Selected Passages from the Letters of Père d'Entrecolles

Being the first detailed accounts of the manufacture of Chinese porcelain to reach the Occident.

INTRODUCTION

The letters of Père Francois Xavier d'Entrecolles provide a first-hand account of the manufacture of porcelain at Jingdezhen during the first quarter of the eighteenth century. Père d'Entrecolles was a French Jesuit missionary who lived from 1664 to 1741. Two of his letters, the first written in 1712 and the second in 1722 were amongst the first accounts available in the West on Chinese porcelain.

The two letters were translated from the French and published in William Burton's *Porcelain, It's Art and Manufacture*, B.T. Batsford, London, 1906. The text of the letters used here was copied from Burton's book and placed on an Internet web-site belonging to the magazine *Ceramics Today,* with some errors in transcription. It is hoped that at least some of these have been corrected by the present editor.

Where possible, an attempt has been made to convert names from the Wade-Giles system used in the original English translation to *pinyin*. Where this has been done the pinyin name is given first followed by its Wade-Giles equivalent in square brackets, for example: Jingdezhen [Ching-tê-chên].

THE FIRST LETTER

The first letter is dated 1st September, 1712 and was addressed to Père Orry, procurer of the Chinese and Indian missions. It was written from Jaochow [Jao-chou].

From time to time I have stayed in Jingdezhen [Ching-tê-chên] to administer to the spiritual necessities of my converts, and so I have interested myself in the manufacture of this beautiful porcelain, which is so highly prized, and is sent to all parts of the world. Nothing but my curiosity could ever have prompted me

to such researches, but it appears to me that a minute description of all that concerns this kind of work might, somehow, be useful in Europe.

Besides what I myself have seen, I have learnt a great many particulars from my neophytes, several of whom work in porcelain, while others do a great trade in it. I also confirmed the truth of the information they had given me by a study of the Chinese books on the subject, so that I believe I have obtained a pretty exact knowledge of all that concerns this beautiful art, so that I can talk about it with some confidence. Among these books I examined the history of Fuliang[1] [Fou-liang], and I have read carefully, in the fourth volume, the article on porcelain.

It says in these annals that formerly the porcelain was of exquisite whiteness and free from fault, so that when the pieces were transported into other countries, they were known only as the precious jewels of Jaochow [Jao-chou]. Further on, it says the beautiful porcelain which is of such vivid whiteness or of a beautiful celestial blue, all comes from Jingdezhen [Ching-tê-chên]; there is some made in other places, but it is quite different in colour as well as in finish.

Without mentioning examples of the pottery that are made all over China, but which are not called porcelain, there are some provinces such as Fujian [Fuchien] and Guangzhou [Canton] where porcelain is made, but foreigners can make no mistake for the porcelain of Fujian [Fuchien] is white like snow without sheen, and it is not decorated with colours. Some workmen of Jingdezhen [Ching-tê-chên] formerly transported themselves and their materials there, hoping to make considerable profit by reason of the great European commerce at Xiamen [Amoy]; but this scheme came to naught, as they were not successful in their manufacture.

The reigning Emperor[2], who neglects nothing, had porcelain workers sent from Jingdezhen [Ching-tê-chên] to Beijing [Peking], together with everything proper for this kind of work; nothing was omitted that would have enabled the work done under his eyes to succeed, but it is stated that this also ended in failure. It may be that political or other interests had something to do with this want of success, but, however that may be, Jingdezhen [Ching-tê-chên] alone has the honour of sending porcelain to all parts of the world, even the Japanese buy from there.

Then follows an account of the situation and appearance of Ching-tê-chên-its population and government which is omitted here.

After these few particulars of the situation and present conditions of Jingdezhen [Ching-tê-chên], let us come to the porcelain in which its whole wealth consists. Let me state all that I know as to the materials used in its composition and their preparation; as to the kinds of porcelains and the way to make them; as to the oil[3] that gives them their brightness and their several qualities; as to the

[1] Jingdezhen was in Fuliang county.
[2] The Kangxi emperor, who reigned from 1662 to 1722.
[3] Glaze.

colours which are their ornaments, and the art of applying them; as to the firing and the precautions that are taken to give the suitable degree of heat: finally, I will conclude by making some reflections on the old and modern porcelains, and on certain shapes or designs which the Chinese find it impracticable to manufacture. These things that the Chinese cannot do might, perhaps, be easily done in Europe if one could find there the same materials.

The material of porcelain is composed of two kinds of clay, one called Petuntse [Pe-tun-tse][4] and the other Gaoling[5] [Kao-lin]. The latter is disseminated with corpuscles, which have some shimmer[6], the former is simply white and very fine to the touch. While a large number of big boats come up the river from Jaochow [Jao-chou] to Jingdezhen [Ching-tê-chên] to be loaded with porcelain, nearly as many small ones come down from *Ki-mctn* [garbled in the original] laden with Petuntse [Pe-tun-tse] and Kao-lin [Gaoling] made up into bricks, for Jingdezhen [Ching-tê-chên] does not produce any of the materials suitable for porcelain. Petuntse [Pe-tun-tse], which is so fine in grain, is simply pulverized rock taken from quarries, and then shaped into bricks. Every kind of stone is not suitable, or it would not be necessary to go for it, twenty or thirty miles away, into the next province. The good stone, the Chinese say, must have a slight tinge of green. The pieces of stone are first broken with iron hammers, and the fragments are reduced to a very fine powder in mortars by means of certain levers, which have a stone head shod with iron. These levers are worked incessantly, either by men or by water-power, in the same way as the tilt-hammers in paper-mills. The powder is then put into a great vessel filled with water, and stirred vigorously with an iron shovel. When it has been allowed to stand several minutes, a kind of cream forms at the top four or five fingers thick; this they take off and put into another vessel full of water. The mixture in the first vessel is stirred up several times, and each time they remove the scum that gathers on the top, until nothing is left but the larger particles, the weight of which makes them sink to the bottom; these are finally taken out and again pounded. With regard to the second vessel into which they put all that has been skimmed out of the first, they wait until a kind of paste has formed at the bottom, and when the water above it seems very clear it is poured off so as not to disturb the sediment. This paste is then thrown into moulds, which are a kind of large and wide wooden box, the bottom of which is a bed of bricks with an even surface. Over this brick bed a coarse cloth is stretched, up to the sides of the case; this cloth is filled with the paste, and soon afterwards they cover it with another cloth on the top of which they put a layer of bricks laid evenly, one by the side of the other. This helps to squeeze out the water more quickly without losing any of the porcelain material which, as it hardens readily, takes the shape of the bricks[7]. Before

[4] Chinese porcelain stone. Once thought to be a feldspathic rock, but now believed to be micacious in character (NH).

[5] China clay, the clay mineral *kaolinite* (NH).

[6] Possibly a reference to particles of white mica in the clay.

[7] Stephan Bushell notes that *"It is interesting to see this rudimentary filter-press being used in China nearly one hundred and fifty years before filter-presses were introduced in Staffordshire"*.

it has become quite hard the paste is divided into little bricks, which are sold by the hundred; this colour and the shape have given it the name Petuntse[8] [Pe-tun-tse]. There would be nothing to add to this preparation if the Chinese were not in the habit of adulterating their merchandise; but people who roll little grains of paste in pepper dust, and mix them with real peppercorns, are not likely to sell Petuntse [Pe-tun-tse] without mixing it with coarser materials, so that it has to be purified afresh before it is used.

Gaoling [Kao-lin] requires a little less labor than Petuntse [Pe-tun-tse]; nature has done the greater part. Mines of it are found in the heart of certain mountains, which on the outside are covered with reddish earth. These mines are fairly deep ; it is found there in masses, and it is also made up into little squares in the same method as described above for the Petuntse [Pe-tun-tse]. I should be inclined to think that the white clay of Malta, known as the clay of St. Paul, approaches in its nature to the Gaoling [Kao-lin] I am speaking of, although one cannot perceive in it the small silvery particles with which the Gaoling [Kao-lin] is sown. Fine porcelain owes its strength to the Gaoling [Kao-lin]; it is only the mixture of a soft earth or a soft clay, which gives strength to the Petuntse [Pe-tun-tse] obtained from the hardest rocks.

