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PHILIPPINE CLAY WORK.

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THE object of this article is to state briefly what clay work has been done in the Philippine Islands, what is being done, and what may reasonably be expected in the future. Much crude pottery is made throughout the Islands. The output in 1909, consisting principally of pots for holding water and for cooking food, was estimated at ₱400,000.[1] These are made in a most primitive manner. The clay is not refined, no potter's wheels nor molds are used, no glaze is applied, and no kilns are built. The manufacture of pottery is principally a

Photograph by Bureau of Science, Manila, P. I.

Plate I. An Igorot woman of the Mountain Province beginning a pot.

household industry and is confined to localities where clay is found or where there are facilities for its transportation. Al-

[1] Philippine Pottery, by George I. Adams and Wallace E. Pratt. Philippine Journal of Science (1910), Vol. V, No. 2, p. 143, Manila, P. I.

most every province has some town or barrio noted for its production of pottery.

A common sedimentary clay is used. This is sometimes so plastic that an addition of as much as one-third sand is necessary

Photograph by Bureau of Science, Manila, P. I.

Plate II. Shaping the pot.

Photograph by Bureau of Science, Manila, P. I.

Plate III. Making the rim.

to prevent cracking. Stones and sticks are removed by hand and then the clay is thoroughly mixed by tramping. A lump of clay is placed on a small board or block that can revolve more or less easily on another beneath it. The clay is made into a

Photograph by Bureau of Science, Manila, P. I.

Plate IV. Giving the pot a smooth finish.

Photograph by Bureau of Science, Manila, P. I.

Plate V. Transporting pottery in the Mountain Province.

crude cup-shaped article and then set away till it becomes of a tough leathery consistency. This is then given a second shaping by holding a smooth stone inside and beating the pot with a wooden paddle. Sometimes to make the article more smooth the ware is painted with a fine-grained red slip (probably ochre) and then polished with a piece of a large shell. When the pots are dry they are piled on a layer of bamboo sticks and rice straw, covered with more of the same fuel, and burned in the open. The firing is completed in a few minutes. The women and the children make the pots, while the men carry them to market on their backs, on horses, or in bancas.

An interesting local industry has been established at Piddig,

Photograph by Bureau of Science, Manila, P. I.

Plate VI. Using jars to carry water, Mountain Province.

Ilocos Norte, where small clay pipes are used, mainly as cigar or cigarette holders.[2] These pipes are molded from the clay by the use of the hands and two small pointed pieces of bamboo. These pieces of bamboo have one end pointed for making the hole in the stem and cutting the design. The other end is flatter and is used for forming the bowl both inside and out. To moisten the clay as it becomes dry it is necessary for the makers to use the grease and sweat from their noses. They believe that the quality of the pipe is improved thereby.

The pipes are burned in rice straw. After they are burned

[2] The information on Piddig pipes was furnished by E. J. Murphy, Division Superintendent of Ilocos Norte.

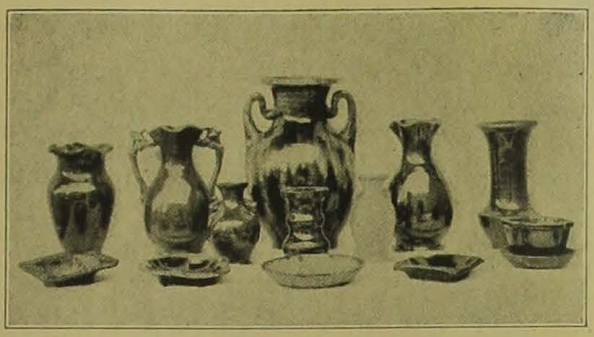

Plate VII. Vases and trays designed and modeled by first-year students.

and while still hot they are covered with a preparation of rice chaff and carabao dung. The heat of the pipes sets the mixture on fire, but as the combustion is imperfect, a deposit of carbon forms on the pipes and turns them black, giving them a glazed effect. The people know nothing, however, of real glazing.

The decoration always consists of two designs. One is called "Sinicirilo," or face of man, and the other is "Siguemguem," or hand of man. Large quantities of these pipes are used by Ilocanos. The price runs from three to ten centavos each.

