is being continually cut off and mountain rice planted. This method has been carried on so continuously in many places that the coarse, grass has taken the place of the timber, and open plains or campos have been formed. This grass, cogon, is too thick and strong to be turned by the rude plows in use, and immense portions of the country have thus become useless except for pasture.

The buffalo is also used for riding and for transporting rice and sugar and timber upon huge two-wheeled carts, which are frequently roofed with palm thatch or woven bamboo for protection against rain. Horses are abundant in many of the islands, but are rarely used in agriculture. They are small and hardy and make good saddle beasts. The Indians never think of feeding them, but ride them as long as they wish and then turn them loose upon the plains. Fowls are kept by many of the people, and swine by a few.



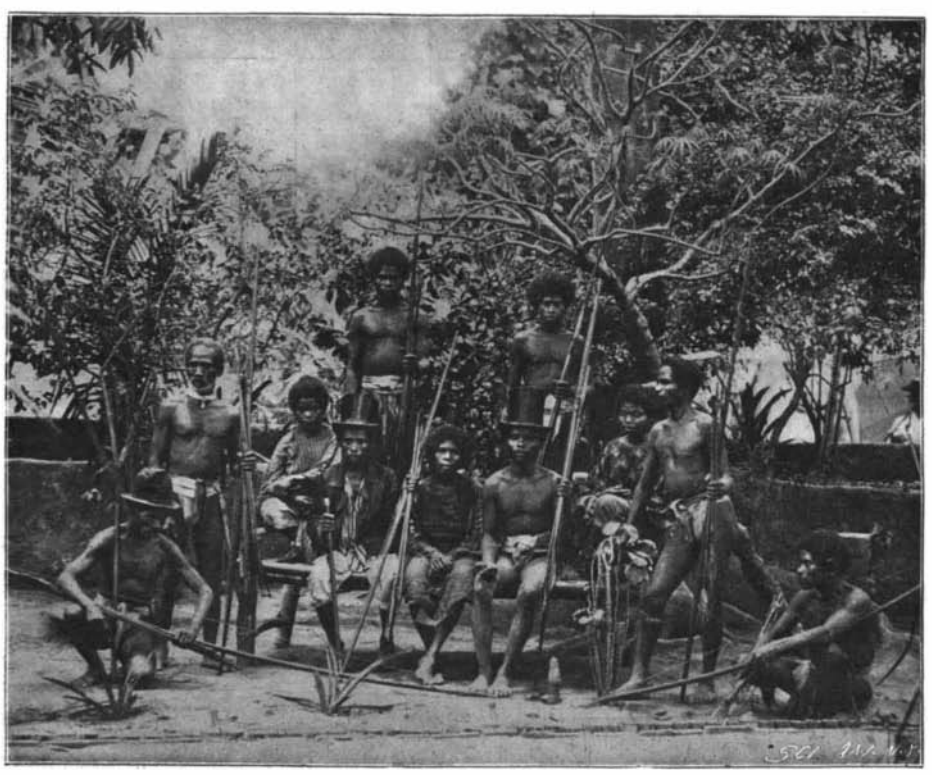
VISAYAS WOMEN WEAVING.

Each family has its fruit garden, frequently surrounding the house, in which are found bananas, cocoanuts, betel nut palms, custard apples, mangoes, and other fruits. In the ravines and on the mountain sides are planted patches of the banana producing the Manila hemp, abaca. The sugar and coffee of the islands are chiefly the product of foreign capital and enterprise.

The Indians make good hunters, killing great numbers of deer and wild swine with their dogs and lances. They also collect wild honey and gums and rattan and timber from the woods. They are good sailors and fishermen. Their boats are of the Malay type, long and narrow, with outriggers on both sides. They carry large sails, and the sailors keep them from capsizing by crawling out upon the outriggers and thus balancing the boats. They fish with cast nets and seines and also extensive fish pens and weirs.

There is considerable trade and intercourse kept up between the various islands by the larger native boats.

The women aid in the care of the fields and sometimes in the fishing. In the central islands they show great skill in weaving, using silk imported from China and the fiber of pineapple to mix with the native cotton and the finer kinds of abaca. The goods made are especially fitted to the climate, being light and almost transparent, so that the air and sunlight readily pass through them. Our engravings are made from photographs taken in the Philippine Islands.



NEGRITOS OF MARIVALES—THE CHIEF AND HEAD MEN WITH HATS PRESENTED BY THE SPANISH.

Films for Photography.