A rich merchant told me that the English or Dutch (the Chinese use the same name for both nations) bought, several years ago, some Petuntse [Pe-tun-tse], which they took to their own country to make porcelain with, but, having taken no Gaoling [Kao-lin], their undertaking failed, as they afterwards owned. The Chinese merchant said to me, laughing, "They wanted to have a body without bones to support its flesh".

Besides the boats laden with Petuntse [Pe-tun-tse] and Gaoling [Kao-lin] with which the riverbank at Jingdezhen [Ching-tê-chên] is lined, others are filled with a whitish liquid substance. I have long known that this substance is the oil[9] that gives porcelain its whiteness and its sheen, but I did not know its composition, which I have since learnt. It seems to me that the Chinese name *Yeou* which they apply to different kinds of oil suits the liquid I am speaking of less than the word *Tsi*, which means glaze, and I should think that people would call it by that name in Europe. This oil or glaze is extracted from the hardest stone; which is not surprising, as it is said that stones are chiefly formed out of the salts and oils of the earth, which mix and closely unite together. Although the same kind of stone from which Petuntse [Pe-tun-tse] is prepared may also be used for the preparation of this glaze, they generally select the whitest pieces and those, which have the greenest spots.

The history of Fuliang [Fou-liang], though it does not enter into details, says that the best stone for the glaze is that which has spots similar in colour to the cypress leaf[10], or with reddish marks on a brownish ground something like

[8] In Chinese *Petunse* means *little white bricks*.

[9] The word *oil* is always used for glaze by Pere d'Entrecolles. But we shall now translate it *glaze* to avoid confusion.

[10] Dr. Bushell says this refers to dendritic markings of oxide of manganese.

toadflax. The rock is first well washed, and then prepared in the same way as Petuntse [Pe-tun-tse]; when the purest stuff has all been collected out of the first vessel into the second one they add to about every hundred pounds of the cream one pound of a stone or mineral like alum, named *Shih-kao*[11]. This has to be first roasted in a fire and then pounded; it acts like rennet in coagulating the material, though care is taken to keep it liquid. This stone glaze is never used alone, but another is mixed with it which acts like its essence. The composition of this is as follows: They take big pieces of quicklime, on to which a little water is thrown by hand to reduce them to powder; a bed of dried bracken is spread upon this and then another layer of slaked lime, and so on alternately; then the ferns are set on fire. When all is consumed the ashes are spread upon new beds of dried bracken. This is repeated five or six times running; it can be done still oftener, and the glaze is all the better for it. Formerly, so it says in the history of Fuliang [Fou-liang], they used besides the bracken the wood of the tree Se-tse. I should think by the tartness of this fruit when it is not ripe, and by its little crowning husk, that it is a kind of medlar. My converts tell me that this wood is no longer used, seemingly because it has become very scarce in this district. It was perhaps owing to this wood that the porcelain made in early times is more beautiful than that which is made nowadays. The nature of the lime and the bracken contribute also to the quality of the glaze, and I have noticed that that which comes from certain places is much more esteemed than that which comes from elsewhere. When they have obtained a certain quantity of the ashes of lime and bracken, they are thrown into vessels full of water. In one hundred pounds they dissolve a pound of Shih-kao (see above). The mixture is stirred up and then left to stand until there appears on the surface a scum or crust, which is skimmed off and thrown into a second vessel, and so on several times. When a kind of paste has collected at the bottom of the second vessel they decant the water, and the liquid sediment is used as the second oil to be mixed with the previous one. For a proper mixture it is necessary that the two purees are equally thick; to ensure this they dip into each little squares of Petuntse [Pe-tun-tse], which they dip in several times, and then take out to judge if the thickness of the deposit is the same with both.

The best glazes are made from a mixture of ten parts of the stone glaze with one part of the glaze of lime and fern ashes, and the most economical never put less than three parts. The merchants who sell the glaze, however little inclined they are to cheat, do not think much of increasing its volume; they put water to the glaze, and, to disguise their fraud, they add Shih-kao in proportion to thicken the liquid.

Before I explain the way in which this glaze is used it will be better to describe how the porcelain is made. In the less frequented districts of Jingdezhen [Ching-tê-chên] are vast sheds surrounded by walls, where one sees ranged, stage upon stage; a great number of jars of earth. Within these walls live and work an infinite number of workpeople, who each have their allotted task, and a piece

[11] Said to be gypsum or sulphate of lime.

of porcelain, before it is ready to go into the oven, passes through the hands of twenty persons, and that without any confusion. Doubtless they have proved that the work is done much more quickly in this way. The first task consists in purifying again the Petuntse [Pe-tun-tse] and the Gaoling [Kao-lin] from the waste added to it when it was sold, which is performed by the same washing and settling as before described. It is not necessary to break up the pieces of Gaoling [Kao-lin]; these are simply put into a very open basket, which is placed in a vessel filled with water, where the Gaoling [Kao-lin] easily liquefies of itself, though there is generally a residue left which must be thrown away. By the end of a year this waste accumulates, and forms big masses of a white spongy sand, which the workmen must clear out from their workshops.

When the two materials have been prepared in this way they must be mixed in their proper proportions. For the fine porcelains they put as much Gaoling [Kao-lin] as Petuntse [Pe-tun-tse]; for the inferior ones they use four parts of Gaoling [Kao-lin] and six parts of Petuntse [Pe-tun-tse]; while the least that they use is one part of Gaoling [Kao-lin] and three of Petuntse [Pe-tun-tse].

The mixture is thrown into a big pit well paved and cemented, where it is trodden and kneaded until it becomes stiff; this is very laborious work; those Christians who are employed at it find it difficult to attend church; they are only allowed to go if they can find substitutes, because as soon as this work is interrupted all the other workmen are stopped.

From the mass thus prepared, lumps are taken and spread on large slates. The workmen knead, beat, and roll them thoroughly, taking care that no hollows are left inside the mass and that no foreign bodies get into it. A hair, a grain of sand would spoil the whole work. If this mass is badly worked the porcelain cracks, splits, drops or bends. From these prime materials such beautiful works of porcelain are produced, some by shaping on the wheel, others only in moulds; and they are afterwards finished with a knife. All the plain pieces are made in the first way. A cup, for example, when it leaves the wheel, is very roughly shaped, almost like the top of a hat before it has been blocked. The first workman only gives it the required diameter and height, and it leaves his hands almost as soon as it is commenced, for he receives only three deniers per board, and on each board are twenty-six pieces. The foot of the cup is then nothing but a piece of clay of the necessary width, and it is only hollowed out with a knife when the other operations are finished, and when the cup is dry and firm enough. When the cup leaves the wheel it is taken by a second workman, who puts it straight upon its base. Shortly afterwards it is handed over to a third man, who puts it on its mould and gives it its shape; this mould is mounted on a kind of wheel. A fourth workman trims and polishes the cup, especially the rims, with a knife, and pares it down as much as necessary for its transparency; he scrapes it several times and moistens each time, however little he may have pared it, if it is too dry, for fear he should break it. In taking the cup from the mould they turn it softly on the same mould without pressing it more on one side than the other, otherwise it would develop cavities in the clay or it would go out of shape. It is surprising to see the rapidity with which these vessels pass

through so many different hands; and I am told that a piece of fired porcelain has passed through the hands of seventy workmen. I can easily believe this by what I have myself seen, for these great workshops have been for me a kind of *Areopagus*, where I have preached Him who fashioned the first man out of clay, and from whose hands we depart to become vessels of honour or of shame.

The large objects of porcelain are made in two pieces; one half is lifted on the wheel by three or four men, who support it on each side while it is being shaped; the other half, which is almost dry, is put on to it, and they join the two together with the same porcelain materials diluted with water, which serves as a sort of mortar or glue. When these pieces, so glued, are quite dry the seam or join is polished inside and outside with a tool, so that, with the help of the glaze, no inequality is left. In this way, too[12], they put handles, ears, and other pieces on to vases. This relates chiefly to the pieces that are made in moulds or by hand, such as fluted pieces, or those of bizarre shape; animals, grotesques, idols, the busts ordered by Europeans, and such-like things. This kind of moulded piece is made in three or four parts, which are joined together and finished by the use of tools, by which means they are polished, carved, or hollowed and perfected in details that the mould does not give. As for flowers and other ornaments, which are not in relief, but in intaglio, they are impressed in the porcelain by seals or stamps; reliefs, ready prepared, are also applied in the same way, almost as gold lace is put on a coat.