There are a few factories in the Philippines and these use kilns. The Spanish introduced the dome-shaped beehive kiln, which was used to fire Spanish roofing tile so much in vogue before galvanized-iron roofing was introduced. This type of kiln is now used for firing brick. The usual type of a pottery kiln is a long semicylindrical structure introduced by the Chinese, in which are produced the large tinajas and sugar pelones. The kilns are fired with wood. The temperature attained is low, but the clay is very fusible and a semivitrified product often results. A Japanese kiln has lately been introduced. This consists of two ovens—the first for glazing and the second for firing biscuit. Four of these are now being operated—one in San Pedro Tunasan, Laguna, owned by a Japanese; one in Pagsanjan, Laguna, built by two boys who studied a year in the pottery school while it was in Laguna; another in the primary school at Lumbang, Laguna; and a fourth in the ceramic department of the Philippine School of Arts and Trades. A fifth is being built for a pottery school to be organized in Libmanan, Camarines.

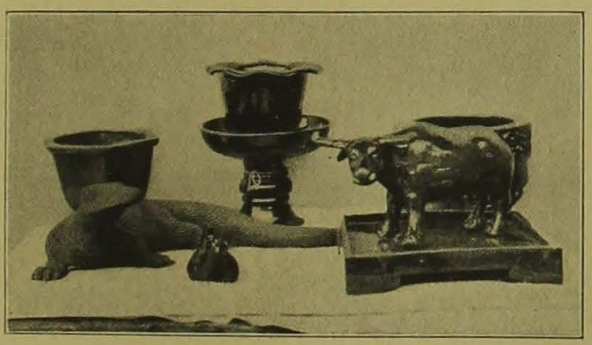

Plate VIII. Articles representing the products of modeling, pressing, and throwing.

Plate IX. Sinicirilo pipe made in Piddig, Ilocos Norte.

About 700 years ago clay work in Japan was in approximately the same stage of development as is the industry in the Philippines to-day. The Japanese obtained their knowledge from China and proceeded to develop their industry. To-day thousands are earning their living by working in factories. Pottery is also conducted as a household industry. Whole cities are devoted to the manufacture of some clay product and one sees father, mother, and children engaged in modeling, firing, glazing, and decorating. Japan is well known for its excellence in porcelain and faïence. In contrast, in the Philippines one sees crude articles made in a desultory and primitive way. With the same efforts intelligently directed, more and better articles could be produced, resulting in greater earnings and a higher development of clayworking.

The city of Seto, Japan, has a population of about 30,000. It is a center for porcelain manufacture and was the first place in Japan in which a glaze was applied to a burned clay. A "fiesta" is held every year in honor of Kato, the man who introduced the art of glazing. The kaolin, feldspar, and quartz deposits are near and there are plants for refining these. There are about one hundred kilns, each containing from three to seventeen ovens. One family may own from one-fourth of an oven to five or six ovens and produce enough every month in the home or factories to fill these ovens. The expense of firing is divided according to the amount of space occupied by each charge. Sometimes other families buy the glazed dishes, toys, etc., decorate them with color (china painting), and fire them in muffle kilns in their back yards. An old man with a doll in one hand and two brushes in the other will dash on the black for hair and eyebrows, red for cheeks and lips, and pass the doll on to his granddaughter, who will apply the other colors. Large factories often order great amounts of the unglazed ware and ship them to be glazed in their own kilns. Thus in Seto we see a city devoted entirely to clay work, with its pottery school, factories for refining materials and for manufacturing finished articles, household manufacture, and the allied work of packing and transportation.

Plate X. Siguemguem or hand-design pipe from Piddig, Ilocos Norte.

Plate XI. Piddig pipe of fern design.

This is greatly in contrast to the Philippine pottery industry, but it is possible to develop a similar stage of the industry in this country.

Throughout the Philippines there are found deposits of common clay. Much of this can be used for brick, hollow block, fire proofing, roofing tiles, vitrified brick, etc. There are deposits of fire clay and kaolin (China clay). In Paracale and in Baguio there is found the pure quartz necessary for glazes and porcelains. In Ilocos Norte there is a granulite dyke [3] which compares favorably with the Cornish stone of England. This Cornish stone or pegmatite rock is much used in glaze and porcelain composition. Thus we can find materials for terra cotta, faïence, fire-clay products, stoneware, and porcelain. As the geological investigation of the Philippines continues there will undoubtedly be discovered many other deposits of ceramic materials.