Mr. W. J. Stillman, the critic, writes to The London Times: The importance of photography for scientific expeditions has become so great that I believe the account of a crucial experiment I have just concluded, to test the value of films of celluloid as a substitute for glass, may be of interest to the scientific world. Having been requested to organize the photographic section of the first African expedition led in 1893 by the late Captain Bottego, who was so barbarously killed last year on his second journey into the regions of the Upper Nile, I decided to provide the official photographer only with celluloid films, but of two kinds—the roll of flexible film, used in the kodak, and the cut thick "films," which practically are employed as glass. The former, as is now well known, have limited lives, and my chief dependence was on the latter, which are shavings about the fourth of a millimeter in thickness from a solid block of celluloid, flexible, practically not breakable, and lying flat in the holder like glass. The results, considering the inexperience of the operator, who learned the process while we were waiting for the supply of material, and the difficulties of the climate, water, etc., were most satisfactory; but, with a view to exhaustive testing of the capacities of the material, I kept by me several packets of the same consignment of films, and tested them from time to time. Of one of these packets in my possession in Rome ever since, and coated, as I learned from the manufacturer, in June, 1892, I have just exposed and developed four on a most difficult subject, and produced four perfect negatives as good in every respect as if they had been made five years ago. Lieutenant Citerni, the photographer of the second and luckless expedition, which I also fitted out with the same material, informs me that the films worked perfectly up to the capture of the party by the Abyssinians, two years after setting out, and that they developed without injury at a temperature of 30° Centigrade, the lowest their nights gave them. But as the development might be effected a year or more after exposure and at home, the advantage is not limited to this.

Considering the extreme portability and infrangibility of these films and their inestimable superiority in these respects over glass, and in other respects over paper, I think that these experiments have a high value for scientific voyagers, to whom photographic illustration is so important, and the difficulties of photographic operation en voyage are so great. A priori, as the celluloid is produced under the action of strong acids, and has a certain tendency to liberate the acids with time, their action tending to cause insensibility in the haloid which holds the photographic image, I believe that in so long a time as is covered by my experiment they would have become quite insensible, but I did not see that in this respect there was much falling off.

A little there probably is, for in the case of films of the highest sensibility I have found that impressibility for all practical purposes had disappeared after a year, those of lower sensibility losing less in proportion; but this is of absolutely no moment, exposure in the camera for a second more or less being a matter of no importance. The fact that a traveler may with this portable and unbreakable material spend years in the most difficult explorations with photographic record possible at all stages, and develop it on his return home, ought to be of scientific import.

Electricity on War Vessels.

Technical reports which have been received at the Navy Department indicate that the electrical appliances on our warships have worked successfully during action. This has been particularly pleasing to the naval constructors, who have found that the use of electricity in the operation of the turrets, steering gear and windlasses was satisfactory. The opposition to this plan from the conservative element in the department has been so strong that the new battleships for which bids have just been opened will be equipped with electrical turrets only.

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The Educational Value of Machine Work.

In machine shop work for manual training the influence of the highly efficient instruction in the technical schools has been strongly felt. Our manual training methods have been, in many cases, better suited to the technical school than to manual training.

There is a very widespread idea that, since the machine shop deals with machine tools, there can be no great mental effort involved. This view is erroneous; intense mental effort may be called for by a properly arranged course.

The basis of a machine shop course should be the mental condition of the pupil rather than varied and extensive uses of the machines. This gives a good reason for the manual training differing from the technical course. A critical examination of machinery is rich in educational advantage. Our pupils are rushed too soon into the technique of the work.

The economical use of the students' time and energy is all important. Hand work, being comparatively slow and uneconomical, should form but the connecting link between the hand work in wood and the machine work in metal. The hand responds promptly to detailed direction of the mind; if the hand does not attain the desired result, the trouble is with the mind, not the hand.

There is a degree of accuracy called commercial accuracy, which it is perfectly practicable to maintain, but which can only be exceeded by incurring disproportionate expense. Interchangeable parts of machinery have the errors confined to such narrow limits that the variations cause no trouble with the machine as a whole.

In manual training we sometimes ask for the highest attainable accuracy, rather than the lesser, practical accuracy.

Machine shop work assimilates readily the teachings of other branches, and can be made to form a good connecting link between the matter studied from books and the material surroundings. The mere doing is not without its value, but, after all, it is the teacher working with the shop as his tool that makes the most lasting and beneficial impression on the boy.—Abstract of paper read July 12 before the American Manual Training Association, at Washington, D. C., by C. P. Binns, of the Teachers' College.

Commercial Emery.

Available practical information, other than elementary, on the above mineral is conspicuous by its absence from all the mining and chemical works I have been able to consult. Merchants who buy and manufacturers who work up the stone into emery wheels and emery cloth, to say nothing of the knife polishes, pastes, and powders, seem to be, one and all, more or less completely in the dark, and they buy and pay high prices, comparatively, for stone of inferior quality, while they refuse to give their attention to stone which is, from a practical and analytical point of view, of superior value.