I have recently learnt something concerning these moulds. When they obtain a model of any required piece of porcelain, which is such that it cannot be made by hand on the wheel, they impress on the model some moulding-clay, and when this has been properly impressed it is cut up into pieces of pretty large size, which are left to stiffen. When the moulds are to be used the sections are put in front of the fire, after which they are coated with the porcelain material according to the thickness required. They press this coating firmly by hand, and then the mould with the coating is put for a moment in front of the fire, to detach the clay press from the mould. The various sections of the whole piece, after being separately moulded, are joined together with a thick slip of the porcelain materials. I have seen animal figures of large size made in this way, and after they had left the substance to get hard it was shaped and finished with a tool and the separate parts were then united together. Afterwards pieces are glazed and fired. If it is desired to have a decoration of different colours this is afterwards painted and the gold is applied, and then it is fired a second time. This kind of porcelain, which is made with great care, is of course very dear...

Then follows a paragraph relating to the kind of clay from which the moulds are made, and to the advantage a merchant has in the rapidity with which he can execute European orders if he possesses a good stock of moulds, so that he can employ many gangs of workmen at the same time.

It is time to ennoble the porcelain by passing it over into the hands of the

[12] That is by the use of 'slip'.

painters[13]. These porcelain painters are not less poor and wretched than the other workmen, which is not very surprising when we remember that in Europe they would only pass for apprentices of a few months' standing. All the science of these painters, and of Chinese painters in general, is based on no principles, and only consists in a certain routine helped by a limited turn of imagination. They know nothing of the beautiful rules of this art; though it must be acknowledged that they paint flowers, animals, and landscapes which are much admired, on porcelain as well as on fans and lanterns of the finest gauze. The painting is distributed in the same workshop among a great number of workmen. One workman does nothing but draw the first colour line beneath the rims of the pieces; another traces flowers, which a third one paints; this man is painting water and mountains, and that one either birds or other animals. Human figures are generally treated the worst. Certain landscapes and plans of towns that are brought over from Europe to China will hardly allow us, however, to mock at the Chinese for the manner in which they represent themselves in their paintings.

As for the porcelain colours, they are of every kind. In Europe people hardly see anything else but a vivid blue on a white ground, though I believe that our merchants have also imported some of the other kinds[14]. There are some pieces the ground of which is like that of our polished metal mirrors; others are wholly red, and among these some have the red in the glaze, while others are of a *soufflé* red[15], and are sprinkled with little dots almost like our miniatures. When these two kinds of work are successfully produced, which is rather difficult, they are highly prized and extremely dear.

Finally there are porcelain pieces where the landscapes with which they are painted are formed of nearly all the different colours, enhanced by the brilliance of gilding. These are very beautiful when no expense is spared, but the ordinary porcelain of this kind is not to be compared with that painted in blue alone. It says in the annals of Jingdezhen [Ching-tê-chên] that formerly the people only used white porcelain; apparently they had not found in the neighborhood of Jaochow [Jao-chou] a blue equal to that which comes from a great distance and which is very dear.

It is said that a porcelain merchant, having been wrecked on a desert coast, found there more riches than he had lost. While he was roaming about the shore, and his servants were making a small vessel out of the remains of his ship, he perceived that stones fit to make the most beautiful blue were quite common there. He took with him a big load, and they say that such beautiful blue had never been seen at Jingdezhen [Ching-tê-chên]. Later on the Chinese merchant tried in vain to find the coast where chance had once sent him[16].

[13] *Hua p'i*: literally 'painters on the unfired clay'.

[14] A further proof of the predominance of blue-and-white pieces among the porcelains first imported into Europe in large quantities.

[15] *Soufflé* glazes or colour-effects are those obtained by blowing the pigment through a gauze, generally on to the fired glaze.

[16] Is this some legendary Chinese account of the imported Mohammedan blue of the fifteenth century?

The blue is made in the following way: It is buried in the gravel that lies half a foot deep on the bed of the porcelain furnace, where it is roasted for twenty-four hours; then it is reduced to an impalpable powder in the same way as other colours, not on a marble slab, but in a large porcelain mortar, the bottom of which is left unglazed, as is also the head of the pestle which is used for pounding.

The red is made from copperas[17], and as it may be that the Chinese have something special in it, I will report their method. They put a pound of copperas into a crucible, which is well luted to a second crucible used as a cover, in which they make a small hole, which is covered so that it can be easily uncovered if needed. The whole is surrounded by a large charcoal fire, and in order to have more heat reverberated upon it they put bricks all round about it. As long as the smoke that rises (from the hole in the top crucible) is very black the material is not yet ready, but it is finished as soon as a kind of thin fine cloud appears. Then they take some of the stuff, mix it with water, and make an experiment by rubbing it on a piece of fir wood. If it produces a beautiful red they take away the charcoal fire and partially cover the crucible. When this has cooled down a small cake of the red colour is found at the bottom of the crucible, but the finest red is that which is stuck to the inside of the covering crucible. One pound of copperas makes four ounces of the red colour.

Although porcelain is naturally white, and the glaze adds to its whiteness, there are certain decorations for which they use a special white on the porcelain that is painted in different colours. This white is made from the powder of a transparent rock, which is calcined in the oven in the same way as the azure blue[18]. To half an ounce of this powder they put an ounce of white lead. This powder also is used in the preparation of other colours; for example, to make a green they take half an ounce of the powder of this pebble, and they add one ounce of white lead and three ounces of the very purest scoriae[19] of copper.

The prepared green becomes the matrix of the violet colour, which is obtained by adding a dose of white. The preparation of the green is varied according to the tint of violet they wish to produce.

A yellow colour is made by taking seven drachms of white prepared as above, to which they add three drachms of the red colour made from copperas.

All these colours, put on to the porcelain that is already fired after having been glazed, appear green, violet, yellow, or red only after the second firing. The Chinese books say that these colours can only be applied with white lead, saltpeter, and copperas. The Christians who are employed in this work have only spoken to me of white lead, which is mixed with the colour diluted with

[17] In the second letter Father d'Entrecolles corrects this statement. The red was in fact made using copper. Copperas, or green vitriol, is a form of ferrous sulphate.

[18] Dr. Bushell suggests that this transparent white pebble is native white arsenic. It must be pointed out that the accounts given in the first letter of the preparation of colours are very imperfect, they are largely corrected in the second letter (q.v.).

[19] The refuse of a smelted metal or ore; slag.

gum-water. The red of which I have been speaking, with the ordinary porcelain glaze, and another glaze made from white pebbles, are prepared in the same way as the ordinary glazes. I have not been able to learn the quantity either of one or the other; neither how much red is mixed with this glaze; but experiments will reveal the secrets. They then put the porcelain to dry, and fire it in the ordinary oven. If after the firing the red comes out pure and brilliant without blemishes, they have obtained the perfection of the art. These porcelain pieces have no resonance when they are struck[20]. The other kind of red, known as *soufflé* red, is made thus: the colour having been prepared, they take a tube, one end of which is covered with very fine gauze; they softly apply the bottom of the tube to the colour; the gauze being filled with colour, they blow into the tube, and the porcelain is covered all over with little red spots. This kind of porcelain is rarer and dearer than the other, because it is more difficult to make if they must observe the necessary precautions. The black porcelain has also its value and its beauty; this black contains lead, and is not unlike our polished metal mirrors. When this is gilded it is still more charming. The black colour is given to the porcelain when it is dry, and for this purpose they mix three ounces of blue with seven ounces of ordinary glaze[21]. Experiments will tell you exactly how to make this mixture according to the required shade. When the colour is dry they fire the porcelain, and afterwards they paint the gold upon it and fire it again in a special furnace.