The Bureau of Education has recognized the opportunities for advancement in clay work, and in accordance with its industrial policy organized a pottery school in 1910. This school was started in Laguna Province but was later moved to Manila and became the ceramic department of the Philippine School of Arts and Trades.

The students of the woodworking course constructed the building for this department and the following equipment was made in the school: One blunger of 40 gallons capacity, a settling tank of 120 barrels capacity, one kiln 12 by 24 feet (containing two ovens), a test kiln, a frit kiln, eleven potter's wheels, kneading table, modeling table, brick-maker's table, drying racks, and a filing case for clay samples and tests. The equipment includes the following power machines: A cup machine, a saucer and plate machine, a lathe, a ball grinder, a glaze mill, and a polisher. This equipment accommodates about sixty pupils, and with it terra cotta, faïence, stoneware, porcelain, and all other classes of clay products can be made.

Plate XII. Another type of Piddig pipe.

[3] Asbestos and Manganese Deposits of Ilocos Norte with Notes on the Geology of the Region. By W. D. Smith. The Philippine Journal of Science, Vol. II, Sec. A, June 2, 1907, Manila.

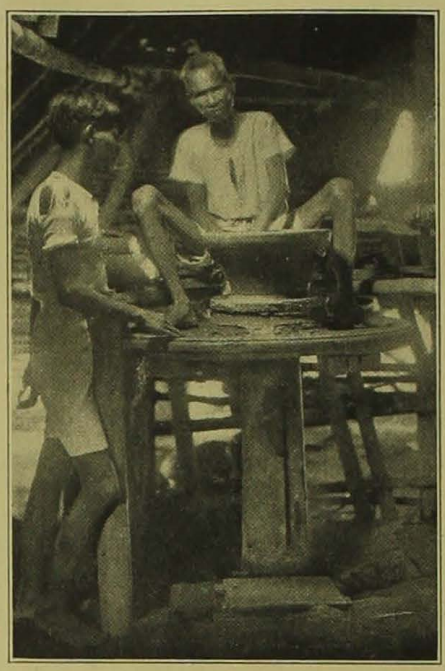

Plate XIII. Throwing a tinaja on a native wheel.

The ceramic department aims to train boys so that they will be able to equip and operate a factory. In the first year of the course the students construct the kilns and make common brick, fire brick, decorated tiles, and common glazed ware of various colors and designs.

Sixteen provinces have submitted samples of clay and on them one hundred tests have been made. Fifteen samples of grayish and white clays, commonly called "yeso," have been received. Of these eight burned a white color, six gray, one red, and two buff. White clays from Los Baños, Laguna, from Nasugbu, Batangas, and from Santa Cruz, Zambales, have been received in bulk and have been used separately, mixed together, and mixed with common clay, in each case with good results. Further experiments with the white burning clays will be made for stoneware and porcelain.

Twenty-nine clays and mixtures have been tested for vitrified brick. Of these, three warped slightly, five cracked, one swelled, fifteen showed too short a range between vitrification and viscosity, and five, with a slight variation of mixture, would apparently make a good serviceable brick.

Plate XIV. Finishing the tinaja.

The most successful experiments were those on refractory ware. Fire bricks, fire-clay tiles, and posts have been made and used in the kilns and have in every way served as well as the imported article.