"A rose by any other name does *not* smell as sweet," and the consequence is that names of mines which have long been exhausted are given to new ones whose product, in some cases, does not represent half the value of their reputation.

The complete analysis of emery stone is a tedious and expensive process, and perhaps, as a rule, very accurate estimations of its composition are not needed. There are, however, a few practical and easy ways of testing its comparative value which I propose to place before your readers, so that they may have, if they like, something more to go upon than a name, however well known it may be, and some better guarantee of quality than that supplied by the price paid per ton.

It goes without saying, of course, that the value of an emery stone depends upon its abrasive power, the amount of work it will do on glass, steel, etc., before reduction to an impalpable powder which has no longer any cutting action. This abrasive power depends almost entirely upon the percentage of anhydrous oxide of alumina contained in the mineral. Some, perhaps most, of the best emeries carry also a small percentage of titanates, but as the amount of these rarely exceeds five per cent, they may be left out of consideration. The principal impurities in emery consist of salts of lime and iron.

We have, therefore, roughly in emery stone:

1. Oxide of alumina (anhydrous).
2. Titanate of iron.
3. Limestone.
4. Oxides of iron.

Numbers one and two are insoluble in strong acids, while numbers three and four are soluble. Hence it is an easy matter to get rid of the latter, and so estimate the percentage of alumina and titanate the stone contains.

First Experiment. — Take one gramme of finely granulated emery, and heat gently over a small spirit lamp, in a small glass beaker, with ten grammes of aqua regia, for ten minutes, with frequent agitation. At the end of this time carefully pour off the acid liquid, which will have become more or less highly colored. Now add to the residue in the beaker other ten grammes of acid, and set aside in a warm place for two hours, now and again gently agitating. At the expiration of two hours pour off the acid, and carefully wash the residue several times with water. Drain, put in a warm place to dry thoroughly, and weigh the residue.

The loss in weight represents the soluble and valueless material and the weight of the residue represents its percentage of abrasive value.

Second Experiment (Magnetic Loss).—Take one gramme of finely powdered and sifted emery, place on a sheet of white paper, and draw through the powder a small horseshoe magnet. With most emeries, it will be found that the two poles of the magnet become covered by adherent particles of magnetic oxide of iron. After passing the magnet through the powder, raise it a little, and lightly tap it, so that any particles may fall which are not firmly adherent. Now wipe off carefully the adherent magnetic oxide on to another piece of paper, and again pass the magnet through the emery powder, again remove adherent particles, and repeat the process until the magnet comes away from the emery quite clean. Now weigh this clean residue.

The loss in weight represents the magnetic iron oxide, valueless as an abrasive.

Third Experiment (Abrasive Power).—Take a small glass mortar with glass pestle. Carefully and exactly weigh the pestle. Now place in the mortar one gramme of fine granular emery, add a very little water—two or three grammes—and proceed to triturate the emery with a regular pressure and motion as long as the least grittiness or bite on the glass can be felt. As soon as it is found that there is no more "bite," wash clean and thoroughly dry the pestle and again weigh it. Its loss in weight will represent the relative abrasive power of the emery under examination.

The time occupied in this experiment will vary considerably and in exact relation with the value of the stone for grinding purposes. The end of the operation is very distinct and well marked, and two or three trials of different emeries will render any intelligent man capable of performing the experiment.

Precautions.—1. Every test of abrasive power must be made with the same pestle and mortar, to avoid possible variations in the hardness and texture of the glass.

2. Every test must be made on emery granulated by sieving to the same degree of fineness.

In this way every manufacturer is a law unto himself, for the reason pointed out in precaution number one, and variations in the quality of different shipments can be recognized with the utmost facility.

At the beginning of these experiments I had the idea that the specific gravity of the stone might perhaps give indications of its quality, but in actual practice I find this character is quite unreliable. As will be seen by the table printed in this paper, one of the worst Asia Minor stones has almost exactly the same gravity as one of the finest, and the variation between it and the well known Naxos is very small.

No.	Abrasive Power.	Loss with Acids.	Magnetic Loss.	Specific Gravity.
		Per cent.	Per cent.	
1	100·00	25	..	3·92
2	82·80	18	..	4·08
3	80·00	25	15	4·10
4	76·50	12	9	3·85
5	69·00	17	13	3·95
6	40·60	38	4	3·85
7	37·50	..	39	4·07
8	31·25	15	20	4·33
9	25·00	..	..	3·89
10	17·34	25	2	3·78

From the above table, it will be noticed that the difference between the best and the worst emery examined is the difference between 100 and 17½. Yet, as a matter of fact, the difference in the prices at which these emeries are sold is the difference between £3 10s. and £3 only, and this is a typical example of the influence of a name, and the astounding ignorance of manufacturers of the chemical composition of the raw material they are using.