Another kind of porcelain that is made here I have not seen before. It is all perforated like cut paper work, while inside it is a cup for holding a liquid. The cup is in one piece with the perforated envelope. I have seen other porcelains on which Chinese and Tartar ladies were painted in natural colours. The drapery, the complexion, and the features were all exquisite, so that from a distance one might have thought they were pieces of enamel.

It may be remarked that when they use on their porcelains the glaze made from white pebbles, the ware becomes a special kind which they call *Tsoui-ki*. This is all marbled and cracked with an infinity of veins, so that from a distance one might think it was shattered into a thousand fragments without falling to pieces, so that it resembles a piece of mosaic work. The colour which is given by this glaze is a somewhat ashen white. If the piece of porcelain has been painted in blue and this glaze is used upon it, it appears likewise cracked and marbled when the colour is dry.

When they wish to apply gold they beat it and grind it in water in a porcelain dish until they see underneath the water a little golden cloud. This they leave to dry, and in use they mix it with a sufficiency of gum-water, and with thirty parts of gold they incorporate three parts of white lead, and put it on the porcelain in the same way as the colours.

Finally there is a kind of porcelain made as follows: they give it the ordinary

[20] This is the famous *Sang-de-Boeuf* glaze which the Chinese regarded as such a precious secret, that Pere d'Entrecolles never obtained accurate information about it.

[21] Another piece of partial information which is corrected in the second letter.

glaze and fire it, then they paint it with different colours and fire it again; sometimes the painting is reserved intentionally until after the first fire, and sometimes they use this method to hide defects in the porcelain pieces by painting colours on the defective places and firing them a second time. This porcelain, though it is over-coloured, is, however, liked by many people. It often happens that one feels unevennesses on porcelain of this kind, which may be due to the want of skill of the workman, or it may be that it was necessary to give shadows to the painting, or that it was intended to cover the defects of the porcelain body. When the painting is dry, as well as the gilding, if there is any, they pile the porcelain pieces into the kiln, putting the small ones into the big ones. The kilns for firing the goods may be made of iron if they are small, but generally they are of clay. The one I saw was as high as a man and nearly as wide as our biggest wine cask; it was made in several pieces, and from the same materials as the porcelain saggars, the separate pieces being a foot high and a foot and a half long, though they were only a finger's breadth thick. Before they were fired they had been rounded into the proper shape; they were put one over another and well cemented. The bottom of the kiln was raised half a foot from the ground. It was put on rows of thick but not very big bricks, while round the kiln was a wall of well-baked bricks, which had at the bottom three or four holes like the hollows of a fireplace. This brick wall left an empty space of about half a foot, with the exception of three or four places which were filled up so as to make ribs for the kiln. I believe they erect the kiln and its enclosure at the same time, otherwise the kiln would have no support. They fill the kiln with the porcelain pieces that are to be fired a second time, putting them in piles, the smaller pieces into the bigger ones, as I have said. When all is ready they cover the top of the kiln with pieces of pottery like those used for the sides ; these pieces, which cross one another, are closely united together by a clay mortar. Only in the middle do they leave a hole through which they can see when the porcelain is sufficiently fired. They light a quantity of charcoal under the kiln as well as on the top, and they put pieces into the space between the brick enclosure and the kiln, the hole on the top of the kiln being covered with a piece of broken pitcher. When the fire has become bright they look from time to time through this hole, and when the porcelain seems shiny and the colours are bright and glossy they pull out the fire and afterwards the porcelain.

An idea comes into my mind about these colours which are used on porcelain pieces that have already been fired, and are rendered glossy by means of white lead, to which, according to the annals of Fuliang [Fou-liang] they formerly added saltpeter and copperas. If one were to use white lead with the colours that glass quarries are painted with, and if, afterwards, one were to give them a second firing, should we not recover the secret formerly possessed of painting upon glass without losing anything of its transparency? One might try by an experiment. This secret which we have lost makes me recall another secret that the Chinese regret they possess no longer. They once knew the art of painting on the sides of porcelain pieces fishes or other animals that could only be seen when the piece was filled with some liquid. They call this kind of porcelain

"azure put in the press", because of the position in which the blue colour is placed. I will give an account of what they have retained of this secret, in the hope that Europeans may be able to contrive what the Chinese no longer know. For this method the porcelain must be very thin; when it was dry they put the colour rather plentifully, not on the outside of the piece as is their usual custom, but on the inside. They generally painted fishes, as if they were more suitable to be revealed when the cup was filled with water. When the colour had dried, they put a thin layer of dilute slip upon it. This layer pressed the blue between the two sheets of clay. When the layer was dry they put glaze inside the porcelain piece, and some time afterwards they put it on the mould on the wheel. As it had been thickened from the inside they pared it down on the outside without going as far as the colour, and after that they dipped the outside of the porcelain piece in the glaze, and, all being dry, it was fired in the ordinary way. This was exceedingly delicate work, and required skill that apparently the Chinese no longer possess. From time to time they try to recover the art of this magical painting, but in vain. One of them assured me a little while ago that he had made fresh trials, and that he had been nearly successful.

Be that as it may, it is possible to say that even now a beautiful blue colour reappears on porcelain after having been lost for some time. When the colour is first painted it is of a pale black; when it is dry and the glaze has been put upon it, it disappears entirely, and the porcelain seems quite white, the colour being buried under the glaze; but the fire makes it appear in all its beauty, almost in the same way as the natural heat of the sun makes the most beautiful butterflies, with all their tints, come out of their eggs. I will add a circumstance that I must not forget, viz., that before the porcelain is glazed they polish it, and remove the slightest irregularities. For this purpose they use a brush made of very small feathers; the brush being slightly dipped into the water and passed over the piece with a very light touch. Great skill is required in putting the glaze on to the porcelain so that it is not too thick, and that it is evenly spread over the piece. For porcelain pieces that are very thin and light, they apply two slight coats of glaze. If the coats of glaze are too thick the thin sides of the vessel cannot support them, and will instantly sink out of shape. These two layers are equal to one ordinary layer of glaze such as is put on the thicker pieces. The first coating is put on by sprinkling, the other by immersion. The cup is held in the hand from outside, sloping over the vessel that contains the glaze, and with the other hand they pour inside as much glaze as is needed to wet it everywhere. This is done to a great many cups, and when the first ones are dry inside, the glaze is put on the outside as follows: the workman puts one hand into the cup, and, supporting it with a little stick under the middle of its foot, he dips it into the vessel filled with glaze, and quickly draws it out again.

I have before remarked that the foot of the porcelain piece was left solid; in fact, only after it has been glazed and is dry do they put it on the wheel to hollow out the foot. After that they paint on it a little ring, and often a Chinese letter, and when this painting is dry they glaze the part that has just been excavated, and that is the last thing they do to it before it is taken to the firing.

I have been surprised to see how a man can balance on his shoulders two long and narrow planks on which the porcelain pieces are carried, and that he goes like that through several well-populated streets without breaking his ware. It is true that the people carefully avoid knocking against him, however slightly, because they would be obliged to pay for the damage they had caused, but it is astonishing that the carrier himself controls his steps and all the movements of his body so well that he does not lose his balance.

Where the furnaces are we find another scene. In a kind of vestibule before the furnace one sees piles of boxes and cases made of clay[22] prepared for holding the porcelain. Each vase of porcelain, however small it may be, has its case ; the pieces that have covers as well as those that have none-these covers are only slightly attached to the bottom part during the firing, so that they easily come apart by a little blow. The small porcelain pieces, like tea- and chocolate-cups, are placed a good many in one case. In this operation the workman imitates Nature, who to ripen the fruit and bring it to perfection, puts it into a case so that the heat of the sun gets at it little by little, and its action inside is not too much interfered with by the air that comes from outside during the fresh nights.

These cases are lined inside with a kind of sand-down, for they are covered with Gaoling [Kao-lin] dust as this sand does not stick too much to the foot of the piece that is put on it. The bed of sand is first pressed and given the shape of the bottom of the porcelain piece, which does not itself touch the sides of its case. The top of the case has no lid; a second case, after the shape of the first and similarly filled with porcelain, comes on it, so that it covers it completely without touching the porcelain underneath. In this way they fill the kiln with big cases all containing porcelain. Thanks to these thick veils the beauty, and, if I may say so, the complexion of the porcelain piece is not sunburnt by the heat of the fire.