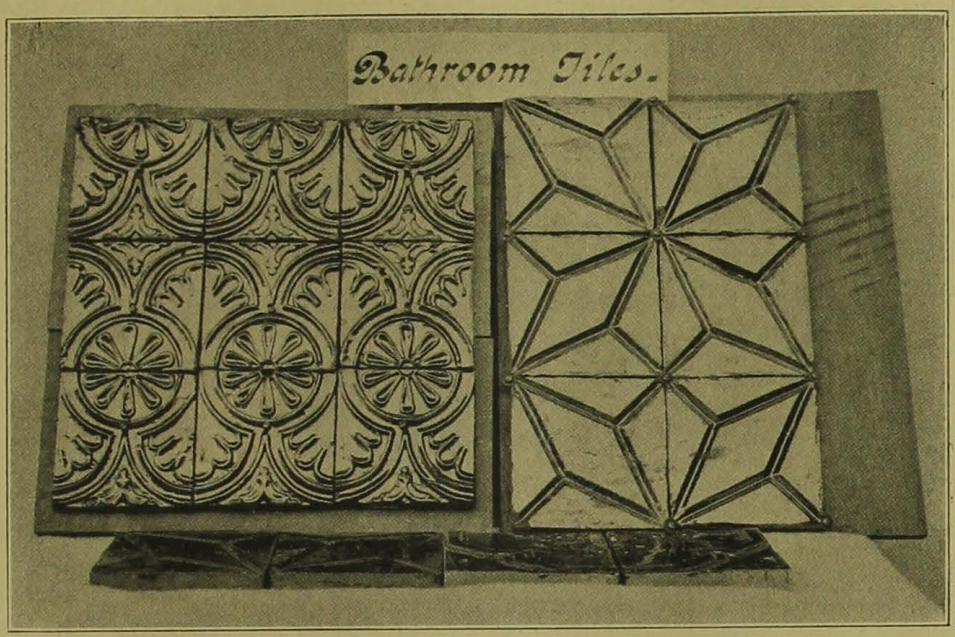

Plate XV. Bathroom tiles made by first-year students at the Philippine School of Arts and Trades.

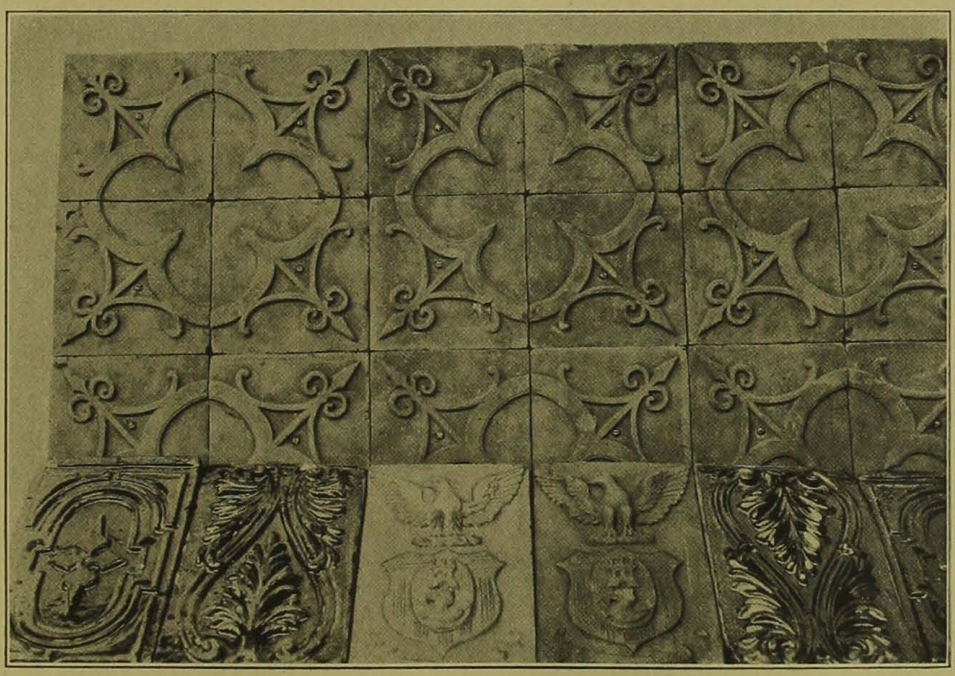

Plate XVI. Terra-cotta decorative tile, first-year work.