It is a difficult matter to give a description of good emery which shall be of use to users of it, other than the semi-chemical ones herein explained. But, on the spot, in Asia Minor, a man who is accustomed to the handling of large quantities of stone from different mines can tell unerringly by its fresh fracture whether the stone is good, bad, or indifferent. It varies very much in "grain," one of the very best emeries in Asia Minor being very coarse grained and another of equally good character being fine grained. The difference being caused probably by the ordinary chemical law, slow cooling yielding large crystals and rapid cooling small crystals. This is more or less proved by the fact that, up to a certain point, the deeper you get in an emery mine, the larger and the more regular the crystallization becomes.

To judge of a stone by its outward appearance is very misleading. Chip a piece of the emery and take it into a good light, not direct sunlight. It should show a perfect regularity in the size of its crystals, an absence of spots of all sorts, and be of a clean gray. The grains of alumina will seem to stand out from the surface and will lend a sort of transparency to the stone. Bad stone, when examined in the same way, will show holes, patches of red, spots of white, and especially a flat, glassy form of crystal. Some specimens contain mica, and this renders the stone almost valueless and quite unsalable. Mica will be found in most emery mines, but it is generally between the slabs of stone and sometimes adherent, not in the emery itself.

In places where denudation has exposed emery to the action of the rain and air, decomposition has occurred, with the production of a reddish clay. This is particularly the case in one or two large mines in the neighborhood of Kuluk. This decomposition goes on to a less extent in all emery mines which allow of the percolation of water and access of air. In other instances, where an impermeable covering of limestone has prevented the infiltration of water, the emery comes out white on the outside, and as by far the larger demand is for red-coated emery, it has led to the artificial coloring of the white and gray stone. This sort of falsification may easily be ascertained by washing with water. Stone which has been doctored gives up its coloring at once. Naturally red-coated stone is reddish even when the clay has been scrubbed off. Manufacturers may, with the tests given in this paper, demonstrate the quality of the stone they are supplied with, and would be perfectly justified in refusing any which does not come up to the standard they desire; and having the means to protect themselves, they only are to blame if, in the future, they are misled by bogus names or are swindled by commission agents who do not know the difference between emery and ironstone.

FRANK R. BULLAND.

Big Fortunes from Little Inventions.

It has become almost an axiom with the majority that larger fortunes are to be raised from some simple invention than from difficult and expensive inventions that involve a great outlay of money to manufacture. This is to a certain extent true. A certain American patent for fastening kid gloves has yielded a fortune of several hundred thousand dollars for its fortunate owner, and the inventor of a collar clasp enjoys $20,000 royalty a year as the reward for his endeavor. A new kind of sleeve button has made $50,000 in five years for its patentee, and the simple twisting of safety pins in such a way that there is no possible danger of the point sticking in the child promises to enrich its owner beyond any of his early dreams of wealth. A man one day turned a piece of wire so as to hold a cork more securely in a bottle, and forthwith somebody saw a brilliant idea, and patented the modern wire stopple-holder, which is now used annually on several million bottles. The accidental bending of a hairpin by a woman to prevent it from sliding out of her hair also easily produced a fortune for her husband, who immediately saw the possibilities of a crinkled hairpin for women.

Instances could be multiplied indefinitely of large fortunes being made from small inventions; but fortunately for those inventors who make a life study of intricate problems of mechanics, and disdain to waste their talents upon trivial, popular articles of the day, there is often also ample reward held in store for the products that take years to produce, and which revolutionize existing methods of industry and mechanics. Edison has reaped honors and riches of a princely character from his discoveries; McCormick has realized in his reaper the fortune of a millionaire; the Corliss engine brought honors and decorations to its inventor, and enabled him to amass a great fortune in a few years; Prof. Bell found in his telephone not only the consummation of his early hopes and ambitions, but a substantial pecuniary reward; Harveyized steel armor has become synonymous with the inventor's name, and it brings an annual income of huge proportions to its discoverer; Elias Howe, the inventor of the sewing-machine, realized over $2,000,000 from his inventions; and Nikola Tesla, though still young and rich in promises, finds an abundance of money in his work.—George Ethelbert Walsh in Cassier's Magazine.

New Coaling Stations.

The Naval Board detailed to examine sites for coaling stations have now made their report. The Board visited various points along the coast from Maine to Port Royal, S. C., and made recommendations of suitable places for these stations, of which there are destined to be a large number, with the steady increase in the navy. One of the great lessons which the war has taught has been the lack of means of coaling war vessels along our coasts, and it was not until the war broke out that coaling stations were established at Dry Tortugas and Key West. Since this time a contract has been let for a station at New London, Conn. None of the new stations which are contemplated will be elaborately equipped, and the cost of each is likely to be from $100,000 to $200,000, according to location and importance. The storage capacity of each will be from 5,000 to 20,000 tons.