With regard to the small pieces of porcelain which are enclosed in the big round cases, each one is put on a saucer of clay about as thick as two crown pieces, and as wide as the foot of the piece itself; Gaoling [Kao-lin] dust is also strewn over these supports. When the cases are a little too wide, they do not put porcelain pieces into the middle, because these would be too remote from the sides, so that they might fail in strength and open and sink, and thus cause damage to the whole pile. It is well to know that these cases are one-third of a foot in height, and that they are partly filled before they have been fired at all. Those that have been fired previously and are still serviceable are filled entirely.

I must not forget the manner in which the pieces of porcelain are placed in these cases. The workman does not touch the pieces directly with his hands as he might break them, for nothing is more fragile. He takes them off the planks by means of a little cord. This cord is attached to a two-pronged wooden fork which he holds with one hand, while with the other he holds the two ends of the string that are crossed or opened according to the size of the piece; the cord

[22] Saggars.

is passed round the piece, which is then gently lifted and placed in the case or on its little saucer. All this is done with incredible quickness.

I have already said that the bottom of the furnace is filled with gravel to the depth of half a foot. This gravel serves to steady the piles of cases, which in the middle of the furnace rise to a height of at least seven feet. The two bottom cases of each pile are left empty, because they would be insufficiently fired, and also because the gravel bed partly covers them. In the same way the case which is placed on the top of the pile is left empty. The piles in the middle of the furnace are filled with the finest porcelain ; at the far end they place those pieces that are less fine, and near the mouth they place those that are very strong, which are composed of equal parts of Gaoling [Kao-lin] and Petuntse [Pe-tun-tse], and which have been glazed with a stone that is somewhat black or reddish, because this class has more substance in it than the other. The piles of cases are placed close together, and are united by pieces of clay put between them, at the top, at the bottom, and in the middle, but so that a free passage is left for the flame to penetrate everywhere evenly[23].

Every kind of clay is not equally suitable for making the cases; here they have three kinds; a common yellow clay which predominates in quantity, a hard clay, and a very unctuous clay. The last two kinds of clay are mined in the winter in very deep mines, where it is impossible to work in the summer.

Before the cases are fired they are yellowish; after the firing they are of a very dark red. For the sake of economy the yellow clay is largely used, and that is why the cases only stand two or three firings, after which they break completely. If they are only slightly cracked or split, an osier ring is used to hold them together; the ring burns away, but the case can be used this time without the porcelain being injured. They have to take care not to fill an oven entirely with new cases; at least half of them must have been fired before. These are placed at the top and the bottom of the piles, while in the middle they place those that are newly made. It is stated in the history of Fuliang [Fou-liang] that the cases were formerly fired alone before they were used for firing porcelain; no doubt in those days they thought less of the expense and more of a perfect piece of work.

Here an account of the construction of the Chinese porcelain furnace has been omitted.

On the top of the furnace there are three little peep-holes, covered with some broken pieces of pot, and they relieve the air and smoke of the oven. The workmen judge the progress of the firing by uncovering the peep-hole which is nearest to the chimney, and with some irons they uncover one of the cases. They judge that the porcelain is finished by the brightness inside the oven and

[23] The porcelain oven or furnace described by Pere d'Entrecolles is that which is used in China to this day; it is practically a deep horizontal reverberatory furnace; a similar kiln has even been used in Europe, especially in Germany, but has almost entirely been abandoned for many years now on account of the uneven way in which such kilns fire.

especially how the colours shine in their brilliance[24]. Then they leave off the firing and close up the furnace for some time. The furnace is fired as follows: they first heat it for a day and a night, then two men, who relieve each other, keep on putting in wood, of which they burn as much as 180 loads. It is stated in the annals that formerly they used 240 loads of wood, and twenty more if the weather was rather rainy, although at that time the ovens were only half as large as at present. They first kept up a small fire for seven days and nights, and on the eighth day they made a very fierce fire. It will clearly be seen, therefore, that the old porcelains must have had more substance than the modern ones. Formerly they observed one thing that is neglected nowadays. When the firing was finished they did not open the furnace for ten days for the big porcelain pieces, and for five days for the small ones. At the present time they wait, it is true, a few days before they open the furnace and take out the big pieces, for without this precaution they would crack, but the small pieces are taken out the following morning if the fire has been put out at the beginning of the previous night. When the porcelain is burning hot the workman who pulls it out can only touch it by protecting his hands with the ends of a long scarf which hangs round his neck. I have been surprised to hear that, after having burned in one day as much as 180 loads of wood, there were no ashes left in the fireplace the next morning.

After all I have said no one can be astonished that porcelain is so dear in Europe, and still less so when they hear that, besides the great profits of the European and Chinese merchants, the whole oven-full is hardly ever successful. Sometimes it is quite lost, and when they open the furnace they find the porcelain pieces and the cases reduced to a mass as hard as rock. Neither is it easy to regulate the fire, for the state of the weather instantly changes the action of the fire, the quality of the material it acts upon, and that of the wood which keeps it going. For one workman who gets rich there are a hundred others who ruin themselves, though they still try their fortunes further in the hope that they may save enough to become shopkeepers. Moreover, the porcelain that is sent to Europe is made after new models that are often eccentric and difficult to reproduce; for the least defect they are refused by the merchants, and so they remain in the hands of the potters, who cannot sell them to the Chinese, for they do not like such pieces.

I have said that the difficulty of making certain models sent from Europe is one of the reasons why the pieces are so costly. It is almost impossible for the Chinese to make some of the shapes sent to them from foreign countries, although they make many things at which foreigners are astonished, or that they would consider impossible. For instance, I have seen a large porcelain lantern made in a single piece, through which a candle lit up the whole room; this piece was ordered seven or eight years ago by the heir-apparent.

The same Prince ordered also different musical instruments, amongst others a

[24] By this he must mean the colours of the glazes, or of the underglaze colours, for no others are fired in these furnaces.

kind of little organ called *tseng*, which is about a foot high and contains about fourteen pipes, the melody of which is agreeable enough; but every attempt to make this failed. They were more fortunate in making flutes and flageolets, and another instrument, called *Yun-lo*, which is composed of a set of little round, somewhat concave, plates, each of which gives a particular note. Nine of these are hung in a frame in different rows and played upon with small sticks like the dulcimer; they ring like little bells and are used to accompany other instruments or the voices of singers. They had, so they tell me, to make many experiments to find out the thickness required and the correct firing needed to produce all the tones and get all the notes that are necessary for a chord. I had thought they must have the secret of inserting a little metal in the body of these porcelain pieces to vary the note, but they have undeceived me. Metal is so ill-adapted to combine thin slabs with a space between, joining them together only by cross-bars. These slabs have two holes pierced at either end, so that they may be inserted in some cabinet work or upon the back of a chair, where they look very effective.

The history of Jingdezhen [Ching-tê-chên] speaks of different pieces, ordered by the Emperors, that the potters have tried in vain to make. The father of the reigning Emperor ordered some boxes, three and a half feet long and two and a half feet high, and the bottom was to be half a foot thick and the sides a third of a foot. They worked at these pieces for three consecutive years, and made nearly two hundred examples, not one of which was successful. The same Emperor ordered some slabs for the front of an open gallery; each slab was to be three feet high and two and a half feet wide, and half a foot thick. All these, said the old people of Jingdezhen [Ching-tê-chên] cannot be done, and the Mandarins of this province presented a petition to the Emperor supplicating him to stop this work.

The Mandarins, knowing how great is the genius of Europeans in inventions, have often asked me to procure from Europe new and curious designs so that they might present something unique to the Emperor. On the other hand, the Christians beg me very strongly not to procure such models, because the Mandarins cannot be so easily convinced as our merchants when the workmen tell them that something is impracticable, and often the bastinado is liberally administered before the Mandarin will abandon a scheme that he thinks may be of profit to him.