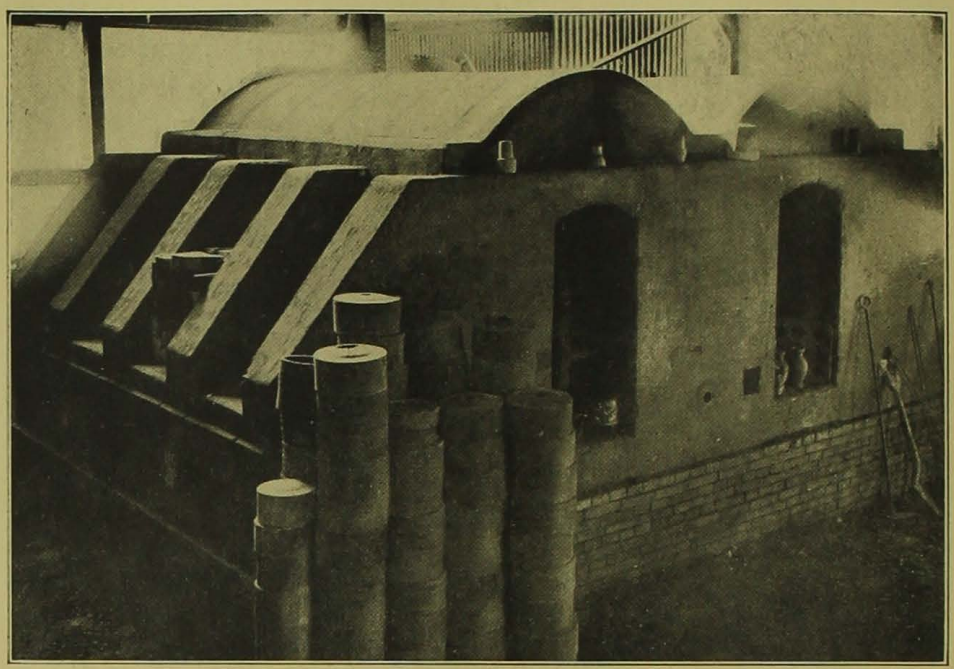

Plate XVII. Kiln built by students of the department of ceramics, Philippine School of Arts and Trades.

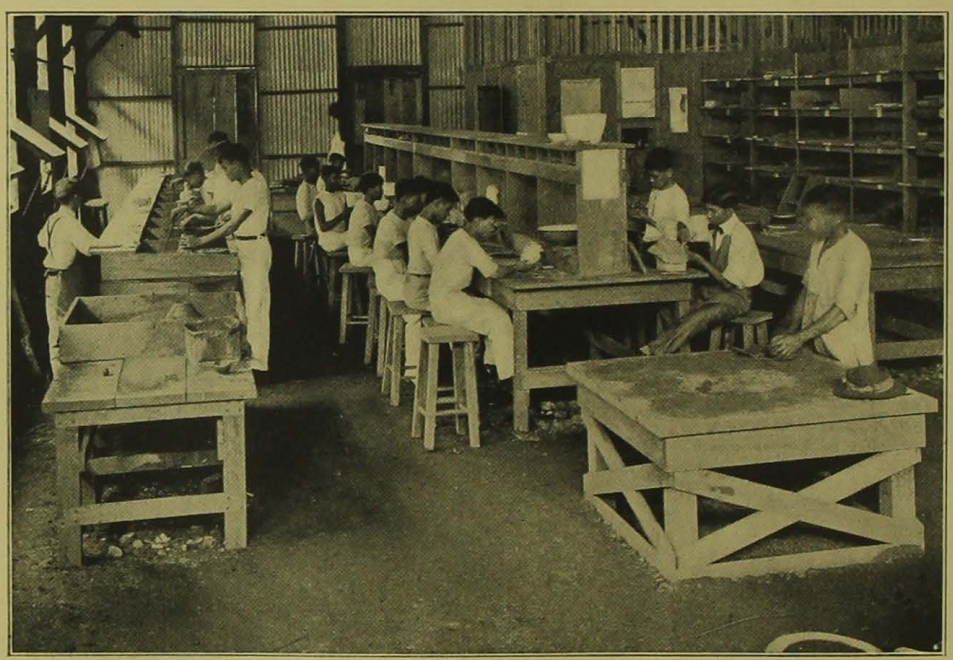

Plate XVIII. Class in ceramics at work in the Philippine School of Arts and Trades.

Practical tests are made to show shrinkage, color, hardness, warping, cracking, etc., from which the usefulness of a clay can be determined. Below are some results of these experiments.

TABLE OF PRACTICAL TESTS OF CLAYS.

Clays.	Shrinkage.		Color.		Cone.	Remarks.
	Air.	Fire.	Air.	Fire.		
	Per ct.	*Per ct.*				
Salsona, Ilocos Norte	11	1	White	White	04	
Santa Cruz, Zambales	5	3	White	White	04	
Nasugbu, Batangas	3	1	White	Grayish	6	
Los Baños, Laguna	6	8	White	White	6	
¾ Los Baños, Laguna, ¼ San Pedro Macati	10	10	Gray	Dark red	6	Well vitrified and kept their shape.
Liloan, Cebu	8	3	Brown	Dark red	6	
½ Los Baños, Laguna, ½ Zambales	4	3	White	Gray	6	Very refractory. Harder than steel. Good faïence bodies.
⅔ Zambales, ⅓ Batangas	3	4	White	Light cream	1	Harder than steel. Vitrified. Good for stoneware and porcelain.
⅔ Zambales, ⅓ Silica	7	3	White	Gray	6	

Statistics for 1911 show that in 460 cities of the United States there were laid 30,000,000 square yards of paving. Of this

Plate XIX. Terra-cotta work of second-year students at the Philippine School of Arts and Trades.