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Reclaiming Sterile Land in Germany.

The value of agricultural land in the consular district of Mannheim, Germany, is unusually high, says Consul Hoffman. The holdings per capita are small, and owners are consequently compelled to plant remunerative crops, reserving only sufficient ground for the cultivation of food products and forage for cattle. An interesting illustration in the attempt to retain, or even increase, the arable surface is at present to be observed two miles east of the city.

The valley of the Rhine is about 20 miles across at this point, the lower or river terrace consisting of agricultural lands exceedingly rich in loam and old river deposits, while two miles east of the river the second terrace rises to a height of about 40 feet, most of which consists entirely of fine sand, covered at various places by a thin film of loam and now used for the training of pines. Passing through several miles of artificial forest, one emerges to find better soil and ordinary farm lands used for raising wheat, oats, potatoes, and carrots.

The removal of the edge of the above-mentioned sand terrace was begun early in the spring, the material being transported by cars over a temporary track. The sand is removed by means of specially constructed dredges, and at this time of writing about 6 acres have been exposed, reducing the surface to the level of the farm lands on the lower or river terrace. The top crust of loam has been carefully removed from the sand terrace and carried down to the newly exposed surface of sterile river gravel to form new acreage, being there distributed and having a depth of about 6 or 8 inches. Over a great portion of this new surface young cabbage plants are growing, and other crops will be started as rapidly as the loam is deposited and leveled.

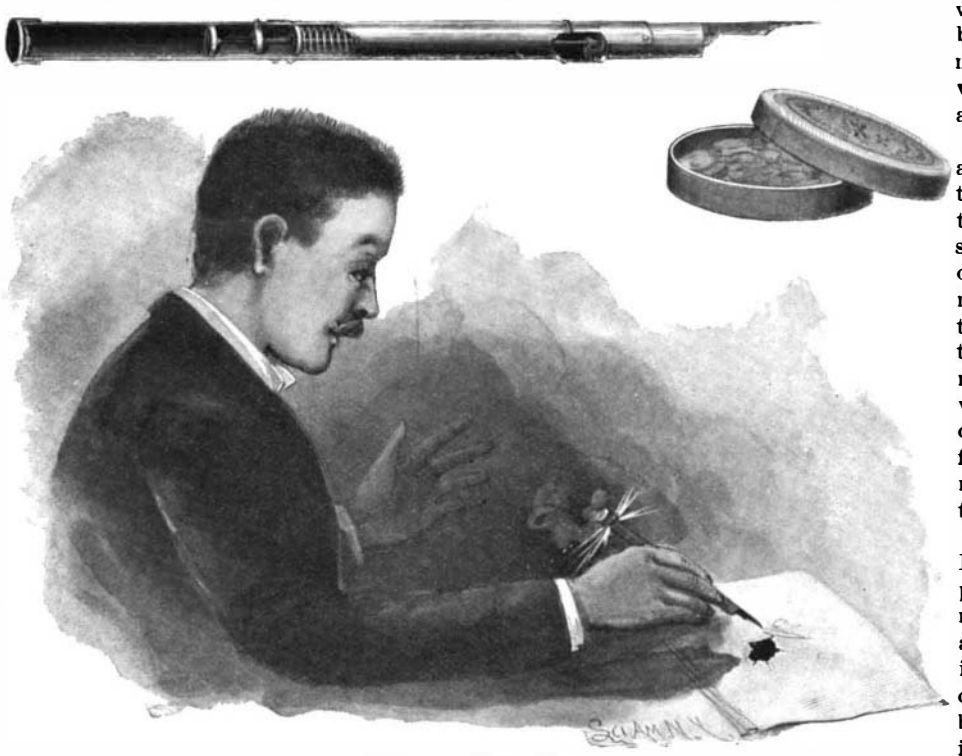
This illustration is but one of many showing rigid economy among these hard-working inhabitants.

THE SURPRISE PEN.

Our engraving shows a very clever trick pen which would tend to create great surprise among the uninitiated. Let us suppose that a gentleman is seated at his desk and is busily writing when a neighbor comes in and he jokingly challenges the latter to try and forge his signature. He hands the pen to his friend, who attempts to write. Immediately there is an explosion and the paper receives a big ink blot. The writer is apt to be surprised by the report, which is like a pistol shot, and if a timid person, is apt to be frightened. The noise comes from the pen itself, as it is so constructed that it can be loaded and shot off at will. The person in the secret can handle the pen with safety, but the poor unfortunate will experience a rather unexpected shock to his nerves when he attempts to write with it.