As each profession has its particular idol, and as Divinity is conferred here as easily as the rank of count or marquis in some European countries, it is not surprising that they have a god of porcelain. Pousa [Pou-sa] (the name of this idol) owes its origin to those designs which the workmen find it impossible to execute. They tell us that formerly the Emperor decreed positively that some porcelain pieces should he made after a pattern which he gave. He was told several times that it was impossible, but all these remonstrances only served to excite his desire. His officers redoubled their demands, and used all kinds of severities to the workpeople. These unfortunates spent all their money and tried their utmost, but they received only beatings in return. At last one of them, in

a moment of despair, threw himself into the burning furnace and was consumed in an instant. The porcelain in that furnace, so they say, came out perfectly beautiful and to the satisfaction of the Emperor, who asked for nothing more. From that time the unfortunate man was regarded as a hero, and became in consequence the idol that watches over the workers in porcelain. I do not know whether his elevation has tempted any other Chinese to follow the same route with a view to a similar honour.

As porcelain has been so highly esteemed for many centuries, one would wish to know how the porcelain of the earliest times differs from that of our own days, and what the Chinese themselves think about it. There is no doubt that China has her antiquaries who greatly favour old things. The Chinaman himself is naturally prone to respect ancient productions, though one finds those who defend modern work; but porcelain is not like ancient medals, which reveal the science of bygone times. Ancient porcelain may be decorated with Chinese characters, but these do not denote any historical period, so that the curious can only prefer them for something in the style and the colours. I think I have heard it said, when I was in Europe, that porcelain to be perfect must have been buried for a long time in the ground. This is a false opinion which the Chinese ridicule. The history of Jingdezhen [Ching-tê-chên], speaking of the most beautiful porcelains of earlier times, says that it was so much sought after that the furnace was hardly opened before the merchants were disputing for the first choice. It cannot be supposed from that that it had been buried. It is true that in digging in the ruins of old buildings and especially in cleaning out old, disused wells, beautiful pieces of porcelain are sometimes found which have been hidden there in times of revolution. This porcelain is beautiful because at such times people would only think of hiding what was precious, that they might recover it when the troubles were over. If it is esteemed now it is not because it has acquired any fresh beauty in the heart of the earth, but because its old beauty has been preserved, and this alone is prized in China, where they give large sums for the smallest utensils of the common pottery that was used by the Emperors Yao and Shun, who reigned several centuries before the Tang [T'ang] dynasty, during which porcelain began to be used by the Emperors. All that the porcelain acquires in growing old in the earth is a slight change in its colourings or, if you prefer, in its tint, which shows that it is old. The same thing happens to marble or ivory, but more readily, because the glaze prevents the moisture penetrating so easily into porcelain. I can say this, that I have found in old ruins porcelain pieces that were probably very old, but I have not noticed anything special about them. If it is true that in growing older they become more perfect, they could not have been like the porcelain made nowadays when they left the hands of their makers. What I believe is, that formerly, as at the present time, there was porcelain of all prices.

The Mandarin of Jingdezhen [Ching-tê-chên], who honours me with his friendship, makes his patrons at the Court presents of old porcelain that he has the talent of making himself. I mean that he has found the art of imitating old porcelain, or at least that of a moderate antiquity; he employs at this work a

number of workpeople. The materials of these false antiques[25] is a yellow clay found in a place near to Jingdezhen [Ching-tê-chên] called *Ma-an-shan* (Saddle-back Hill). The pieces are very thick, for a plate that the Mandarin has given me weighs as much as ten ordinary ones. There is nothing special in the workmanship of these pieces, only that they are given a glaze made from a yellow stone which is mixed with the ordinary glaze, the latter predominating; this mixture gives the porcelain a sea-green colour. These false antiques also resemble genuine pieces in that they do not ring when struck and make no humming noise when held close to the ear. After it has been fired it is boiled for some time in a very fat broth, and after that it is placed in the foulest sewer, where they leave it for a month or more. When it comes out of this sewer it passes for being three or four centuries old, or at least of the preceding dynasty of the Ming, when porcelain pieces of this colour and thickness were highly esteemed at Court.

They have brought me from the debris of a large shop a small plate that I value more highly than the finest porcelain pieces made a thousand years ago. On the bottom of this plate is painted a crucifix between the Holy Virgin and St. John; I am told that formerly they used to export such pieces to Japan, but that none of them have been made for sixteen or seventeen years. Apparently the Christians of Japan made use of this industry, during their persecution, to procure images of our sacred mysteries; this porcelain piece, mixed in the case with the rest, might have escaped the search of the enemies of our religion. These pious artifices must have been discovered in the course of time and rendered of no avail by a stricter search, and that is no doubt the reason why they have ceased to make this kind of ware at Jingdezhen [Ching-tê-chên].

The letter concludes with some general remarks which need not be given here, but we cannot refrain from quoting the final sentences.

Jingdezhen [Ching-tê-chên] owes to the liberality of M. le Marquis de Bruise a church which has a numerous congregation, increasing considerably every year. May God pour His benedictions more and more over these fresh faithful: I recommend them to your prayers. If they were helped by some assistance to increase the number of catechists the people of China would be enabled to learn that not only the luxury and cupidity of Europeans make them send their money as far as Jingdezhen [Ching-tê-chên], but that there are zealous persons who have nobler intentions than those who bring from there such fragile jewels.

THE SECOND LETTER

The second letter is dated from Jingdezhen [Ching-tê-chên] itself, on the 25th of January, 1722, and we translate its essentials.

[25] The *false antiques* referred to here are probably copies of Longquan celadon wares.

However much trouble I have taken in informing myself as to the way in which the Chinese make porcelain, I am far from thinking that I have entirely exhausted the subject. You will see by the new observations I send you that fresh researches have given me fresh knowledge. These observations I will unfold to you without any order, just as I have put them down on paper as I have had opportunity, either in going through the workshops and instructing myself with my own eyes, or by asking different questions of the Christians who are occupied in the manufacture.

1. As gold on porcelain wears away from time to time and loses much of its lustre, it may be restored by moistening the porcelain with clear water, and then rubbing the gilding with an agate, though one must be careful to rub always in the same direction, say from right to left.

2. The edges of porcelain pieces are especially subject to chip off; the Chinese strengthen them so as to obviate this inconvenience by mixing with the glaze some bamboo charcoal. They edge the porcelain pieces with this mixture when they are already dry, putting them on a wheel for the purpose; afterwards they put the glaze on the edge as well as on the rest of the piece, and after firing the edges are just as white. As Europeans have no bamboo, I think they might use in its place willow-charcoal, or still better that of elder, which somewhat approaches bamboo. It must be noted that before the bamboo is reduced to charcoal, the green skin is removed, because they say that the ashes of this skin makes the porcelain pieces burst in the oven. It should also be noted that the workmen must be careful not to touch the porcelain with greasy or oily hands; the place that had been touched would crack infallibly in the firing.

3. Speaking of the colours, I mentioned that there are red ones that are blown *(soufflé)* and I have explained how to make this colour, but I do not remember having said that there are blue *soufflé* pieces, which are easier to make. No doubt people will have seen some of these pieces in Europe. Our workpeople agree that if expense were no object, it would be possible to blow gold or silver on to the porcelain, such as those that have a black or blue ground, so as to produce a decoration of gold and silver rain. This kind of porcelain, which would be in a new style, would surely please people.

Glaze can be blown in the same way as the red colour. A little while ago they made for the Emperor pieces that were so thin and fine that they had to put them on cotton wool, because they had no other means of handling the pieces without great risk of breaking them. It was not possible to dip these pieces into the glaze, so the glaze was blown on, and the pieces entirely coated in this way.

I have noticed that, in blowing the blue colour, the workpeople are careful to lose as little as possible of the colour. They take the precaution to place the vase on a pedestal, and under the pedestal they put a large piece of paper, which can be used for some time. When the colour that falls on the paper is dry it is gathered together with a little brush, so that nothing is lost.