21½ per cent was vitrified paving brick and an estimate for 1912 shows this to have increased to 27½ per cent. The vitrified brick highway is smooth but not slippery, economical in maintenance, and sanitary. Judging by the unsatisfactory paving material used in Manila, it would seem that a brick plant would be a paying proposition.

The city of Manila uses a great quantity of vitrified sewer pipe. Other cities will need this as water and sewer systems are installed. Vitrified brick is also needed in connection with sewer construction. There is a ready market for these products. The material used for a vitrified clay product is shale, impure fire clay, or a common clay. All of these are found in the Philippines and a vitrified brick and pipe factory could easily be started.

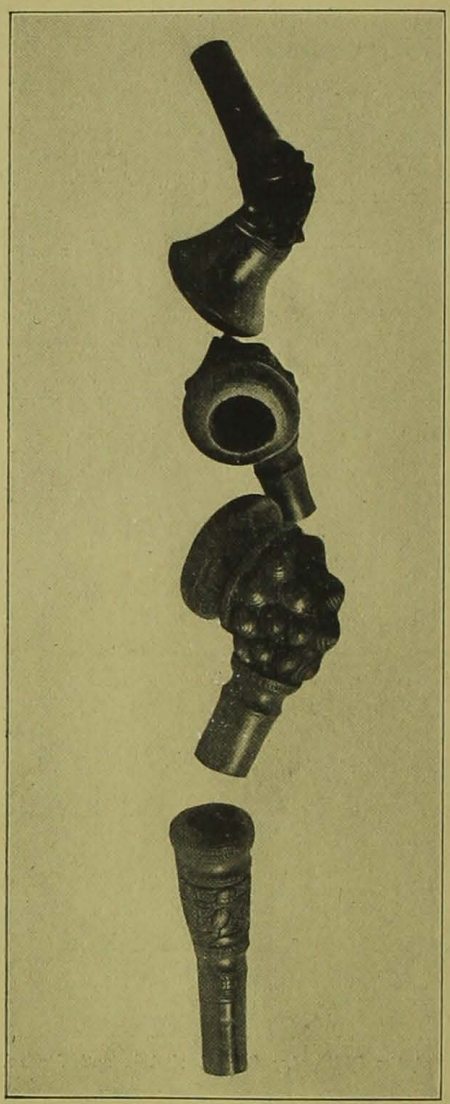

Plate XX. Pipes and stems made by the Igorots.

Every steam boiler installation of any consequence has the fire box lined with fire brick, and wherever sugar is made, fire brick is needed. Crucibles and muffles are used. Thus there is a market for refractory ware which could be made here. There is a growing demand for glazed flowerpots, vases, and other decorated clay ware for home and garden adornment. The demand is also growing for table dishes and for crockery for storing and preserving foods. In Europe much terra cotta and glazed tile are used for the decoration of concrete buildings. The United States is beginning to use more and more of these decorations. The use of a common clay and a simple method of manufacture would enable tile to be made here at low price with considerable profit. Floor tile, bathroom tile, sanitary ware, and roofing tile can be made here more cheaply than it can be imported.

The annual reports of the Insular Collector of Customs for fiscal years ending June 30, 1909, 1910, and 1911 show the following importation of clays and clay products: 1909, ₱289,944; 1910, ₱330,826; 1911, ₱442,534. These sums show the invoice price of the articles, to which must be added wharfage duties

and the merchant's profit to represent Philippine values. The greatest part of the imports is earthenware and stoneware which are made of a crude clay and do not require much skill in the manufacture.

Plate XXI. Faïence work of second-year students at the Philippine School of Arts and Trades.