The upper part of the penholder, into which an ordinary writing pen is thrust, works on a pivot about half way down its length. This separate part is provided with only one-half a bottom, in order that it may engage the conical head of a piston rod which ends in a plunger which sets off the cap secured in the bottom of the penholder. The normal position of the plunger is against the cap of the holder, but it can be raised by means of a projecting pin riveted to the rod and passing through a slot cut in the side of the lower part of the holder. Now the closed half of the bottom of the pivoted end enters a notch caused by the conical head of the plunger, and the plunger with its spring is cocked, as it were, by means of the projecting pin, and is held in place by the bottom of the pivoted section. When the pen is pressed to the paper the pivoted section swings on the pivot, releasing the plunger, which is forced down on the explosive cap by the spring.

The lower end of the penholder is threaded, so that it can secure the end cap firmly in place. The explosive cap is put in the end cap, and it is screwed on the bottom of the holder. Ordinary paper caps for children's pistols are used. As long as the plunger simply rests on the cap there is no danger of an explosion, but just before the joker wishes to give his friend a scare, he cocks it by pushing the plunger up with the pin, until the pivoted top engages it.



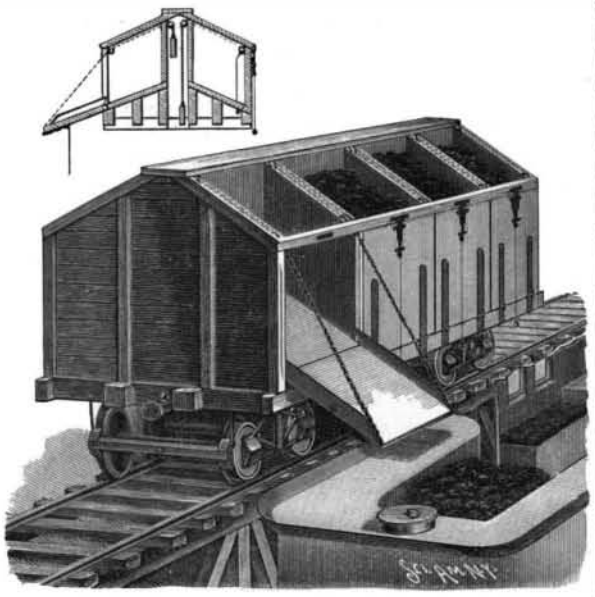
THE SURPRISE PEN.

Toning Muddy Platinotypes.

Workers in platinotype find to their cost that damp paper, or paper printed without proper precautions in damp weather, gives dirty-looking, muddy prints. These, however, may be recovered, and gain a splendid blue-black tone if spread over with glycerine, and a little gold solution be poured on, to be rapidly and evenly incorporated with the glycerine with the aid of a swab of cotton-wool. The change in tone is rapid and marvelous, and a wash to free from the auriferous glycerine completes the process.—M. E. M. D. in Photo. News.

A NEW WAY OF COALING LOCOMOTIVE-TENDERS.

At regular intervals along their lines, the various railway companies have established coaling stations for their locomotives, to which stations coal is conveyed in cars and unloaded. When coaling an engine at these stations large iron buckets are loaded by hand, hoisted by a crane and then lowered into the tender. The expense and labor incurred in this process



AN IMPROVED COAL CAR.

are considerable, and the coal itself is often wasted by this repeated handling. It is the purpose of an invention recently patented by M. J. Griffin, General Yard-Master, and W. P. Hogan, Car-Foreman of the Grand Trunk Railway at Island Pond, Vt., to overcome these difficulties.

The invention in question consists in dividing a car into a series of pockets having sloping bottoms discharging toward the outer sides of the car. These pockets are closed by doors or chutes which can be raised or lowered, and used to discharge the coal into the locomotive-tender. The partitions forming the pockets are made double, with a space between the parts to receive the sides of the doors or chutes. When closed, the doors are locked in place, each by a catch comprising a slide held in engagement with a staple by means of a spring. A rope attached to the lower part of the slide permits the doors to be readily unlocked. The doors are raised and lowered by ropes carried over pulleys through the space in the double partitions, and up on the under side of the foot-board. Counterweights are attached to the ropes, and move vertically in a longitudinal well or chamber, as indicated in the cross section. In using the car an elevated track is provided, running parallel with that occupied by the locomotive. When the engineer desires to replenish his coal supply, he runs alongside of the elevated track with the tender of his engine beneath one of the pockets in the car. The catch of the door or chute being then released by pulling upon the rope, the door falls and the contents of the pocket are discharged into the tender. Locomotives can in this manner be coaled from both sides of the elevated track without causing any delay and without incurring any great expense.

Trade on the West African Coast.