4. They have recently found a fresh material fit to be used in the composition of porcelain; it is a stone or a species of chalk, which is called *Hua-Shih*, which

the Chinese doctors also use to make a draught, which they say is detergent, aperient, and cooling. The men who work in porcelain have thought of using this stone in the place of the Kaoling [Kao-lin] spoken of in my last letter. It may be that some place in Europe may be found which supplies this stone *Hua-Shih*, even if there is no Kaoling [Kao-lin]. It is called by this name because it is somewhat glutinous, and in a way like soap[26]. Porcelain made with *Hua-Shih* is rare, and is much dearer than the other. It has an extremely fine grain, and with regard to the work of the brush, if it be compared with ordinary porcelain, it is like vellum compared with ordinary paper. Moreover, this porcelain is so light as to surprise one who has been accustomed to handle other porcelains; it is also much more fragile than the commoner kind, and it is difficult to seize the proper moment of its firing. Some do not use *Hua-Shih* to make the body, but content themselves with making a kind of thin glue with it, into which they dip the porcelain when it is dry, so that it is coated with a layer of this material before it receives the colour or the glaze, and in this way they obtain a certain degree of beauty. When the *Hua-Shih* is mined it is first washed with water to clear away the yellowish clay with which it is coated, and it is then prepared in the same way as Kaoling [Kao-lin]. I am assured that porcelain can be made of these substances alone without any addition, but one of my converts, who has made this porcelain, tells me that he mixed eight parts of *Hua-Shih* with two parts of Petuntse [Pe-tun-tse]. I have also been told that if they were to put more, than two parts of Petintse [Pe-tun-tse] and eight parts of *Hua-Shih*, the porcelain would sink in the fire because it would not be firm enough. It is five times the price of Gaoling [Kao-lin], so that this kind of porcelain must be dearer than the common kind. They can also trace designs with this material, using it as a slip to paint upon the porcelain pieces, and when the painting is dry the pieces are glazed. After firing, the designs are of a whiteness different to that of the porcelain itself; it seems like a thin vapour spread over the surface. The white of this *Hua-Shih* is known as ivory white[27].

5. Designs are also painted on porcelain with *Shih-kao*; as well as with *Hua-Shih*, which gives another cast to it; but the *Shih-kao* has this peculiarity, that before it is prepared it has to be roasted in the oven, and after that it is treated in the same way as *Hua-Shih* or Gaoling [Kao-lin]. This *Shih-kao* cannot be used to make the body of porcelain, and up to now they have only found the material *Hua-Shih* that can take the place of Gaoling [Kao-lin], and give firmness to the porcelain.

6. I have not spoken of a kind of glaze called *Tauchin*, that is, burnished-gold glaze. I should be more inclined to call it bronze, coffee-coloured or dead-leaf coloured glaze. This glaze is a new invention. To make it they take common yellow clay and give it the same treatment as Petuntse [Pe-tun-tse], and then

[26] It is pretty clear from this where so many of the English potters of the eighteenth century, at Bristol, Liverpool, Worcester, and elsewhere, got the idea of using soap-stone.

[27] The latest opinion is that the mineral used by the Chinese potters under the name of Hua-Shih is not soapstone at all, but an impure Gaoling [Kao-lin] containing a large proportion of white mica.

they use it in a liquid state like ordinary glaze. This fluid yellow clay is first mixed with powdered Petuntse [Pe-tun-tse] and some of the ashes of lime and fern. The proportions of these ingredients are varied according as they intend the colour to be darker or lighter. They tried to make a mixture of gold-leaf with glaze and powdered flint, which they applied in the same way as the red glaze, but this experiment was unsuccessful, and they have found that the burnished-gold glaze just mentioned is more elegant and more brilliant. There was a time when they made cups that had a golden glaze outside, with the purest white glaze inside; since then they have adopted another method, and on the cup or vase that they intend to glaze with this burnished-gold glaze, they attach to the vases in one or two places, shaped pieces of moistened paper, and after the brown coating is applied, the paper is taken off and the reserved white panels are painted with a design in red or blue colour. When the piece is dry it is coated with the ordinary glaze, either by being blown or by any other method. Sometimes these spaces are left with a blue or black ground on which designs in gold are applied after the first firing, but in this style one can imagine many different combinations.

7. They have shown me this year for the first time a kind of porcelain that is now in vogue, which is olive-green in colour, and to which they give the name *Longquan* [Lung Ch'uan]. I have seen some that were called *Ch'ing-kuo*, the name of a fruit very like our olives. This colour is obtained by mixing seven cups of the above-mentioned *Tzu-chin* glaze with four cups of stone glaze, and two cups, or thereabouts, of lime and fern-ash glaze with one cup of powdered flint; all these being mixed in the slip state. The addition of the flint slip produces little veins in the porcelain. When this is applied by itself the porcelain is very fragile, and does not sound when it is struck, but when it is mixed with the other glaze the porcelain, although covered with a network of veins, is no more fragile than usual.

8. The shining black or mirror-black glaze is obtained by dipping the porcelain in a fluid mixture composed of the prepared blue colour. It is not necessary to employ for this purpose the finest blue, but it must be used to considerable strength, and mixed with the glaze used for the burnished-gold glaze as well as with the ordinary glaze. This mixture is a glaze in itself, and in firing the ware they take care to place it in the middle of the oven, and not near the vault where the firing is most active.

9. I was mistaken when I said in my previous letter that the red glaze called *Yu-li-hung* was made with the red colour from copperas, such as is used for painting red colour on the fired white glaze. This red glaze is made from granulated red copper, and the powder of a certain stone or flint that is a little reddish in colour, pounded together in a mortar, and mixed with a boy's urine and with the ordinary white glaze. I have not been able to learn the preparation of these ingredients, and those who know this secret are very careful not to divulge it. The mixture is applied to porcelain that has not been fired, and no other glaze is necessary, but they have to be careful during the firing that the red colour does not run to the bottom of the vase. I am assured that for this red glaze

they use no Petuntse [Pe-tun-tse] in the porcelain paste, but they employ with the Gaoling [Kao-lin] a yellow clay prepared in the same manner as Petuntse [Pe-tun-tse]. It is likely that such a clay is more suitable for developing this particular colour.

Then follows an account of the preparation of the granulated copper, which is of purely technical interest. The worthy father also tells us that the Chinese at this time were unacquainted with aqua-fortis or aqua-regia, and he adds with the utmost naiveté, "their inventions are all extremely simple".

10. They have executed this year designs of a kind which they assured me were impracticable. These are vases three feet or more in height with a lid, which is a pyramid, rising a foot higher. These vases were made in three pieces, joined together with so much skill and neatness that they form one whole without showing the seams. In showing them to me they stated that out of eighty specimens they had made eight only successfully; all the others being lost. These were ordered by merchants from Guangzhou [Canton] who trade with Europeans, for in China they do not desire such expensive porcelains.

11. They have brought me one piece of porcelain called *Yao-pien* or 'transmutation'. This transmutation takes place in the furnace, and is caused either by excess or lack of heat, or by some other obscure causes which are not easily guessed at. This piece, though the workmen tell me it is the result of mere chance, and is a failure in manufacture, is not less beautiful nor less highly prized. It was the intention to make vases in *soufflé* red, and a hundred pieces were entirely spoiled ; the piece that I am speaking of came out of the oven like a piece of agate[28]. By incurring the necessary risk and expense of various experiments, it might be possible to discover the art of making with certainty what has once been the result of chance. The brilliant mirror-black glaze is an instance of this, where what was once the caprice of the oven has been converted into a successful manufacture.

12. When they want to use an extremely white glaze they mix only one cupful of the glaze of the fern ashes with thirteen cupfuls of the stone glaze. This glaze is a very strong one, and cannot be used with underglaze blue colour, for the colour would not show through it when it was fired. The porcelain to which this strong glaze has been given may be exposed without any fear to the greatest heat of the oven. Pieces altogether white are fired in this way, or for subsequent decoration with gilding, or for colours that are fired another time; but if they want to paint the porcelain in blue or any other underglaze colours, then they mix with one cupful of the ashes of lime and bracken only seven cupfuls of the stone glaze. It should be observed that when the glaze contains a good deal of the ashes of lime and bracken, the porcelain must be fired in a temperate part of the oven; that is to say, either after the first three rows of cases or about a foot or a foot and a half from the bottom; for if they were fired higher up in the oven the glaze ashes would melt rapidly and flow down on the porcelain.

[28] Such an occurrence as this may have furnished the starting point of the porcelains made in imitation of agate and other stones some twenty years after the date of this letter.