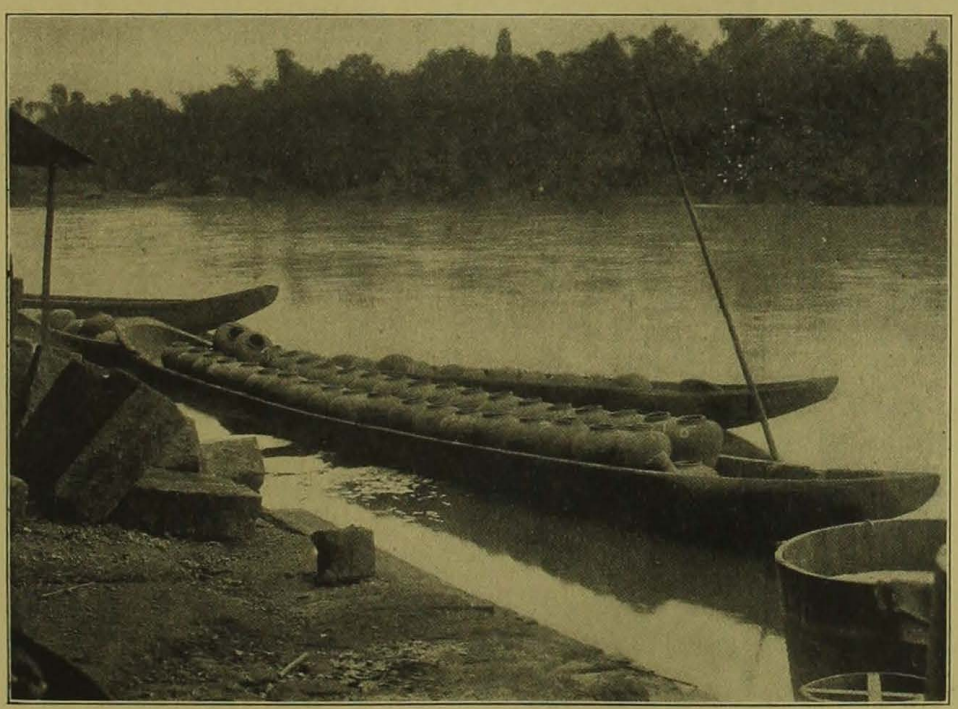

Plate XXII. Pottery transportation on the Pasig River.

It is evident that all kinds of clay products have a market here and that there are materials here for all classes of clay

work. The natural conclusion is that effort should be made to supply the demand from the material at hand. But people must first be interested and instructed in this line of work and then taught how to make a living at it. The stable industries of a country usually grow from a humble beginning. A large factory could be successful if it were organized by people having practical knowledge of the industry, of the resources of the country, and of the customs of the people. However, the ceramic department of the Philippine School of Arts and Trades aims to instruct students so that they will be able to organize and manage small factories for themselves. If a boy goes to his home and makes a success, other people will soon learn clay refining, glazing, firing, etc., and an industry will have been started.

In the following bibliography are listed the principal publications relative to Philippine pottery.

The Occurrence, Composition, and Radioactivity of Clays from Luzon. By Alvin J. Cox. Philippine Journal of Science (1907) Vol. II, A, p. 413, Manila, P. I.

Laguna Clays, Ibid., 1908, Vol. III, A, p. 377.

Philippine Pottery. By Geo. I. Adams and Wallace E. Pratt. Philippine Journal of Science, 1910, Vol. VIII, No. 3.

Elements of Ceramics (Pottery Making). Philippine Education (1911), Vol. VIII, No. 3, Manila, P. I.

Philippine Clay Work. By C. H. Crowe. Mineral Resources of the Philippines, Division of Geology and Mines (1912), Manila, P. I.

Philippine Pottery. By C. H. Crowe. Transactions of the American Ceramic Society, Vol. XIV, 1912, Columbus, Ohio.

What is the money value of an education? The average reduced to individual cases, would be something like this: Two boys, age 14, are both interested in mechanics. One goes into the shops, the other into a technical school. The boy in the shops starts at $4 a week, and by the time he is 18 he is getting $7. At that age the other boy is leaving school and starting work at $10 a week. At 20 the shop-trained young fellow is getting $9.50 and the technical graduate $15; at 22 the former's weekly wage is $11.50 and the latter's $20; and by the time they are both 25 the shopworker finds $12.75 in his pay envelope while the technically trained man draws a salary of $31. These figures are based on a study of 2,000 actual workers made by the Massachusetts Commission for Industrial and Technical Education.