The methods of trading on the west coast of Africa have changed very little in the last fifty years, says The New York Sun. There is much improvement in communication with civilized countries, but the natives themselves are the same old "heathens who in their blindness bow down to wood and stone." The climate has a great deal to do with this, and the always hot and malarious country makes great activity impossible. It is only when we read of possible international complications, caused by the traders of one European country encroaching upon the ceded rights of another, that we find that the trade is worth fighting for. This is notably the fact just now on the Upper Niger, where the French traders and the English representatives of the chartered Royal Niger Company have differences to settle. The French traders used formerly to confine their attention to their own settlements in Senegal and other minor places, and for some years they have had a railroad in operation in the region of the Gambia River, but lately their merchants have been more progressive and are vying with England and Germany for prestige in numerous coast ports. There is now telegraphic communication right down to the Gold Coast, and it promises to be continued down the west and southwest coasts until it reaches Cape Colony and forms a belt connection with the telegraph up the east coast of Africa.

From the old days when Liverpool and Bristol vessels indulged in slave trading as a side issue until quite recently, smart brigs and schooners would go out to the coast with a cargo of merchandise, and the captain would be both trader and navigator. He would visit a number of small places and barter his cargo on board his own ship for palm oil and small quantities of ivory, gold dust, and other native produce. Often the voyage would occupy a year or more, and each vessel would take, besides her crew, coopers and mechanics to assist in the loading. It is said that often a cask of salt, which might be worth $5, has been exchanged for a cask of palm oil worth $150; but that was long ago.

The trade has long ceased to be so lucrative, and though business is still conducted by bartering spirits, tobacco, cotton goods, and a thousand and one other things for produce, it is very rarely that a vessel will trade on her own account. There are several lines of mail steamers that go down the coast from European ports, and the merchants have trading stations or "factories" ashore where they receive merchandise from the mail boats, and dispose of it for produce which they prepare for home shipment. On the northwest coast, in the region of the Gambia River, ground nuts —in reality our peanuts—are cultivated and shipped from the principal port, Bathurst, to Europe, and are there crushed and a valuable oil extracted.

Going south, the next port of importance is Monrovia, the capital of the little republic of Liberia, called often the American colony. Further south again comes Sierra Leone, a large town, and civilized in comparison with many other places; in fact, it is compulsory to wear clothes on its streets. The Sherbro River is hereabout, with its numerous trading stations, and from this vicinity large quantities of palm oil and palm kernels are shipped.

Again going south, or rather east, at this point, one comes to Lagos and the Gold Coast, with Cape Coast Castle and Accra as important military stations. From this district a quantity of gold and ivory is received, and in many places rubber and small quantities of cotton. Further down still, the ports of Bonny and Akassa, at the mouth of the great Niger, are depots where large hulks are anchored to receive merchandise and produce, either from or to the branch steamers that run up the great river. An enormous trade in palm oil is done up the Niger.

As one goes south, Gaboon, another French settlement, is an important point, and here and further south still rubber is taken in large quantities and shipped to Europe, where it vies in quality with the fine South American products. The Congo River is becoming very productive, and down in this part of the coast the climate is much more endurable; in fact, if you go still further south to the Portuguese settlement of St. Paul de Loanda, the country is healthier and the climate good. Lately the merchants are trying to cultivate cotton and jute, and the latter takes very kindly to the soil, and promises to rival the best qualities of the East Indies. Palm oil is not so valuable as it used to be, the low price of cottonseed oil and tallow affecting it very considerably. It is used principally in the manufacture of soap and candles.

IT takes thirty-seven specially constructed and equipped steamers to keep the submarine telegraph cables of the world in repair.