The same thing follows with the red glaze, on account of the granulated copper which enters into its composition, while on the contrary the crackled glaze can be fired higher up in the oven.

13. There is something to correct in what I said in the previous letter about the colours fired on the finished glaze. *The worthy father then gives an account of the Chinese weights, which need not be translated.* I spoke in a previous letter about the on-glaze red made from copperas or Tsao-fan. The red powder is mixed with five times its weight of white lead, and the mixture sifted together. The mixture after being sifted is incorporated with water thickened with a little ox-glue, something like isinglass. They make a white colour by using the most transparent pebbles they have calcined in a porcelain crucible buried in the gravel at the bottom of the oven, and afterwards reducing it to an impalpable powder[29]. To make the white colour they mix thirty-three parts of this white powder with 100 parts of white lead, and apply it with plain water. A dark. green colour is made by mixing together one hundred parts of white lead, thirty-three parts of powdered flint, and eight parts of copper scales, the scum which forms on the surface of copper when it is melted, and this scum has to be carefully ground and washed to remove from it any granulated copper that is mixed with it. A yellow is made from a mixture of one hundred parts of white lead, thirty-three parts of powdered flint, eighteen parts of pure oxide of iron, or of the pure red made from copperas ; though another workman tells me that he uses twenty-five parts of primitive red. A dark blue colour with a tinge of violet is made by mixing one hundred parts of white lead, thirty-three parts of powdered flint, and [unreadable] parts of azure blue, though I am told by another workman that it requires [unreadable] parts of this azure blue. A very clear green called water-green is made by mixing one part of the dark green colour with two parts of the white colour, while a mixture of two parts of dark green and one part of yellow produces a yellowish green which resembles a slightly faded leaf. To make a black pigment they dilute the azure blue largely with water and mix it with a little gelatin. When this colour is painted on it looks black, and the black parts are covered with white, which incorporates with the black during the second fire, just as the glaze is incorporated with the underglaze blue in common porcelains.

There is another colour called *Tsiu* from which they make a deep violet colour. There is some found in Guangzhou [Canton], and some comes from Beijing [Peking], but the latter is much the best. Like the other colours just described this is used only on the porcelain which is re-fired.

Pere d'Entrecolles then describes how the porcelain painters prepare this 'Tsiu'. He was informed that it was a natural mineral, but the whole account shows that it was simply a blue glass, which was ground, washed, and prepared for porcelain painting.

[29] Dr. Bushell points out that this most transparent powder used for the white is probably native white arsenic.The primitive red appears to be a fine oxide of iron, probably a pounded hematite.

14. To gild or silver porcelains they put one part of white lead to ten parts of finely-ground leaf-gold or silver. When silver is used on the brown glaze it has a beautiful sheen. If some pieces are painted in gold and others in silver, the silvered porcelain must not stay so long in the little furnace as the gilded, otherwise the silver will disappear before the gold has reached the point of heat required to give it its proper brightness.

15. There is a cheaper kind of coloured porcelain made here, and it may be that some of the information I am about to give may be of some use to the makers of faience, if they are unable to make Chinese porcelain to perfection. For this kind of work it is not necessary that the materials should be so fine. Cups are used which have already been fired in the porcelain oven without glaze, and which are, of course, quite white. If these are wished to be in one colour they are dipped in the simple colour, but if they are to be in many colours, the colours are applied with a big brush. No other preparation is used for these colours, except that sometimes, after they have been fired, a little vermilion is put upon certain parts, as for example on the beaks of birds; but this colour would disappear if it were fired in the ovens, and so it lasts but a little time. These pieces are re-fired in the large furnace along with the other porcelains that have not been fired, but they are placed in the coolest parts of the oven, where the fire is not so active, because an intense heat would destroy the colours. For this kind of porcelain the colours are prepared as follows: the green is made of oxide of copper, saltpetre, and powdered flint; the commonest azure blue material, similarly mixed with saltpetre and powdered flint, forms the violet colour; the yellow is made by mixing one part of copperas-red with ten parts of powdered flint, and ten parts of white lead; and the white colour by a mixture of four parts of powdered flint to ten parts of white lead. All these ingredients are mixed together with water, and that is all I have been able to learn about the colours of this kind of porcelain, as none of my converts are employed in this business.

16. I said in my previous letter that when the painted porcelains were put into the kiln for the second firing, that the smaller ones were placed into the larger, and that they were arranged like that in the kiln. To this I must now add that they have to be careful that the porcelain pieces do not touch one another in places where they have been painted, or the pieces would be spoiled. The work people arrange the pieces in the following way: they fill the bottom of the kiln with the porcelain pieces, and then they cover these with lids made of the same clay from which the sides of the kiln are made, or even with pieces of broken saggar, for in China everything is made use of; on this cover they lay another range of these porcelain pieces, and so on up to the top of the kiln.

17. I was not very well informed when I said in my first letter that they recognised that the painted or gilt porcelains are sufficiently fired when they see the gold and colours shine out in all their brightness. I have since learnt that the colours only reveal themselves after the refired porcelain pieces have had time to cool. They judge that these pieces are sufficiently fired when, looking through the top hole they see that all the pieces are red down to the bottom,

and, through the fire that surrounds them, they can distinguish one form from another. Likewise when the painted porcelains have lost the unevenness where the colour has been piled on, and the colours have sunk well into the glaze.

With regard to the porcelains that are fired in the big ovens, they judge that the firing is perfect (1) when the flame that comes out from the top is no longer red, but is white; (2) when looking through the holes they see that the saggers are quite red; (3) after having opened one of the top saggers and taken out a piece of porcelain they find when it is cool that the glaze and colours are as they should be; and finally (4) when in looking through the top of the oven they see the gravel at the bottom is all glittering. It is by these signs that the workman judges if the porcelain pieces are fired to perfection.

18. When they wish to cover a vase entirely with blue, they use the blue mineral prepared and diluted in water to the right consistency, and then they dip the vase into it. For the powder-blue they use the most beautiful azure prepared in the way that I have already explained. This is blown on the vase, and when it is dry they cover it with the ordinary glaze, or with glaze mixed with powdered flint if they want the glaze to be crackled. Certain workpeople trace figures on this azure-blue with the point of a long pin. The pin makes as many little dots in the dry azure as is necessary to represent the figure, and after that the glaze is applied. When such a piece is fired the design seems to be performed in the style of a miniature.

19. The pieces on which one sees embossed flowers, dragons and such-like things, are not so difficult to manufacture as one might think. The designs are first traced with a graver on the body of the vase, and then the ground about it is cut away so as to form the relief, and afterwards the piece is glazed.

20. When I spoke in my first letter of the way in which the azure colour is prepared, I omitted to give three particulars, which are worthy of attention. First, before it is buried in the gravel on the bed of the oven, where it is to be roasted, it is well washed to remove the clay that adheres to it. Second, it must be put into a well-luted porcelain crucible. Third, when it is roasted it is broken up, sifted, and put into a glazed vessel; boiling water is then poured over it and well stirred. The scum that floats on the top is removed, and the powder is washed as much as may be necessary. The washed paste is then thrown into a mortar, where it is ground for a considerable time. They have assured me that the azure is found in coal-mines or in the red clay, which occurs in the neighbourhood of these coal-mines. Sometimes fragments are found on the surface of the earth, and that is a sure sign that more may be obtained by digging. It occurs in small pieces not bigger than the large finger, but flat and not rounded. The ordinary mineral is fairly common, but the fine kinds are very rare, and it is not easy to distinguish them by their appearance. They can only be proved by experience. If good azure-blue or enamel-blue could be supplied by Europe, a valuable trade might be done with Jingdezhen [Ching-tê-chên] in very little bulk, and they would exchange for it their most beautiful porcelains.

21. They have attempted to make black designs on porcelain vases with the

finest Chinese ink, but this attempt has been unsuccessful, for when the porcelain is fired it turns out quite white. Doubtless the particles of this black have not enough substance, so that they are dispersed by the action of fire, or they have not the power of penetrating the layer of glaze so as to produce a difference.

I finish these remarks by recommending to your prayers the Church of Jingdezhen [Ching-tê-chên], which contains a great number of workers in porcelain.