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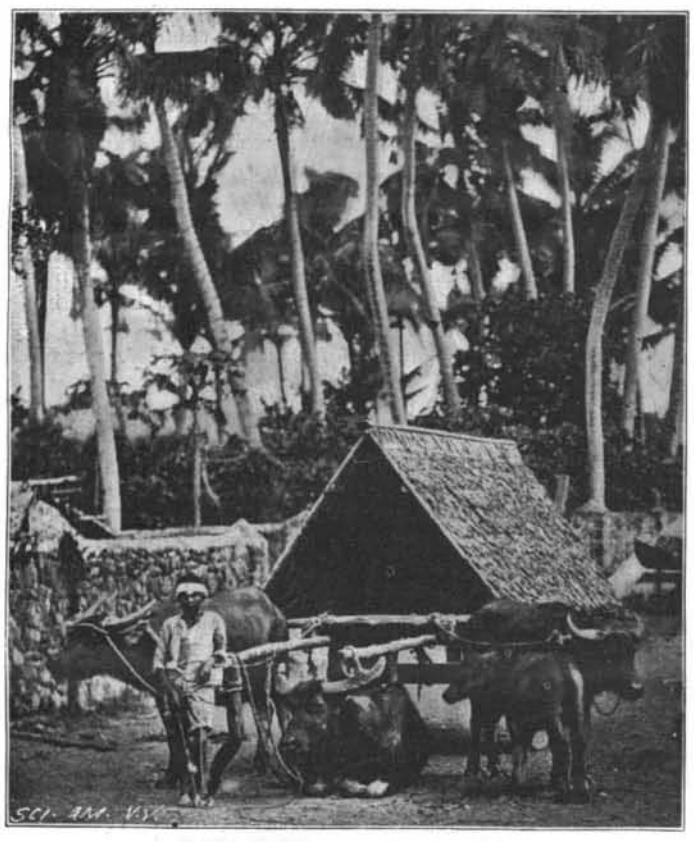
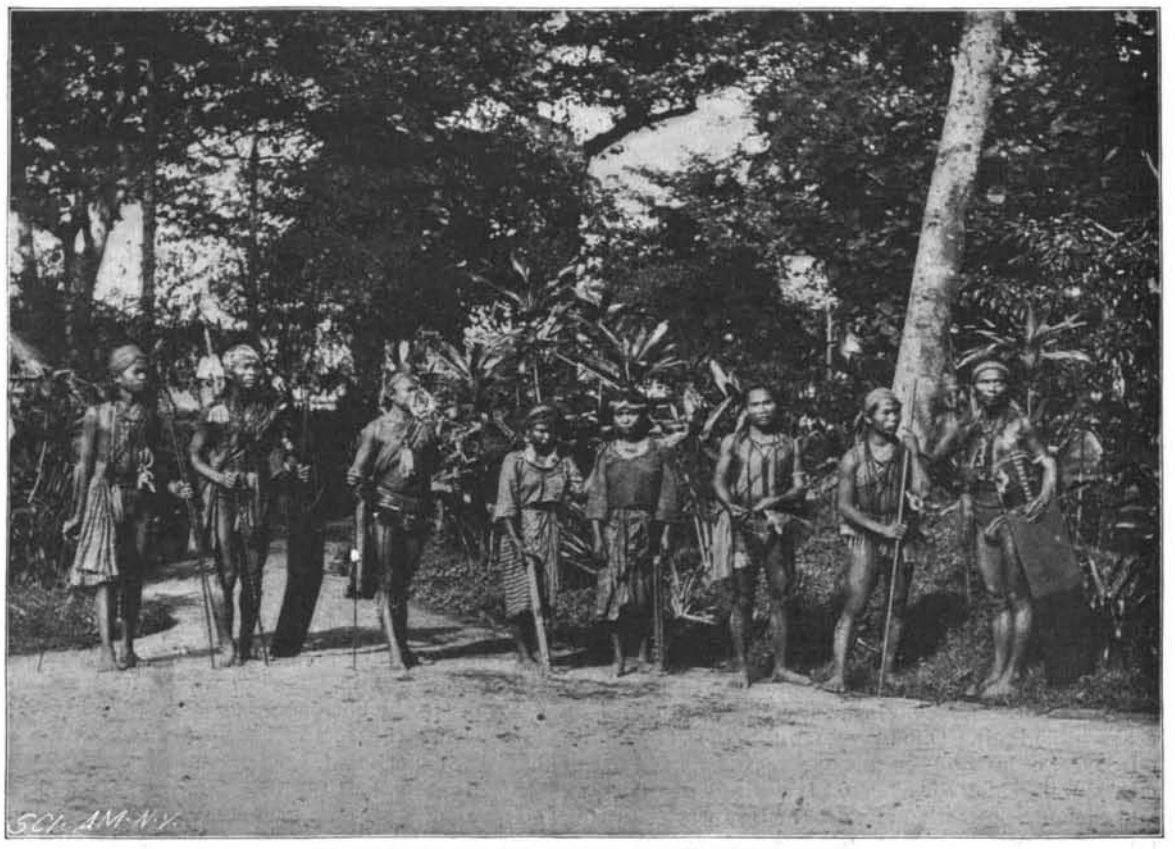
NEGRITOS OF MARIVILES SHOOTING FISH FROM AN INDIAN BOAT

NATIVES OF ABRA.



BUFFALOES AND CARTS, CEBU.



SAVAGES OF NORTH LUZON, WITH THEIR ARMS.

CATHEDRAL, MAJAYJAY, LUZON.

CIVILIZED INDIANS POUNDING AND CLEANING RICE, LUZON.

THE PHILIPPINE ISLANDS—THE SAVAGE AND CIVILIZED INDIANS AND THEIR HOME.—[See page 184.]

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